



Exploring citizen support and willingness to pay for climate adaptation policies in water management

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Exploring citizen support and willingness to pay for climate adaptation policies in water management

The case of the Limburg Water Board, the Netherlands

MSc Thesis in Environmental Economics and Natural Resources (ENR)
MSc Environmental Sciences
Wageningen University & Research

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April 2021

ENR-80436

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Cover picture: Consortium Grensmaas BV. (n.d.)



Abstract

Citizen support for climate policies is regarded as a critical issue when developing climate policies. While there is a growing body of research on the factors that influence citizen support, the majority of these studies focus on climate mitigation policies rather than adaptation. This study examines citizen support for climate adaptation policies in water management and also investigates whether framing has an effect on the willingness to pay for adaptation measures. The data was obtained via a survey by sampling citizens of the province of Limburg (n = 219). The aim of this study is threefold, (1) to gain insight into individual characteristics for climate policy support for adaptation measures, (2) explore the effect of framing on the willingness to pay for adaptation measures, and (3) the results of this study will be used to make recommendation to policy makers. The results show that the set of variables used in this study can account for 24% of an individual's motivation for their support for adaptation measures. Several factors linked to citizen support have been identified through regression analysis, including risk perception, trust, age, income and having children. The analysis shows that older citizens, wealthier citizens and people with children are generally more supportive of adaptation policies. People who perceive risks from the negative effects of climate change and people that trust the government/ Limburg Water Board are more likely to support adaptation policies. To answer the second aim of this study, local framing (neighborhood), distant framing (province of Limburg) and cheap talk were used to explore if framing could influence the willingness to pay for adaptation measures. It appears that the willingness to pay does not differ between people who have received local or distant framing. Although this study provides important information on the factors motivating the support for climate adaptation policies, it should be considered as a starting point for understanding the topic. This research forms the base for further exploring individual characteristics of support for adaptation measures in water management in the Netherlands.

Keywords: climate adaptation policy; water management; citizen support; attitudes-behavior-context; framing.

Acknowledgements

This master thesis brings an end to a significant chapter in my life as I complete my master's degree in Environmental Sciences at Wageningen University and Research. It was a long and difficult period, but also a fantastic learning experience.

First and foremost, I want to thank my supervisor Andries Richter for his guidance and supervision throughout the entire process. Writing this thesis was not always easy, I am grateful for the guidance and valuable feedback of Andries during this period. Next, I want to thank Vince van't Hoff who allowed me to use his email list with respondents in this study, without which I would never have had so many respondents. Further I would like to thank Joyce Copier, who helped me to understand how to process my data in SPSS and also provided critical feedback on my thesis helping me with my writing.

Lastly, I would like to thank my friends and family. Especially my teams buddy Marijn Wever, who was there for me every day on teams during the third lockdown from February until April. After a few months of writing my thesis, I had to take a break in which I completed my internship at Arcadis together with Marijn. After the internship, we kept in touch every day which helped me with the home stretch.

Sanne van Asselt, April 2021

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1. Introduction

“No element is as intrinsic to the Dutch cultural identity as water. A look at maps of the Netherlands spread over the centuries is enough to realize how defining water is for this delta. When a storm surge hits, the Dutch watch anxiously to see whether the rivers are going to overflow their banks again. They handle water ingeniously and with great know-how when they want to control, repel or guide it.” (Metz & Van den Heuvel, 2012, p. 4).

1.1. Background

Over the last century the weather in the Netherlands has changed due to global warming, causing dryer summers, more precipitation in the winters, and overall, more extreme weather (KNMI, n.d.-a). From 1910 to 2009 the mean precipitation per year increased with 25 percent (East and South regions of the Netherlands) up to 30-35 percent (West and North regions) (Buishand, Brandsma, De Martino & Spreeuw, 2011). According to the Koninklijk Nederlands Meteorologisch Instituut (KNMI) extreme weather will occur more frequently in the future due to global warming (KNMI, n.d.).

Using several techniques and data sources, the researchers at KNMI are creating climate change scenarios which predict the Dutch precipitation, temperature, wind, potential evaporation and more for 2050 (van den Hurk et al., 2006). In 2015, KNMI combined with hydrologists from the Deltares research institute (Klijn et al.), examined the effects of climate change on the rivers Rhine and Maas. KNMI and Deltares predicted the mean peak flow rates and water level of the Maas and Rhine. In the worst case scenario, the peak discharge of the Maas (3900 m³/s) will increase with almost 20% in 2050 (4300m³/s) and 25% in 2085 (4450 m³/s) (Klijn et al., 2015).

Dutch residents who live in polders along rivers don't worry much about floods (Baan & Klijn, 2004). It appears that disaster awareness is highest during and immediately after a flood has occurred, but this awareness fades quickly once the danger has passed (Baan & Klijn, 2004). The low level of perceived disaster awareness among the Dutch citizens can be attributed to the excellent water management of the Dutch. The Netherlands counts 21 water boards which are in charge of managing the waterways in their own area and need to ensure that the Netherlands is ready for the extreme weather caused by climate change. The water boards are regional governmental bodies who manage all water related subjects from flood prevention measures to sewage treatments. Dutch citizens pay yearly-set water board taxes which are responsible for 96,9% of the waterboard income (Waterschap, Limburg 2019a).

1.2. Problem description

Climate change is regarded as a major political concern by the vast majority of Dutch people, who want their government to engage in efforts to tackle it (Hagen, Middel & Pijawka, 2015). Paradoxically, they also state that the government should not prioritize reducing climate change over other activities (Hagen et al., 2015). According to Hagen et al. (2015), this is partly due to the fact that people believe that climate change is something that will have no impact on their day to day lives, unlike, for example, rising taxes or higher minimum wages. So, the Dutch citizens view climate change as an important political issue, however, don't want the government to prioritize climate policies over other activities. Therefore, climate policies should be politically acceptable in a way that avoids intense criticism, allowing for its adoption and long-term viability.

Since a couple of years, the Limburg Water Board is implementing new climate policies and measures to comply with the new water safety standards revised in 2017 (Anteagroup, 2015). In 2019 the Limburg Water Board announced that it will invest 495 million euros from 2019 until 2022 and for a large extent the money will go to adaptation measures (Central Bureau of Statistics, 2019). Adaption measures are measures that reduce the adverse impacts (drought, heat or waterlogging) of climate change (Yamaguchi, 2012). The Limburg Water Board stated that they are becoming more and more aware of the impacts of climate change and therefore are going to broaden their approach for adaptation strategies (Kamperman & Biesbroek, 2017). That is the reason for a water board tax

increase in 2020 until 2024 (Beaumont, 2019). Only two other water boards, Hollands Noorderkwartier and Rivierenland, are going to invest more in these coming years. The Limburg Water Board already increased its taxes with 12 percent in 2020 and will further increase until 2023 up to 46 euros in these 4 years.

It is important that policy makers understand citizen preferences and motivation behind climate policies in order to devise policies that are both successful and supported by the public. Scholars agree that climate policies will not be enforced without political acceptability, which implies “citizen support” (Bakaki & Bernauer, 2017; Rhodes, Axsen & Jaccard, 2014). Hence, for a successful climate policy it seems important to not only look at the recommendations from the scientific community but also take into account the public opinion on climate policies (Adger, Barnett, Brown, Marshall, & O’Brien, 2012; Hagen et al., 2015). Adger et al. (2012) found that ignoring the cultural aspects of climate change reduces the likelihood of adaptation and mitigation measures succeeding. As a result, the policies will not connect with the norms and values of individuals/communities and will eventually miss the mark and fail. Hence it is important to investigate public support when implementing new policies.

Because of this, the Limburg Water Board needs to ensure that these new climate policies will be supported and that the tax increase raises little to no opposition. For this it is important that the water board understands its citizens preferences and motivation behind these climate adaptation policies. In addition, framing can be used to keep the resistance to the increase in taxes as low as possible (Nolan and Tobia, 2019; Spence and Pidgeon, 2010; Wiest, Raymond & Clawson, 2015).

1.3. Research relevance

In the coming years the Water Boards and other government institutions will keep implementing adaptation strategies due to the changing climate. This calls for a growing need for the public to support adaptation measures. So far, numerous studies have been conducted looking at which factors influence climate policy support, with a special focus on mitigation policies (Dietz, Dan & Shwom, 2007; Gjerstad, Johannesson, & Nordø, 2017). Rhodes et al., 2014; Rhodes, Axsen & Jaccard, 2017; Tvinnereim, Fløttum, 2017). The findings of these studies cannot simply be generalized to understand support for adaptation, due to the major difference between adaptation and mitigation. Mitigation is combating the human cause of climate change and adaptation is adapting to climate changes that are already occurring or inevitably to come (Hay & Mimura, 2006). To decrease this knowledge gap, this research will determine which factors influence an individual's climate policy support for adaptation measures. This knowledge can then be used by policy makers in communication programs to increase the support base for adaptation measures in the future.

1.4. Research objective

This research aims to gain insight into individual characteristics for climate policy support for adaptation measures. This research will also look at whether framing could be used by the Limburg Water Board to keep the resistance to tax increases as low as possible. Lastly, the results of this research will be used to make recommendation to policy makers.

The aim of this study is threefold:

1. Gain insights into the policy support for adaptation measures
2. Explore the effect of framing on the willingness to pay for adaptation measures
3. Write recommendations for policy makers

In order to reach the aim of this study the following main research question has been formulated:

Which factors influence an individual's climate policy support for adaptation measures in water management?

To answer the main research question, the following sub-research questions have been formulated:

- (1) *According to literature, what adaptation measures are currently being taken by the Limburg Water Board and how are the water board taxes composed?*
- (2) *According to literature, which factors influence citizens willingness to accept higher taxes?*

- (3) According to literature, which factors could explain climate policy support?*
- (4) What is the influence of attitudinal, contextual and socio-demographic factors on a person's climate policy support for adaption measures in water management?*
- (5) Which factors influence the willingness to pay for adaptation measures in water management?*
- (6) What is the effect of varying the framing of the willingness to pay question for adaptation measures in water management in two alternative way?*

The first three sub research questions will be answered with literature and will be integrated into the theoretical framework. This framework will be the starting point of the empirical part of the research. The fourth and fifth sub research questions are formulated to assess the potential of the attitudinal, contextual and socio-demographic explain the policy support and willingness to pay. Lastly the sixth sub research question assess the potential of framing on the Willingness to pay for adaptation measures in water management.

1.6. Report outline

Chapter 2 will elaborate on the case of the Dutch water boards. This chapter will start with a description of the emergence of water boards. Next, the tasks of the water board and the composition of the water board taxes are explained. In the end of chapter 2 there will be a focus on the tasks, taxes and adaption measures of the Limburg Water Board. Chapter 3 gives an overview of and reviews the existing empirical evidence and theory regarding the different factors that influence an individual to support climate policies. Chapter 4 will describe the different facets of the methodology for this research. This chapter kicks off by explaining the research design, in which the research method, the origin of the survey questions and survey experiment are described. Chapter 5 will give the results of the findings of the survey, only findings relevant to the research objective will be shown. Graphs, tables and charts will be used to give a clear overview of the results. Chapter 6 presents the results in relation to the research questions, and existing literature will be discussed. To end this research in chapter 7, the conclusion, in which the main research question will be answered.

2. The case of the Dutch water boards

This chapter will elaborate on the case of the Dutch water boards. The first sub-research question will be answered. In section 2.2., the question ‘According to literature, what adaptation measures are currently being taken by the Limburg Water Board and how are the water board taxes composed?’ will be answered.

2.1. Water boards

The landscape of the Netherlands consists largely of river deltas. The Rhine, Maas, Schelde and Eems are four extensive European rivers that flow through the Netherlands and will eventually end in the North Sea. Around 26% of the Netherlands is below sea level, meaning that without any flood defenses, flooding would be a problem for 55% of the Netherlands (Planbureau voor de leefomgeving, 2013). As a result, water management is, and has always been, a top priority for the Dutch. This is where the water boards come in, they must ensure a carefree life for Dutch citizens when it comes to water safety. As shown in Figure 1 the Netherlands counts 21 water boards. The focus of this research is on the Limburg Water Board, number 11 on the Figure 1.

LEGENDA

1. Waterschap Aa en Maas
2. Waterschap Amstel, Gooi en Vecht
3. Waterschap Brabantse Delta
4. Hoogheemraadschap van Delfland
5. Waterschap De Dommel
6. Waterschap Drents Overijsselse Delta
7. Wetterskip Fryslân
8. Hoogheemraadschap Hollands Noorderkwartier
9. Waterschap Hollandse Delta
10. Waterschap Hunze en Aa's
11. Waterschap Limburg
12. Waterschap Noorderzijlvest
13. Waterschap Rijn en IJssel
14. Hoogheemraadschap van Rijnland
15. Waterschap Rivierenland
16. Waterschap Scheldestromen
17. Hoogheemraadschap van Schieland en de Krimpenerwaard
18. Hoogheemraadschap De Stichtse Rijnlanden
19. Waterschap Vallei en Veluwe
20. Waterschap Vechtstromen
21. Waterschap Zuiderzeeland

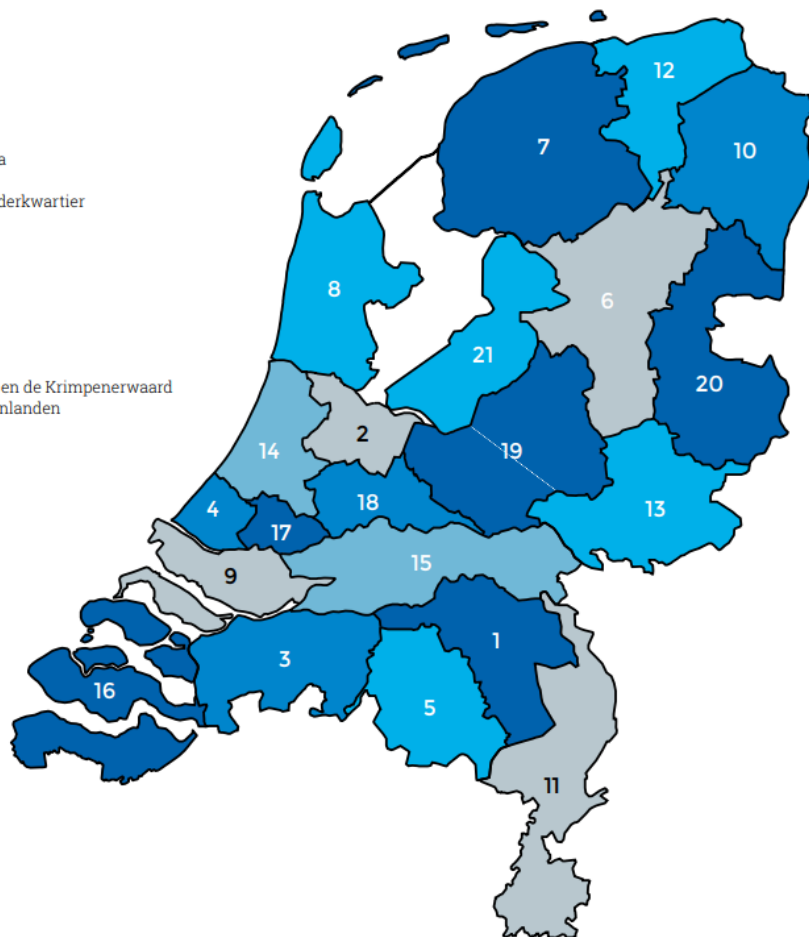


Figure 1 The 21 water boards. Retrieved from (Unie van Waterschappen, 2019)

2.1.1. Establishment of water boards or *hoogheemraden*

The Dutch began reclaiming land from peat areas for agricultural purposes in the early 10th century. The reclamation (*ontginning* in Dutch) was carried out by digging deep, parallel ditches through the peat, which allowed water to drain (Hoogheemraadschap van Rijnland, n.d. -b). *Ambachten*, the smallest administrative units in the countryside, were in charge of maintaining and caring for these ditches and drained fields. An *ambacht* is a part of a *heerlijkheid*, which is a piece of land owned by a gentleman (*heer* in Dutch) to whom certain rights are attached. As a result, one *heerlijkheid* can contain multiple *ambachten*. When there was a common interest, these

ambachten would collaborate. These partnerships, on the other hand, were often without responsibilities and with no specific authority to oversee the construction and maintenance of waterworks (water works are ditches). This changed in the 13th century, in 1255 Count Willem II of Holland stated that from that moment on the collaborations between *ambachten* would have privileges. He created the first official *heemraadschap*, which is now known as the Rijnland Water Board. The *hoogheemraadschap* of Rijnland is shown above in figure 1 (number 14). The word *hoogheemraadschappen*, or water boards, was invented in the 14th century to differentiate them from the *heemraden*, who governed the local *ambachten* (Hoogheemraadschap van Rijnland, n.d.-a). Since the countryside was divided into many *heerlijkheden*, even with the appointment of *heemraden*, many gentleman's from various *heerlijkheden* would still quarrel instead of cooperating. Count Floris V, who couldn't bear it any longer, devised a structure to ensure good teamwork in 1277. Count Floris V decided that the dyke count (*dijkgraaf* in Dutch) would be the chairman of a party of at least four *hoogheemraden*. In addition, the dyke count would be a representative of the count (Regionaal Archief Gorinchem, n.d.).

The importance of water control and the presence of *hoogheemraden* was recognized in the 1814 constitution (Bunschoten, 2011). The provincial states were in charge of surveillance and had the authority to cancel and name water boards with the king's approval. From the 14th century till 1850 the number of water boards increase to approximately 3500 (Waterschap Brabantse Delta, 2019). The number of water boards began to decline in the years that followed. This was largely due to some major events, the *waternoodsramp* of 1953 for instance. Which demonstrated that when water takes control, collaborating with over 100 water boards in one area is inefficient. Between 1850 and 1950, the number of water boards fell to 2670, with many of them merging or being dissolved (Mostert, 2016).

Article 4 of the 1983 overall constitutional revision states that “all Dutch people have the right to elect members of general representative bodies and to be elected as members of these bodies” (Mostert, 2016). The revision of the constitution eventually led to the *Waterschapswet* (Water Board act) being proposed to the lower house in 1987. After five years, in 1992, the Water Board Act went into effect, establishing the water board as a public body. The water boards are given autonomous water management authority, which means that municipalities and provinces are no longer allowed to intervene in day-to-day management. There are currently 21 water boards in 2020.

2.1.2. Tasks and taxes

The main goal of the water boards is to ensure that there is enough clean surface water while also protecting citizens from over-watering (Rijksoverheid, 2019). Managing and regulating water levels in polders, purifying wastewater, nature management, and managing dikes and other flood defenses are tasks that will ensure these primary interests. There are approximately 3.300 km of primary flood defenses and 14.400 km of secondary flood defenses in the Netherlands (Unie van Waterschappen, 2019). Dikes, dunes, and dams are the first line of defense against floods from the North Sea, Wadden Sea, large rivers, the IJssel and Markermeer (Rijkswaterstaat, 2019). Over 6100 pumping stations regulate the water level, and 325 sewage treatment plants purify the water for 7.9 million households and 1.7 million businesses (Unie van Waterschappen, 2019). Lastly, five water boards manage 6.600 km of roads and 1.000 km of cycle paths in the west of the Netherlands.

Water board taxes are used to fund the completion of these tasks. As a result, the water boards do not have to compete for government funds with other government spending. They can fund necessary investments themselves with water board taxes. In general, the water boards' costs are as follows (Unie van Waterschappen, n.d.):

- 39% to the treatment of sewage water
- 28% to activities in water systems
- 13% to the management and maintenance of flood defenses
- 20% to other activities

In 2019 the total amount of water board taxes collected by the water boards was € 2,9 billion (Unie van Waterschappen, 2019). The water board taxes are divided into two categories: water system management and purification management. The water system levy and purification levy are made up of several factors, as shown

in table 1. Everyone who lives in the Netherlands and owns or rents a home is required to pay the water system levy and the purification levy. Citizens and businesses who discharge wastewater directly into surface water must pay a purification levy. The water system levy for people who own a home is calculated in part by the WOZ (Real Estate Valuation) multiplied by a percentage (shown in table 1), which varies by water board. People who own natural areas or undeveloped land must also pay for them; the exact amount is shown in table 1.

Table 1. Water board taxes of water board Limburg explained 2020. Retrieved from: (BsGW, n.d.)

| Water system levy | | |
|-----------------------------------|----------|--------------------|
| Water system charge built | 0,0265 % | Of the WOZ value |
| Unbuilt paved public roads | € 255,10 | Per hectare |
| Other unbuilt | € 51,02 | Per hectare |
| Natural areas | € 4,01 | Per hectare |
| Water system charge for residents | € 63,50 | Per household |
| Purification levy | | |
| Purification (treatment) levy | € 52,26 | Per pollution unit |
| Pollution levy | € 52,26 | Per pollution unit |

2.2. Limburg Water Board

The water boards of Peel en Maasvallei and Roer en Overmaas merged into the Limburg water board in 2017, which was expected to result in reduced costs for Limburg residents. However, the costs have risen since the merge in 2017. This began in 2018 when the water board needed additional funds to combat beaver damage to the dikes. While the main goal for every water board is the same, tasks differ per region. The Maas, one of the four major rivers that flows through the Netherlands, travels many kilometers through the province of Limburg. One of the major responsibilities of the Limburg Water Board is to ensure that the Maas does not overflow and stays within the dikes. In Limburg, there are 170 km of dikes that need to be taken care of by the water board (Waterschap Limburg, n.d.-c).

In the budget of the Limburg Water Board of 2020, there are a few projects that are emphasized. The first are flood defenses around the Maas, which will protect 60.000 Limburg residents; the second are robust buffers that will be built to deal with heavy rains; and lastly, purifying the water chain, with a special focus on removing medicine residue from water (Waterschap Limburg, 2019b). The first two projects focus on combatting the consequences from climate change and will cost around 53 million euros, purifying the water chain is estimated to cost 71 million euros (Waterschap Limburg, 2019a). These projects ensure that additional investments are required, and a tax increase is unavoidable, according to the Limburg water board. These investments ensure that the total costs of 2020 rise from 146 million in 2019 to 161 million in 2020 (Waterschap Limburg, 2019a). Table 2 depicts the projected tax burden from 2020 to 2023.

Table 2. Prognosis burden development of water board taxes in Limburg from 2020 to 2023. Retrieved from (Waterschap limburg, n.d.-b)

| | Taxes 2019 | Taxes in budget 2020 | Increase 2020 | Forecast increase 2020-2023 | Average annual increase 2020-2023 |
|---|-------------------|-----------------------------|----------------------|------------------------------------|--|
| Multi-person household (3pu), owner-occupied home €200K | €249 | €276 | €27 | €46 | €11,50 |
| Multi-person household (3pu), rental house | €199 | €220 | €21 | €33 | €8,25 |
| One-person household (1pu), owner-occupied home €200K | €153 | €172 | €19 | €34 | €8,5 |

| | | | | | |
|--|---------|---------|---------|---------|-----------|
| One-person household, (1pu) rental house | €103 | €116 | €13 | €21 | €5,25 |
| Agricultural company 25 ha, buildings €400k, (3pu) | €1.286 | €1.544 | €258 | €421 | €105,25 |
| Agricultural company 40 ha, buildings €400k, (3pu) | €1.911 | €2.310 | €399 | €649 | €162,25 |
| Agricultural company 80 ha, buildings €400k, (3pu) | €3.577 | €4.350 | €773 | €1.255 | €313,75 |
| Company buildings €300K, (3pu) | €219 | €241 | €22 | €36 | €9 |
| Company buildings €400K, (25pu) | €1.301 | €1.419 | €118 | €170 | €42,5 |
| Road authorities / owners 300ha | €62.505 | €76.530 | €14.025 | €22.725 | €5.681,25 |
| Nature managers / owners 300ha | €1.056 | €1.203 | €147 | €285 | €71,25 |

Pu: pollution units

2.2.1. The Maas floodings (1993/1995)

To understand why Limburg is such an intriguing case for water board tax and climate adaptation policy support, a brief history of floods in Limburg is provided.

The Maas River's discharge is primarily dependent on rainwater and groundwater, so the river is known as a rain river (Directoraat-Generaal Rijkswaterstaat, 1993). The Maas (or Meuse) begins in the higher province of Haute-Marne in France, flows through the French Ardennes, the Belgian Ardennes, and enters the Netherlands near Maastricht in the province of Limburg. Because the lower reaches of the Maas flow through the Netherlands, rainfall in the Maas in France and Belgium will eventually end up in the Grensmaas in the Netherlands. When there is a period of heavy rainfall combined with meltwater from tributaries, high tide is likely. Flooding is more likely in the winter and spring due to sustained rainfall in France and Belgium, as well as meltwater from the Ardennes at that time of the year. Rainwater will reach the Netherlands in half a day due to the steep slopes of the Maas in the Ardennes (Directoraat-Generaal Rijkswaterstaat, 1993).

Prior to 1908, there was no law prohibiting people from building houses in the Maas' natural valley. The authorities concluded that if no restrictions were imposed, the Maas's flow rate and storage capacity would be hampered by the expansion of villages in the Maas valley. As such, in 1908, the *Rivierenwet* (River law) went into effect, making it illegal to build without a permit in the winterbed, the natural valley of the Grensmaas (Directoraat-Generaal Rijkswaterstaat, 1993).

According to a report published in 1993 by the Directoraat-Generaal Rijkswaterstaat, the risk of flooding was underestimated. In December 1993, this became painfully clear. The Maas could no longer hold the water after a week of continuous rain in Belgium and France. On December 22, a water level of NAP (Normaal Amsterdams Peil or Amsterdam Ordnance Datum) + 45.90M was measured in Borgharen, which, combined with a high flow rate of 3120m³/s and a very slow fall, resulted in high tide for two weeks (Directoraat-Generaal Rijkswaterstaat, 1 December). Borgharen is a *winterbed* village five kilometers above Maastricht. Approximately 10.000 people were evacuated during this period of high water. The high water affected 21000 hectares of land in Limburg, causing damage worth approximately 265 million gulden (roughly 120 million euros). (Directoraat-Generaal Rijkswaterstaat, 1993).

Because the chances of a flood in the twentieth century were around one in every 50 years, people did not expect a new flood to occur soon after the flood of 1993. However, without any changes to the dikes and rivers, a new flood appeared only two years later, in 1995. Meltwater from the Ardennes and a high wind force of 5 to 6 caused the water to flow into the *winterbed* of the Maas in January 1995, following a period of persistent rainfall in Belgium and France. On January 31, the Maas water level was measured in Borgharen at NAP + 45,71M with a flow rate of 2861 m³/s (TAW, 1995). The flow rate and water level were both lower than during the 1993 flooding, but due to a longer period of high water, the dikes' condition became critical. Around 250 000 people living near the Maas and Rhine were evacuated as a precaution (EenVandaag, 2018). The direct damage from the flooding

was estimated to be around 150 million gulden, while the indirect damage was estimated to be around 1.5 billion gulden.

2.2.2 Water Board Limburg adaptation measures

The changing climate has caused many water problems in the province of Limburg over the last decade. Numerous downpours caused significant flooding in May 2018, and extreme downpours and hail caused millions of euros in damage to the agricultural sector in June 2016. In contrast to 2010, 2012, and 2014, there was almost no rainfall in 2017, resulting in widespread drought. As a result, the effects of climate change were increasingly brought to the attention of water boards. As a direct consequence, the Limburg water board decided to prioritize “*Water in Balans*,” a program focusing on adaptation measures in Limburg (Waterschap limburg, n.d.-d). The communities are integrated into the project as a whole in this program. Limburg's water board is convinced that the project will be less successful if the community is not engaged. Below is a list of six adaptation measures undertaken/worked on by the Limburg Water Board in recent years.

1. Buffers are built which will ensure that the excess rainwater will slowly disappear into the ground. Buffers will be built in Meerssen and Oirsbeek.
2. Removing silt and or sand from the Eckeltsebeek will make the stream deeper and this will ensure that it will be able to tolerate more water.
3. Widening of waterways and enlarging, moving and removing several connecting pipes between ditches. This project will be realized in the Schelkensbeek
4. Temporary storage of water in upstream areas near Breevennen, this will result in a lower water level downstream in Oostrum and so this will decrease the risk of flooding. This project is located in Breevennen/ Oostrumsche Beek, Municipality of Venray
5. About 300 hectares of the Maas riverbed has been widened, the banks have been lowered and dikes on a stretch of twelve kilometers have been reinforced and raised. In addition, a large new nature reserve is being created. This project is called the Grensmaas Project.
6. Finally, the Limburg Water Board is also educating people and showing people how they can adjust their house in a way that will decrease the risk of flooding and will also lower the costs when your house is flooded.

3. Theoretical framework

This chapter gives an overview of and reviews the existing empirical evidence and theories regarding the different factors that influence a person to support climate policies. Section 3.1 will answer sub-research question 2 ‘*According to literature, Which factors influence citizens willingness to accept higher taxes?*’. Section 3.2. will answer sub-research question 3 ‘*According to literature, which factors could explain climate policy support?*’. Section 3.3 will conduct a literature review to investigate the impact of framing on the willingness to pay for climate policies. This section will help decide which type of framing to use and how to overcome any bias that may arise during the willingness to pay research. Current facts and logical thinking will be used in section 3.4 to establish hypotheses to answer the research questions.

3.1. Understanding taxpayer behavior

This section will look into tax compliance behavior and whether it can be used in this research. Policy changes often go hand in hand with an increase in taxes. This is also true for the Limburg Water Board; the new measures that will be implemented in the coming years will be accompanied by an increase in water board taxes. For this study, it's important to understand what factors cause people to support new policies or policy changes when they are accompanied by an increase in taxes.

There are numerous definitions of tax compliance in the literature; according to Devos (2013), the definition of Roth, Scholz, and Witte (1989) is most complete. They state that income tax compliance requires an individual to comply with the reporting requirements and thus will file the necessary tax returns on time, as correctly as practicable, and in conformity with all regulations. According to several papers there are a few important determinants for compliance behavior among which trust, fairness and social norms (OECD, 2010; Walsh, 2012). To clarify, water board taxes are different from income taxes. In the Netherlands, an individual is personally responsible for correctly completing the tax return every year. With water board taxes, there is no action needed, every individual that is registered with the municipality will receive assessment notice from the water board stating the tax to be paid at home. So, there is no active choice to evade taxes. An individual could choose not to pay the water board taxes, however a fine will follow. However, the water board will do everything to keep compliance as high as possible so that it can easily implement new policies accompanied by a tax increase without any real resistance.

Fairness and trust, according to Walsh (2012), are often linked; if an individual thinks a tax is fair, they will trust the result. According to the OECD (2010), there are three forms of justice in taxation, one of which is contingent on lawmakers and is known as distributive fairness. The assumption that the government will handle tax revenue responsibly and fairly is known as distributive fairness. As a result, they are more likely to support an increase in taxes as they assume that the government will handle their money carefully and spend it well (OECD, 2010).

Individuals who have a "good example" of someone who complies with taxes will adopt this behavior, the chances of them changing their tax compliance behavior are slim (Lefebvre et al., 2014). As a result, the social incentive to do good has a positive impact on people and influences their compliance behavior in a positive way. This is also supported by Walsh (2012), who writes that people's behavior is influenced by others without them realizing it, so if people in their environment set a good example, others will unconsciously mimic it. Walsh (2012) discovered that a large proportion of respondents believe that tax evasion is unacceptable, indicating that there is a social norm in place. This perceived social norm is an injunctive norm, because it is created by other people's opinions on what is right or wrong (Devos, 2013).

To conclude, this section explored why people pay taxes and why they would support a tax increase. section 3.2. will further elaborate on support for climate policies that often involve an increase in taxes. The factors, trust, fairness and social norms have a demonstrable effect on tax compliance and could also explain the support for tax increases and will thus be included in sections 3.2 and 3.3..

3.2. *The ABC model*

Several studies have been conducted in recent years to determine which factors have a positive or negative impact on the support for climate policies (Bakaki & Bernauer, 2017; Dietz et al., 2007; Gjerstad et al., 2017; Rhodes et al., 2014; Rhodes et al., 2017; Tvinnereim et al., 2017; Zahran, Brody, Grover & Vedlitz, 2006). Climate change policy is becoming more important every year, however the public support for climate policies is still one of the biggest challenges (Nolan & Tobia, 2019). Public support is a fundamental element for climate policies to succeed. Climate policy support is a complex issue and many theories have been used to try and explain this behavior. According to Guagnano, Stern & Dietz (1995), behavior (B) is a product of attitudes (A) and external conditions (C). The attitudes-behavior-context (ABC) model was developed explicitly to explain environmentally significant behaviors (Stern, 2000). The ABC model mentions that behavior is an interactive product of internal attitudes, such as norms, beliefs, values etc., and external contextual factors which includes social, political, and economic factors. This model has been used before to understand climate policy support and especially mitigation policies (Rhodes et al., 2017). In this research the ABC model is chosen to explore how these variables might be associated with support for adaptation measures in water management. In addition to the attitudinal and contextual factors, personal capabilities are the final category as mentioned by Stern (2000). Personal capabilities include variables which are in most cases evaluated through socio-demographic characteristics. This research will not test the model but rather uses it as a framework of possible explanatory variables which may be linked with citizen support for adaptation measures in water management.

3.2.1. Attitudinal variables

The first category of explanatory variables are attitudinal variables which include general environmental concerns, values, norms and explicit concerns about climate change.

In Germany Frondel, Simora, and Sommer (2017) found that people who experienced natural events caused by climate change experience a higher risk perception. People who experienced personal damages from these natural events experienced an even higher risk perception (Frondel et al., 2017). In research in the Netherlands, they investigated if previous experiences with flooding would influence a person's adaptive actions for flooding. They found that a previous experience indeed has a significant impact on a person's behavior and motivates them to take adaptation measures (Zaalberg et al., 2009). They mention that the perceived risk of an individual influences the amount of personal adaptation measures taken towards climate change (Frondel et al., 2017). This research will investigate if the perceived risk could also cause a higher citizen support for adaptation measures taken by the Limburg Water Board.

Further, several studies explore the role of environmental attitudes in citizen support for climate policy. They found that people who are commonly concerned about climate change and/or environmental problems will show a higher support for climate policies (Clark et al., 2003; Rhodes et al., 2017; Zahran et al., 2006). Numerous scholars use the New Ecological Paradigm (NEP) scale to measure the general environmental concern of participants (Clark et al., 2003; Dietz et al., 2007; Rhodes et al., 2014; Rhodes et al., 2017; Zahran et al., 2006). The New Ecological Paradigm (NEP) scale measures assumptions about humanity's right to rule over the rest of nature, humanity's potential to disturb nature's equilibrium and the presence of growth limits for human populations (Dunlap et al., 2000). Research shows that people who score high on the NEP scale, and show thus positive attitudes towards the environment, are more likely to participate in pro environmental behavior (Clark et al., 2003). Instead of other scholars that use the NEP scale, this study will look at the European value study (EVS) to measure the environmental attitudes.

Lastly, research shows that individuals who are aware of the climate change consequences are more likely to support climate change policies (Dietz et al., 2007; Rhodes et al., 2017; Park & Vedlitz, 2013). To be more specific, people who are for instance aware that greenhouse gasses cause climate change, aware that climate change leads to extreme weather and are aware that climate change is a serious problem for society show a high awareness of climate change consequences. Steg and Abrahamse (2005), found that people who show a high environmental

concern are well aware of the climate change consequences and may be more supportive of climate change policies.

On the basis of the above-mentioned literature, it was decided to include the following variables in this study: risk perception, environmental attitudes and awareness of consequences.

3.2.2. Contextual variables

The second category of explanatory variables are contextual variables which include political, social and economic factors.

Zahran et al. (2006) examined the role of 'living area' on a person's support for mitigation or adaptation climate policies. Zahran et al. (2006) argue that the effects of climate change differ per region and that this 'physical vulnerability to climate change' could impact a person's support for climate change policies. They found that people who are confronted with the visible features of climate change show a higher support for adaptation policies. This research will explore if living area is a pertinent factor in explaining a person's support for adaptation measures in water management.

Trust is included as a causal factor in most research exploring citizen support for climate policies (Dietz et al., 2007; Haring & Jagers, 2013; Rhodes et al., 2014; Rhodes et al., 2017). Dietz et al. (2007) found that trust was among the 'most significant predictors' and demonstrated to have a positive effect on a person's climate policy support. The results of Haring and Jagers, (2013) support this statement; they found that people who show high trust in the government are more likely to support a raise in pro-environmental taxes. Trust in the government shows to be an important factor for climate policies which require an increase in taxes, which can be linked to distributive fairness (Rhodes et al., 2017). This research will explore if trust in the government and Limburg Water Board makes people more likely to support adaptation measures in water management.

Empirical survey evidence suggests that social norms have played an important role in the support of climate policies (Bolsen et al., 2014; De Groot & Schuitema, 2012; Drews & Van den Bergh, 2016). "Social norms refer to one's assumption about the extent to which significant others support an environmental policy and their motivation to comply with these others, which results in a certain amount of "social pressure"" (De Groot & Schuitema, 2012. p.101). Bolsen, Leeper, and Shapiro (2014) found evidence that a social norm could directly impact a person's policy support. Their experiment shows that when the population is displayed as less supportive of climate policy the participants were also less likely to support this policy. This statement is also supported by De Groot and Schuitema (2012), they found evidence that a strong social norm in favor of climate change policies would increase the policy support. They mention that a social norm is an important factor in explaining policy support. In addition, Haring and Jagers (2013) found that people who trust other citizens would be generally more supportive of a raise in pro-environmental taxes. This research will explore if there is a social norm in place and so if this social norm will make influence a person's support for adaptation measures in water management.

Next to social contextual factors there are also economic contextual factors that could play a part in exploring climate policy support. However, the evidence supporting the 'obvious' link between economic factors and policy support is sparse (Drews & Van den Bergh, 2016). Drews and Van den Bergh (2016) do mention that the higher the financial costs the lower the policy support. In addition to water board taxes there are factors that ensure a higher water board tax. For example, an individual that owns an agricultural business or a nature area must pay an extra fee in addition to the water board tax. This research will explore if these so-called water board tax increase factors makes people less likely to support adaptation measures in water management.

Lastly, scholars found that there is a link between future thinking and environmental protection and pro-environmental attitudes (Bain et al., 2016; Milfont, Wilson & Diniz, 2012; Thomas et al., 2018). They argue that this link between future thinking and environmentally friendly behavior could also imply that parenthood could have a positive effect on environmentally friendly behavior. It could be that parenthood makes people more eager

to take pro-environmental action to preserve the environment for the next generation than nonparents (Milfont, Wilson & Diniz, 2012; Thomas et al., 2018). However, no evidence has yet been found for these claims. This research will include 'having children' as contextual variable to see if this could have an effect on the support for adaptation measures in water management.

On the basis of the above-mentioned literature, it was decided to include variables related to the following contextual factors in this study: living area, trust, economic factors, social norms and having children.

3.2.3. Socio-demographics

The last category of explanatory variables are personal capabilities. "These include the knowledge and skills required for particular actions, the availability of time to act, and general capabilities and resources such as literacy, money, and social status and power" (Stern, 2000, p.417). Social demographic variables are often used by academics as indicators of personal capability.

In previous research gender, age, education and income have shown to have a significant influence on citizen support for climate policies. Elliott, Seldon and Regens (1997) conducted a research in America (n=14223) in which they looked at public attitudes towards environmental spending over a period of 17 years (1974-1991). They found that younger, highly educated, wealthy and female citizens would be generally more supportive of climate policies. Rhodes et al. (2014; 2017) also found that being female, education and income may influence a person's climate change policy support.

On the basis of the above-mentioned literature, it was decided to include the following variables in this study: gender, age, income and education.

3.3. *Can framing influence a person's Willingness to pay?*

In the literature there is an agreement on the fact that framing climate change solution has an impact on the public support for climate policies. There are different forms of framing which can impact a person's support for climate policies. Spence and Pidgeon (2010) used framing to influence a person's perception on the impacts of climate change and mitigation. They found that perceptions changed when they framed the information as local versus distant impact and the gains of mitigation versus the losses when not mitigating. The effect of local framing is supported by Wiest, Raymond & Clawson (2015), they also concluded that local framing increases the support for climate policies and gets a higher priority for the government. Nolan and Tobia (2019) found that framing could even increase the support for expensive climate policies. People are more willing to accept expensive policies even if they need to pay for them personally, then policies that demand personal sacrifices for example shorter showers or less flying (Nolan & Tobia, 2019). Framing can be effective for the support for mitigation measures however can it also be used to increase the willingness to pay for adaptation measures? Bulte, Gerking, List, and de Zeeuw (2005) found that framing can influence a person's willingness to pay for manmade problems.

Furthermore, when framing is used during communication with taxpayers, it has been shown to have a significant impact on behavior (Walsh, 2012). According to Walsh (2012), policymakers can increase distributive fairness and thus tax compliance by framing tax information in such a way that it is transparent and clearly states that the approach taken is fair. Solomon & Johnson (2009) found that in addition to framing that; income, climate change beliefs and climate change solutions (respondents that agreed to pay more when the money will be used to invest in mitigation measures) may have a significant influence on the willingness to pay for biomass ethanol (which is a mitigation measure for the transport sector). Trust in government and salience of deforestation (if respondents reckon deforestation in Brazil as an important environmental problem) also show to have a significant effect on the willingness to pay (Bakaki & Bernauer, 2017).

In a choice experiment like 'willingness to pay' there is a chance that a bias will thwart the experiment. Loomis (2011) found evidence of the hypothetical bias which could affect the outcome of the willingness to pay experiment. The hypothetical bias causes people to indicate a higher willingness to pay for a survey than they

normally would in real life. This is because people see a survey as something hypothetical and not as something they really have to spend their own money on (Loomis, 2011), which can affect the validity of the research. There are several researchers who acknowledge the hypothetical bias (Harrison & Rutström, 2008; Loomis, 2011; Nape et al., 2003), however, there are also scholars who do not. Carlsson and Martinsson (2001) found no evidence for a hypothetical bias during their choice experiment. Although, there are some claims that there is no evidence of a hypothetical bias occurring during a choice experiment, these claims are in the minority. As a result, it was decided to assume that the hypothetical bias could occur during this research and to take action to counteract it.

Bulte et al. (2005) used different methods to try and eliminate the hypothetical bias. They used a hypothetical script, a hypothetical/cheap talk script and a consequentialism script. A cheap talk script is used to counteract the hypothetical bias by discussing the hypothetical bias. The participants are told that this is a hypothetical question and that they don't actually have to pay the money (Cummings & Taylor, 1999). Bulte et al. (2005) concluded that the willingness to pay was significantly lower with the cheap talk and consequentialism script, than the hypothetical script. There is also literature that did not find clear evidence of the effectiveness of cheap talk to eliminate the hypothetical bias (Murphy, Stevens & Weatherhead, 2004). According to Murphy et al. (2004) there is no method alone that will eliminate the hypothetical bias, they mention that multiple methods are necessary to eliminate the bias. Bergeron, Doyon and Muller (2019) did not find evidence supporting that cheap talk could eliminate the hypothetical bias, however they did discover that cheap talk could be effective in eliminating the Strategic bias (SB). The Strategic bias occurs when people deliberately bid high or low to influence prices of a good, this is common by private goods (Bergeron et al., 2019). Flood prevention measures are public goods, so the chance of SB to appear will be low.

In this research local framing will be used to see if this can boost the willingness to pay for adaptation measures. To try and eliminate the hypothetical bias, cheap talk will be used.

3.4. Research questions and hypotheses

In this section, existing evidence and critical reasoning will be used to develop hypotheses for all the different factors mentioned above. This section will have the same structure as the previous pieces.

3.4.1. Attitudinal factors

Frondel et al. (2017) and Zaalberg et al. (2009) found in their study that people who perceive high risk from negative effects of climate change are eager to take personal adaptation measures. If this perceived risk makes people take personal adaptation measures, it is likely that these people will also support adaptation measures the government or water board is taking. In this research it is expected that people who perceive high risk from climate change will be more likely to support climate adaptation policies.

Corner et al. (2014) and Kahan and Braman (2006) found evidence that positive attitudes towards the environment and climate change will increase the support for climate policies. In addition, research shows that people who score high on the NEP scale are more likely to participate in pro environmental behavior (Clark et al., 2003). In this research it is expected that people who show positive attitudes are more likely to support climate adaptation policies.

Lastly, Dietz et al., (2007), Park and Vedlitz, (2013), Rhodes et al, (2017) and Steg and Abrahamse (2005) found evidence that awareness of consequences of climate change would positively impact climate change policy support. In this research it is expected that people are more aware of the climate change consequences are more likely to support climate adaptation policies.

3.4.2. Contextual factors

It is expected that risk perception and living area are linked. People living in rural areas that overflow, could show a higher risk perception towards climate change. It is expected that a high-risk perception will increase the policy support, therefore it is expected that people living in rural areas that overflow will also be more likely to support

climate adaption policies. This hypothesis was already tested by Zahran et al. (2006), they indeed found that there is a significant link between living area and being confronted with the visible features of climate change and a higher policy support.

Empirical evidence shows that there is a clear link between trust in the government, scientist and climate organizations and climate policy support (Dietz et al., 2007; Harring & Jagers, 2013; Rhodes et al., 2014; Rhodes et al., 2017). In this research there will be a focus on trust in the government and the waterboards. When people trust the government, they will generally also trust the government with their tax money. Since the adaptation measures are paid for by tax money, it is expected that people who will trust the government and water boards will also trust their decisions and support these. Due to the compelling evidence of the impact of trust on policy support, it is expected that people who demonstrate a high trust in the government and the waterboards will show a higher support for climate adaptation policies.

Next, there is strong evidence to suggest that there is a link between social norms and climate policy support (Bolsen et al., 2014; De Groot and Schuitema, 2012; Drews & Van den Bergh, 2016). Evidence shows that when there is a positive social norm in place, the population is more likely to support climate change policies. In this research it is expected that indeed a social norm would increase the policy support. However, there is no evidence that there is a social norm in place that will support the climate adaptation polices. Therefore, it is expected that there is a social norm in place supporting pro environmental behavior. This hypothesis is established on the basis of risk perception and living area hypotheses.

There are economic contextual factors in place which could impact a person's climate policy support. There are some exceptions to the normal amount of water board taxes a person or household needs to pay. Owning a agricultural business, a nature area or any other area or business are factors that ensures they have to pay higher taxes. It is expected that people who already pay high taxes will be less supportive of adaptation measures which will costs them more money. This hypothesis is drawn from Drews and Van den Bergh (2016) who mention that higher financial costs will lower the policy support.

Lastly, It is expected that people with children will be more eager to take pro-environmental action to preserve the environment for the next generation than non-parents (Bain et al., 2016; Milfont, Wilson & Diniz, 2012; Thomas et al., 2018). It is hypothesis that people with children would be more supportive of adaption measures than people without children.

3.4.3. Socio-demographic

Research shows that younger, highly educated, wealthy and female citizens will generally be more supportive of climate policies (Elliott et al., 1997; Rhodes et al 2014; Rhodes et al 2017). Thus/Consequently, in this research it is expected that younger, wealthier, highly educated females will show more support for climate adaptation policies. Evidence shows there is a positive relationship between income and education, so highly educated people will generally also make more money (Gregorio & Lee, 2002).

3.4.4. Framing and cheap talk

Empirical evidence shows that framing climate change solution will influence a person's support for climate change (Nolan & Tobia, 2019; Wiest et al., 2015). Spence and Pidgeon (2010) found that local framing and distant framing of climate change impacts and losses influence a person's perception of climate change policies. In this research the willingness to pay for adaptation measures in people's neighborhood (local framing) versus willingness to pay for adaptation measures in Limburg (distant framing) will be tested. It is expected that people who will get the question with the local framing will show a higher willingness to pay.

In addition, a cheap talk script is used to see if this could eliminate the hypothetical bias. There is no agreement in the literature that cheap talk works for eliminating the hypothetical bias (Bergeron et al., 2019; Bulte et al., 2005; Murphy et al., 2004). The script used in this research is shorter than the script from Bulte et al. (2005) this

could limit the effect of the cheap talk. For this research it is expected that the cheap talk will have no effect on the willingness to pay for adaptation measures.

3.4.5. Factors influencing willingness to pay

Income, attitudes towards climate change and trust in the government have shown to positively influence a person's willingness to pay for climate policies (Bakaki & Bernauer, 2017; Solomon & Johnson, 2009). It is expected that wealthier people will naturally have more money to spend on other things, besides day-to-day spending. Moreover, if these people have a positive attitude towards the environment and climate change, this could increase the willingness to pay for adaptation measures. In addition, trust in the government and their spending's will also increase the amount of taxes a person would be willing to pay for adaptation measures.

4. Methods

This chapter describes the different facets of the methodology for this master thesis. The first part of this chapter describes the research design, origin of the survey questions and survey experiment. Next there is a short section to describe the research area and a paragraph with background information. In the data collection section, which follows next the sampling method and the strategies used to obtain a sufficient number of respondents are explained. At the end of this chapter, the data analysis section describes which statistical test will be used.

4.1. Research design

Chapter 2 shows which adaptation measures the Limburg Water Board has taken and how these adaptation measures affect water board taxes, answering research question 1. Chapter 3 delved into tax compliance behavior to understand why people support a tax increase, answering research question 2. In addition, a detailed literature study was carried out in Chapter 3. This showed which variables previously demonstrated a link with climate policy support, which resulted in a list of variables to be tested in this research, answering research question 3. In this chapter these variables will be operationalized.

This research is a quantitative study and sought to find quantitative data. For this research a survey is chosen as quantitative instrument to collect data. A survey is the most common used instrument in quantitative research, to claim some statistical evidence (Ayiro, 2012). In all the studies mentioned in the theoretical section a survey is the primary method used. Survey questions from previous research were used to compose the survey used in this research.

4.1.1 The online survey

Constructing a good survey is a long and difficult process. The questions need to be readable (grammar), understandable and not too long. During the process of conducting the survey questions, several versions were sent out to friends with experience in quantitative data collection and survey design. As they were all familiar with the use of a survey, they were a good first source to see if the survey questions were set up correctly. The feedback from this group was used to create a better version which was then sent to family and friends with different age groups/gender and education to see if the survey would be understandable for all different groups. On July 13 there was a last meeting on the survey with Dr. Andries Richter and 1 day later the survey went online. The survey consists of 39 questions in total of which the participants answer only 36 questions. This because the survey contains four different Willingness to pay (with local vs distant framing and cheap talk and no cheap talk) questions, of which participants will only answer one. These questions are distributed over the participants with the use of randomization which is an option in the Qualtrics software.

To ensure the internal validity almost all variables used in this study are well substantiated with literature. Several have a proven effect on the support for climate policies, and all variables have been used before. In addition, to guarantee construct validity, survey questions from previous studies are used. Some of the questions are altered to fit the context and others are cut short to ensure that the fall out will be low. Next to data collection via an internet survey on Facebook, the data collection is complemented by using an email list from previous research. This to try and increase sample validity and hereby diminish the chance of a high non-response bias.

4.1.1.1. Connecting the theoretical framework to the survey questions

The online survey started with a small introduction of the master thesis, stating that the survey is anonymous, that the data will be treated confidentially and a consent question which participants need to answer with yes or no. After which, the survey starts with section one, introducing the adaptation measures and participants opinion on these measures. All the survey questions are closed ended questions and for most of the questions a 5-point likert scale is used. The full Dutch survey is added to appendix A.

Section 1.

The list of adaptation projects of water board Limburg is shown from chapter 2.2.1. Underneath this list these three statements are given:

1. I think it is important that the above-mentioned measures are taken
2. I think it is important for the water board to deal with adaptation measures
3. Floods are part of the equation, the above-mentioned adjustments are not necessary

These questions are asked to measure the variable **policy support**. The first two questions ask participant's opinion on adaptation measures, the last question asks to measure if participants see the necessity of adaptation measures. For these questions a 5-point likert scale is used. The list of adaptation measures which is shown in the survey is taken from the website of water board Limburg (Waterschap Limburg, n.d.-d). To see if people in Limburg support these adaptation measures the above couple of questions are formulated.

Section 2.

To measure the variable **awareness of consequences** these five statements were formulated:

4. Carbon dioxide is a greenhouse gas
5. Climate change/global warming is caused by excessive amounts of greenhouse gases
6. The major cause of increasing atmospheric concentrations of greenhouse gases is burning of fossil fuels (such as gasoline)
7. Climate change/global warming may lead to weather extremes, such as temperature increases, flooding, sea level rise, and extreme storms,
8. Climate change/global warming has been established as a serious problem for society and immediate action is necessary

To measure the amount of awareness of consequences a person possesses about climate change a few questions are formulated using the article of Rhodes et al. (2017). For these questions a 5-point likert scale is used next to a "I don't know" answer.

Section 3.

To measure the variable; **risk perception** these two questions are used:

9. In the next 30 years, how certain are you that changes in the climate will have a negative impact on
 - 9.1. You and your family
 - 9.2. Your village
 - 9.3. Your province
 - 9.4. The Netherlands
 - 9.5. People across the world

This question will measure the perceived risk of participants when it comes to the negative impacts of climate change. It asks participants if they are worried that in the next 30 years climate change will have a negative impact on them/their family, their village and lastly others around the world. This question is received from Sullivan and White (2019).

To measure the variable; **trust** these five questions are used:

10. The government has a good climate policy
11. I am confident that the Limburg water board is performing its tasks well
12. I am confident that the government / water board will protect me against flooding
13. I am confident that the Limburg water board and the government are handling my tax money well
14. I don't mind that I have to pay more (water board) tax for climate policy (for example: adaptation measures)

These five questions are self-conceived questions and formulated using examples from other studies. With these questions the goal is to understand if people trust the government and the water board, but also if people believe that these organizations are handling their taxes with good care. Questions 11/12/13 will show if people trust the water boards and question 14 and 15 will show distributive fairness.

To measure the variable; **Attitudes** these six questions are used:

15. I am willing to give up part of my income if I was sure that the money would be used to fight environmental pollution
16. It's just too hard for someone like me to do a lot for the environment
17. There are more important things in life than protecting the environment
18. Protecting the environment should be a priority, even if it slows economic growth and costs jobs
19. There is no point in making an environmental effort if others don't do the same
20. Many claims about the threatened environment are exaggerated

These five questions are used to measure attitudes towards climate change and are received from the European values study 2017 (EVS, 2017). The questions from EVS are used, because they are more extreme than the questions of the NEP scale. The NEP scale measures a person's general environmental concerns. People who score high on the EVS questions, show serious positive attitudes towards the environment.

To measure the variable; **Social norms** these 2 questions are used:

21. People in my environment (family / friends / neighbors) think climate change is important.
22. People in my area (family / friends / neighbors) try to combat climate change

Questions 21 and 22 will measure if there is a social norm in place. The first question will measure if there is a social norm on the importance of climate change. The second question will measure if there is a social norm in place that promotes the importance of combatting climate change.

Section 4.

Before asking people about their willingness to pay for water board taxes, there needs to be reassurance that the participants live in Limburg and pay water board taxes. That is why the next four questions are asked:

23. Do you live in the province of Limburg?
24. Do you pay water board taxes?
25. Do you know how much water board taxes you are paying over 2020?
26. Tick which applies to you
 - 26.1. I live alone in a rental house
 - 26.2. I live with 2 (u and one other) or more in a rental house
 - 26.3. I live alone in an owner-occupied home
 - 26.4. I live with 2 (u and one other) or more in an owner-occupied home

Question 23 and 24 are asked to ensure the sample population only included people living in Limburg and who are paying water board taxes. This to ensure this sample population only included the target population. Question 25 is asked to see how many people are aware of the amount of water board taxes they are paying. It is important that the participants have the same knowledge on the amount of their water board taxes, to ensure that people without this knowledge will not influence the outcome. Question 26 is used to show participants the average water board tax someone will be paying in their situation.

To measure the variable; **Local framing, distant framing and cheap talk** a 2 by 2 design was used with these four questions are used:

27. In the past 10 years, more and more people have suffered from water damage due to the extreme weather. To limit this water damage, the water board may decide to take special measures to reduce the flooding opportunities in your area. However, such measures are expensive. Would you like to indicate below what the maximum water board tax increase per year is that you would be prepared to pay for the protection of your **neighborhood**? All the money will be used to build buffers / raise dikes etc.
28. In the past 10 years, more and more people have suffered from water damage due to the extreme weather. To limit this water damage, the water board may decide to take special measures to reduce the flooding opportunities in your area. However, such measures are expensive. Would you like to indicate below what the maximum water board tax increase per year is that you would be prepared to pay for the protection of your **neighborhood**? All the money will be used to build buffers / raise dikes etc. **Note:** This is a hypothetical question! You don't have to actually pay the money. In general, people experience difficulties answering hypothetical questions. People typically bid more money than they are really

willing to pay. When answering the question below, try to consider whether you would actually pay this amount to ensure that your **neighborhood** is flooded less. Imagine that this amount will then no longer be available to finance other purchases. Would you please indicate below what the maximum water board tax increase per year is that you would be prepared to pay for the protection of your **neighborhood**?

29. In the past 10 years, more and more people have suffered from water damage due to the extreme weather. To limit this water damage, the water board may decide to take special measures to reduce the flooding opportunities in your area. However, such measures are expensive. Would you like to indicate below what the maximum water board tax increase per year is that you would be prepared to pay for the protection of your **Province of Limburg**? All the money will be used to build buffers / raise dikes etc.
30. In the past 10 years, more and more people have suffered from water damage due to the extreme weather. To limit this water damage, the water board may decide to take special measures to reduce the flooding opportunities in your area. However, such measures are expensive. Would you like to indicate below what the maximum water board tax increase per year is that you would be prepared to pay for the protection of your **Province of Limburg**? All the money will be used to build buffers / raise dikes etc.
- Note:** This is a hypothetical question! You don't have to actually pay the money. In general, people experience difficulties answering hypothetical questions. People typically bid more money than they are really willing to pay. When answering the question below, try to consider whether you would actually pay this amount to ensure that your **Province of Limburg** is flooded less. Imagine that this amount will then no longer be available to finance other purchases. Would you please indicate below what the maximum water board tax increase per year is that you would be prepared to pay for the protection of your **Province of Limburg**?

A between subjects design was used, i.e. each participant will answer only one of these four questions, and the survey software will randomly select which question a participant will get. Questions 27-30 show the four scripts that are used in this survey. The four scripts differ in the used of local framing (neighbourhood) and distant framing (Province of Limburg), alongside this cheap talk is used for two out of four questions.

The cheap talk script used in this research is a shortened version of the script of Bulte et al. (2005). The whole survey will take up to 15 minutes. To reduce the fall out in this part of the survey the script will be short. The script was shortened to reduce the amount of reading for the participants.

Section 5.

To make sure this survey will give a representative sample of the population among other reasons these next eight of questions are asked:

31. What is your Gender?
32. What is your Age?
33. What is your gross household income?
34. What is your highest level of education?
35. Do you have kids?
36. Do you live in a city or village?
37. Do you live in an area that overflows during extreme weather?
38. Tick which ones apply to you!
 - 1.1. I have an agricultural business
 - 1.2. I own a nature reserve
 - 1.3. I own an area or company I have to pay extra water board tax on (If your area or company is not covered by the two options mentioned above, check this option)
 - 1.4. None of the above applies

Questions 32 – 36 will measure the **social demographic** variables. Questions 36 and 37 are contextual variables that will measure the variable **living area**. Question 36 will ask where people live, in a city, suburb or rural. Question 38 will ask if there living are overflows with extreme weather. Question 38 is economic contextual variables measures the number of people who pay more than the normal amount of water board taxes.

Section 6.

Section 6 is the end page of the survey. In this page participants are thanked for the participation and are asked to leave their email when they would like to keep in touch of the results and win one of the VVV vouchers. There is also a section where people can leave any remarks on the survey as a hole, just one questions or leave a comment. These comment when useful can be used in the results of this survey.

4.2. Research area and target population

The Limburg Water Board covers an area of 2.209 KM², almost 1.2 million people live in this area. The Limburg Water Board manages 180 km of primary flood defenses and purifies around 150 million m³ wastewater every year (Waterschap Limburg, n.d.-a). The target audience are the citizens of Limburg who pay water board taxes. The participants need to be 18 and over and own or rent a house. Individuals that own a home or rent a home are obligated to pay water board taxes. This is shown in table 1 and 2 and explained in paragraph 2.1.2.

4.3. Data collection

During this research a literature study and a survey are used to answer the research questions. the survey consists almost entirely of closed questions which will ensure that there will be only quantitative data that can easily be used in SPSS. In the end of the survey there is one open question where people can leave any recommendation or comments. The questionnaire is in Dutch, to eliminate fall out through not understanding the English language. For most of the questions a so-called 5-point Likert-type scale will be used. The thesis relies on snowball and convenience sampling, as there was no budget to employ a professional survey company. On the 14th of July the survey was posted on several Facebook groups and LinkedIn. From here on people started to share the survey link on social media with friends and family who live in Limburg and pay waterboard taxes. Alongside social media, participants of previous research (van het Hoff, 2020) were contacted.

The data collection started on 14th of July and ended on the 14th of August. During this period the survey was re-posted every 3/4 days on various Facebook sites. After these 4 weeks 239 people completed the survey. From the 239 people who completed the survey, 18 did not live in the province of Limburg or did not pay water board taxes. The option “other” for gender was taken out of the SPSS output. There was one participant who chose this option, this ensured that the data of this participant was not included in the analysis. This resulted in a sample size (n) of 219 participants.

4.4. Data analysis

On the 14th of August, the survey data was downloaded from Qualtrics and uploaded in SPSS software (version 27). This Chapter will start with an overview of all the variable used in the SPSS analysis. Then, the results of the questionnaires will be discussed, hereafter an explanation of the test chosen for the SPSS analysis per research question will be given along with the hypotheses.

In table 3 an overview of all variables is given. The table starts with the dependent variables and continues with the Attitudinal variables, the Contextual variables and end with the Socio- demographics variables. The second column shows the measurement is displayed, so how this variable will be measured.

Table 3 Overview of the variables

| Variable name and questions | Measurement |
|---|---|
| <i>Dependent Variable</i> | |
| Policy support 1. I think it is important that the above-mentioned measures are taken | 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree |

| | |
|--|---|
| <p>2. I think it is important for the water board to deal with adaptation measures</p> <p>3. Floods are part of the equation, the above-mentioned adjustments are not necessary</p> | <p>5) Strongly agree</p> |
| <p><i>Attitudinal variables</i></p> | |
| <p>Environmental attitudes</p> <p>1. I am willing to give up part of my income if I was sure that the money would be used to fight environmental pollution</p> <p>2. It's just too hard for someone like me to do a lot for the environment</p> <p>3. There are more important things in life than protecting the environment</p> <p>4. Protecting the environment should be a priority, even if it slows economic growth and costs jobs</p> <p>5. There is no point in making an environmental effort if others don't do the same</p> <p>6. Many claims about the threatened environment are exaggerated</p> | <p>1) Strongly disagree</p> <p>2) Disagree</p> <p>3) Neutral</p> <p>4) Agree</p> <p>5) Strongly agree</p> |
| <p>Risk perception</p> <p>In the next 30 years, how certain are you that changes in the climate will have a negative impact on</p> <p>1. You and your family</p> <p>2. Your village</p> <p>3. Your province</p> <p>4. The Netherlands</p> <p>5. People across the world</p> | <p>1) Not at all sure</p> <p>2) A bit sure</p> <p>3) Somewhat sure</p> <p>4) Very sure</p> <p>5) Extremely sure</p> |
| <p>Awareness of consequences</p> <p>1. Carbon dioxide is a greenhouse gas</p> <p>2. Climate change/global warming is caused by excessive amounts of greenhouse gases</p> <p>3. The major cause of increasing atmospheric concentrations of greenhouse gases is burning of fossil fuels (such as gasoline)</p> <p>4. Climate change/global warming may lead to weather extremes, such as temperature increases, flooding, sea level rise, and extreme storms</p> <p>5. Climate change/global warming has been established as a serious problem for society and immediate action is necessary</p> | <p>1) Strongly disagree</p> <p>2) Disagree</p> <p>3) Neutral</p> <p>4) Agree</p> <p>5) Strongly agree</p> <p>6) I don't understand</p> |
| <p><i>Contextual variables</i></p> | |
| <p>Living Area</p> | <p>1) Urban</p> <p>2) Suburb</p> <p>3) Rural</p> |
| <p>Living in an area that can overflow</p> | <p>1) Yes</p> <p>2) No</p> |
| <p>Water board tax increase factors</p> | <p>1) I own an agricultural business</p> <p>2) I own a nature reserve</p> <p>3) I own an area or business that I have to pay additional water board tax on (If your area or business does not fall under the two options listed above, please tick this option)</p> <p>4) None of the above applies</p> |
| <p>Trust</p> <p>1. The government has a good climate policy</p> <p>2. I am confident that the Limburg water board is performing its tasks well</p> <p>3. I am confident that the government / water board will protect me against flooding</p> <p>4. I am confident that the Limburg water board and the government are handling my tax money well</p> <p>5. I don't mind that I have to pay more (water board) tax for climate policy (for example: adaptation measures)</p> | <p>1) Strongly disagree</p> <p>2) Disagree</p> <p>3) Neutral</p> <p>4) Agree</p> <p>5) Strongly agree</p> |

| | |
|--|---|
| | |
| Social norms 1. People in my environment (family / friends / neighbors) think climate change is important. 2. People in my area (family / friends / neighbors) try to combat climate change | 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree |
| Having Children | 1) Yes 2) No |
| <i>Socio-demographic</i> | |
| Gender | 1) Female 2) Male |
| Age | 1) 18-24 2) 25-34 3) 35-44 4) 45-54 5) 55-64 6) 65+ |
| Income | 1) Under 36.500 2) 36.500 3) Above 36.500 4) Don't want to say |
| Education | 1) No education 2) Primary education 3) Secondary education 4) Secondary vocational education (MBO) 5) Higher professional education (HBO) 6) Academic education |

As mentioned before in chapter 4.1.1.1. and shown in table 3, multiple questions are asked to measure one factor. For example, to measure the awareness of consequences 5 questions are asked. For the SPSS analyses the answers to these questions will be combined into one mean answer per participant. This mean answer shows the mean value of for example the variable knowledge per participant. These mean values will make it easier to look for correlations and provides a clear output in SPSS. Mean values will be calculated for the variables: policy support, awareness of consequences, risk perception, trust, environmental attitudes and social norms.

The variable awareness of consequences was transformed into a dummy variable to ease the interpretation. With 0 for Strongly disagree, disagree, Neutral & I don't know and 1 for Agree & Strongly agree.

Before combining the answers into new variables, a reliability analysis is carried out to ensure that the set of questions measure the same variable. In this research the Cronbach's Alpha will be used to test the internal consistency, in other words, how jointly linked a set of questions are as a group. When a group of questions produce similar answers under similar circumstances (female/ male/ different age groups etc.) the reliability of the group of questions will be high.

$$\text{Formula for Cronbach's Alpha: } \alpha = \frac{\text{The number of items (N)squared * Average covariance}}{\text{Sum of all the item variances + Sum of all covariances}}$$

In table 4 the Cronbach's alphas for the 6 new variables are shown. The group of items for risk perception show the highest internal consistency. The group of items for social norms has a low internal consistency; this can partly be explained by the fact that there are only two questions that measure the variable Social norms.

Table 4 Reliability analysis

| Variables | Cronbach's Alpha | Internal consistency |
|--|------------------|----------------------|
| Policy support (N=3) | $\alpha = 0.723$ | Acceptable |
| Awareness of consequences (N=5) | $\alpha = 0.805$ | Good |
| Risk perception (N=5) | $\alpha = 0.941$ | Excellent |
| Trust (N=5) | $\alpha = 0.775$ | Acceptable |
| Environmental Attitudes (N=6) | $\alpha = 0.751$ | Acceptable |
| Social norms (N=2) | $\alpha = 0.644$ | Low |

4.4.1. Descriptive statistic

The sample population consists of 92 females and 127 males (N=219). On average, a participant from this population is male, between 55-64 years old, highly educated and has an above average income. Next, the average participant agrees that adaptation measures are necessary. For the other key variables, risk perception, trust, environmental attitudes and social norm the histograms show that participants answered "neutral" on average, see table 5.

Table 5 Descriptive statistics for all variables

| Variable | Median | Mean |
|---------------------------------------|-------------|-------------|
| Policy support (ps) | 4.30 | 4.33 |
| Ps 1 | 4 | 4.37 |
| Ps 2 | 4 | 4.35 |
| Ps 3 | 4 | 4.17 |
| Environmental attitudes (ea) | 3.33 | 3.33 |
| Ea 1 | 3 | 2.86 |
| Ea 2 | 4 | 3.73 |
| Ea 3 | 4 | 3.49 |
| Ea 4 | 3 | 3.10 |
| Ea 5 | 4 | 3.46 |
| Ea 6 | 3 | 3.34 |
| Risk perception (rp) | 3.4 | 3.16 |
| Rp 1 | 3 | 2.91 |
| Rp 2 | 3 | 2.89 |
| Rp 3 | 3 | 3.04 |
| Rp 4 | 4 | 3.26 |
| Rp 5 | 4 | 3.71 |
| Awareness of consequences (ac) | 0.8 | 0.72 |
| Ac 1 | 1 | 0.68 |
| Ac 2 | 1 | 0.68 |
| Ac 3 | 1 | 0.62 |
| Ac 4 | 1 | 0.85 |
| Ac 5 | 1 | 0.78 |
| Trust (t) | 3.2 | 3.15 |
| T 1 | 3 | 2.59 |
| T 2 | 4 | 3.58 |

| | | |
|-------------------------------------|----------|-------------|
| T 3 | 4 | 3.66 |
| T 4 | 3 | 3.03 |
| T 5 | 3 | 2.88 |
| Social norm (Sn) | 3 | 3.16 |
| Sn 1 | 3 | 3.34 |
| Sn 2 | 3 | 3.08 |
| Living area | 1 | 0.9 |
| Living in an area that can overflow | 1 | 0.58 |
| Water board tax increase factors | 0 | 0.05 |
| Gender | 1 | .58 |
| Age | 5 | 4.45 |
| Income | 3 | 2.03 |
| Education | 5 | 4.74 |
| Having children | 1 | 0.76 |

Table 5 shows the median and mean for all variables used in this research, in addition to the combined variables. The combined variables are shown in bold, with the variables from which they are composed below. For instance, policy support in bold shows the combined variable that is composed by Ps 1, Ps 2 and Ps 3., which are fully mentioned in table 3. The combined and all other variables can be found in table 3.

Shown in table 6 are the descriptive statistics for the willingness to pay question. After removing those who did not answer in whole percentages and outliers (>100%), ending up with a sample size of 206 participants.

Table 6 Descriptive statistic of willingness to pay

| Type of framing | N | Mean | Std. Deviation |
|------------------------------|-----|---------|----------------|
| Local framing | 42 | 11.6905 | 22.12656 |
| Local framing +cheap talk | 49 | 14.7347 | 23.50778 |
| Distant framing | 52 | 8.5769 | 15.50123 |
| Distant framing + cheap talk | 63 | 12.1429 | 20.29211 |
| Total | 206 | 11.7670 | 20.40478 |

4.4.2. Multiple regression

To answer the sub questions (4) *What is the influence of attitudinal, contextual and socio-demographic factors on a person's climate policy support for adaption measures in water management?* and (5) *Which factors influence the willingness to pay for adaptation measures in water management?*. A multiple regression was chosen, because this analysis will show if one or more independent variable(s) can predict the dependent variable. So, the SPSS analysis will investigate the influence of all the variables named in table 3 for the dependent variable's policy support and willingness to pay. The outcomes of SPSS will be described in chapter 5. Results.

For the first analysis with dependent variable policy support it is assumed that the observations $y_1, y_2 \dots y_{219}$ are independent and normally distributed. For the second analysis with dependent variable willingness to pay it is assumed that the observations $y_1, y_2 \dots y_{206}$ are independent and normally distributed.

To explain the dependent variable policy support and willingness to pay this formula is chosen:

Multiple regression formulae:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Y= “Policy support for adaptation measures” / “willingness to pay for adaptation measures”

X₁ : Attitudinal variables

X₂ : Contextual variables

X₃ : Socio-demographic variables

Table 7 lists all hypotheses for the various variables. the results will be tested against these hypotheses, after which conclusions can be drawn.

Table 7 Hypothesis for all variables

| Variabel | Hypothesis effect on the policy support for adaptation measures in water management |
|--|---|
| Attitudinal variables | |
| Environmental attitudes | It is expected that participants with positive attitudes against climate change will be more supportive of adaptation measures (Corner et al., 2014; Kahan and Braman, 2006) |
| Risk perception | It is expected that people who experience a high risk perception for the negative impacts of climate change would have a higher policy support for adaptation measures (Frondel et al., 2017;Zaalberg et al., 2009). |
| Awareness of consequences | It is expected that participants who are aware of the climate change consequences will be more supportive of adaptation measures (Dietz et al., 2007; Park & Vedlitz., 2013; Rhodes et al, 2017; Steg & Abrahamse, 2005). |
| Contextual variables | |
| Living Area | It is expected that people living in the urban or suburb will be more supportive of adaption measures than people living in rural areas. |
| Living in an area that can overflow: | It is expected that people who live in an aera that can overflow will be more supportive of adaption measures than people living rural areas. |
| Water board tax increase factors | It is expected that people who pay more water board taxes than others will be less supportive of adaption measures than people who pay less taxes. |
| Trust | It is expected that people who have more trust in the government and waterboards will be more supportive of adaption measures than people have less or don't trust the government and water boards (Hagen et al., 2015; Rhodes et al., 2014; Rhodes et al., 2017) |
| Social norms on positive environmental attitudes | It is expected that participants who are confronted with socials norms on climate change will be more supportive of adaptation measures (Corner et al., 2014; Kahan and Braman, 2006) |
| Having Children | It is expected that people who have children will be more supportive of adaption measures than people who don't have children (Bain et al., 2016; Milfont, Wilson & Diniz, 2012; Thomas et al., 2018). |
| Socio-demographic variables | |
| Gender | According to the literature female are generally more supportive of environmental policies then males (Elliott et al., 1997; Rhodes et al 2014; Rhodes et al 2017). |
| Age | It is expected that younger people will be more supportive of environmental policies than older people (Elliott et al., 1997) |

| | |
|-----------|---|
| Income | It is expected that the higher the income the higher the support for adaptation measures in water management (Elliott et al., 1997). |
| Education | It is expected that the higher the education the higher the support for adaptation measures in water management (Elliott et al., 1997). |

In addition, it is expected that income, climate change beliefs and trust in the government will have a positive impact on the willingness to pay for adaptation measures (Bakaki & Bernauer, 2017 ;Solomon & Johnson,2009).

4.4.3. Mann–Whitney test

To answer sub question (6) *‘What is the effect of varying the framing of the willingness to pay question for adaptation measures in water management in two alternative way?’* a Mann-Whitney test was carried out. The Mann-Whitney U test is used, because this analysis will compare differences between two independent groups with a dependent variable. The dependent variable is the willingness to pay for adaptation measures and the independent groups are the different kinds of framing that were used. This analysis will investigate if the different forms of framing influences the willingness to pay. In this research 4 types of framing were used: Local framing (N=42), local framing + cheap talk (N=49), distant framing (N=52) and distant framing + cheap talk (N=63).

It is expected that local framing will have a positive influence on a person's willingness to pay for adaptation measures (Nolan & Tobia, 2019; Wiest et al., 2015). In addition, it is expected that cheap talk will have no influence on the willingness to pay for adaptation measures (Bergeron et al., 2019; Murphy et al., 2004).

5. Results

This chapter will start with an overview of the descriptive statistic from the SPSS analysis. Hereafter the relevant results will be shown for the research questions and the corresponding hypotheses will be tested. In this chapter the last three sub-research questions will be answered. In section 5.2., sub-research question 4 ‘*What is the influence of attitudinal, contextual and socio-demographic factors on a person’s climate policy support for adaption measures in water management?*’ and 5 ‘*Which factors influence the willingness to pay for adaptation measures in water management?*’ will be discussed. In section 5.3., sub-research question 6 ‘*What is the effect of varying the framing of the willingness to pay question for adaptation measures in water management in two alternative ways?*’ will be answered.

5.1. Descriptive statistics

In SPSS the results of the 219 completed surveys were analyzed, in table 8 an overview of the descriptive statistics for the socio-demographic variables are given. The majority of the population (90.9%) agrees with the statements that adaption measures are important and necessary. This shows that the population is supportive of adaptation measures in water management. Almost 42% of the participants is very sure that in the next 30 years, climate change will have a negative impact on themselves, family, city and the world. The other attitudinal variable shows that 42% of the participants have positive attitudes towards the environment. Next the contextual variables. Overall, the participants seem to trust the government, only 8% seems to distrust the government. It seems that in some cases a social norm is present, 40% of the participants have people in their surrounding that show positive attitudes towards the environment. For living area, 58% of the participants live in an area that overflows when there is heavy rainfall. Of this 58% percent, around 64% lives in a rural area, and less than 1% lives in an urban area. Of all participants, only 10 indicate that they have extra factors that ensure they have to pay more water board tax. Lastly for the socio-demographic variables, the sample size has a good distribution male (58%) female (42%). The participants seem to be well informed when it comes to climate change. Over 57% of the participants are older than 55, 90% is highly educated and over 50% earns more than the average (More than €36.500). Last, around ¾ of the participants has children.

Table 8 Overview of the descriptive statistics

| | Limburg (n = 219) | |
|------------------------------|-------------------|------------|
| | Frequency | Percentage |
| Policy support: | | |
| Strongly disagree | 0 | 0% |
| Disagree | 4 | 1.8% |
| Neutral | 16 | 7.3% |
| Agree | 105 | 48.0% |
| Strongly agree | 94 | 42.9% |
| Attitudinal variables | | |
| Risk perception: | | |
| Not at all sure | 19 | 8.7% |
| A bit sure | 39 | 17.8% |
| Somewhat sure | 63 | 28.8% |
| Very sure | 91 | 41.6% |
| Extremely sure | 7 | 3.1% |
| Environmental attitudes: | | |
| Strongly disagree | 0 | 0% |
| Disagree | 22 | 10.0% |
| Neutral | 95 | 43.4% |
| Agree | 93 | 42.5% |

| | | |
|--|-----|-------|
| Strongly agree | 9 | 4.1% |
| Awareness of consequences: Strongly disagree & disagree & Neutral & I don't know | 50 | 22.8% |
| Agree & Strongly agree | 169 | 77.2% |
| Contextual variables | | |
| Trust: | | |
| Strongly disagree | 1 | 0.5% |
| Disagree | 34 | 15.5% |
| Neutral | 110 | 50.2% |
| Agree | 73 | 33.3% |
| Strongly agree | 1 | 0.5% |
| Social norm: | | |
| Strongly disagree | 2 | 0.9% |
| Disagree | 16 | 7.3% |
| Neutral | 112 | 51.2% |
| Agree | 83 | 37.9% |
| Strongly agree | 6 | 2.7% |
| Living Area: | | |
| Urban | 22 | 10% |
| Suburb | 75 | 34.3% |
| Rural | 122 | 55.7% |
| Living in an area that can overflow: | | |
| Yes | 127 | 58% |
| No | 92 | 42% |
| Water board tax increase factors: | | |
| Owner of an agricultural business | 0 | 0 |
| Owner of a nature reserve | 2 | 0.9% |
| Owner of any company for which I pay extra water tax | 8 | 3.7% |
| None of the above | 209 | 95.4% |
| Socio-demographic | | |
| Sex: | | |
| Female | 92 | 42% |
| Male | 127 | 58% |
| Age: | | |
| 18-24 | 7 | 3.2% |
| 25-34 | 23 | 10.5% |
| 35-44 | 21 | 9.6% |
| 45-54 | 42 | 19.2% |
| 55-64 | 66 | 30.1% |
| 65+ | 60 | 27.4% |
| Income: | | |
| I don't want to say | 32 | 14.6% |
| Less than €36.500 | 45 | 20.5% |
| €36.500 (average income) | 27 | 12.3% |
| More than €36.500 | 115 | 52.5% |
| Education: | | |
| No education | 1 | 0.5% |
| Primary education | 1 | 0.5% |
| Secondary education | 15 | 6.8% |
| Secondary vocational education | 70 | 32% |

| | | |
|--------------------------------------|-----|-------|
| Higher professional education | 82 | 37.4% |
| Scientific education | 50 | 22.8% |
| Having children: | | |
| Yes | 166 | 75.8% |
| No | 53 | 24.2% |

5.2. Multiple regression analysis: policy support

A multiple regression analysis was chosen to answer sub-research question 4 ‘What is the influence of attitudinal, contextual and socio-demographic factors on a person’s climate policy support for adaption measures in water management?’. Columns (2) to (4) in table 9 show the results from estimating policy support for adaptation measures in water management. Column (2) reports the effect of the attitudinal variables on policy support. In model 1 risk is significantly correlated with policy support. Model 1 has an R square of .112, the R square shows the % of variation which can be explained by the model, see figure 2. This means that 11,2% of policy support can be explained by risk, environmental attitudes and awareness of consequences. In column (3) the contextual variables are added, model 2 contains the attitudinal and contextual variables. Model 2 has an R square of 0.187, which means that 18,7% of policy support can be explained by the attitudinal and contextual variables together. In model 2, the variables risk and trust are significantly correlated with policy support. By adding the contextual variables, the percentage declared by environmental attitudes has fallen sharply which results in no significant correlation between policy support and environmental attitudes. Column (3) adds the socio-demographic variables creating model 3. Model 3 has an R square of 0.242, which means that 24,2% of policy support can be explained by the attitudinal, contextual and socio-demographic variables together. In model 3, the variable risk, trust, age, income and having children show to have a significant correlation with policy support. Model 3 has the largest R square, which means that the variables all together explain more than separately which was predictable. Due to the high R square model 3 is the preferred model. This model includes the full set of independent variables.

In model 3, the variable risk, trust, age, income and having children show a significant correlation with policy support. The unstandardized B shows the slope between the slope of the line between the independent variable and the dependent variable. In this case policy support is the depend variable and risk, trust, age, income and having children are the (significant) independent variables. The unstandardized B for risk is .093, which means that for every one unit increase in risk the policy support for a person increases by 0.093 units. The unstandardized B for trust is 0.274 so, for every one unit increase in risk the policy support for a person increases by 0.274 units. For both trust and risk applies that the higher the risk/trust the higher a person’s policy support which is in line with the hypothesis. Risk refers to the risk perception of an individual towards the negative effects of climate change. Trust refers to an individual’s trust in the government and the water boards. The unstandardized B for risk is much lower than the unstandardized B for trust, which means that trust has more impact on the policy support than risk perception. The unstandardized B for having children is .237, however since the variable “having children” only has 2 values: 1 which is Yes and 0 which is No, a positive unstandardized B indicates that people who have children are more supportive towards adaptation measures in water management.

The unstandardized B for age is 0.097, so for every one unit increase in age the policy support for a person increases by 0.097 units. The values for age range from 1 18-24 to 6 65+, which indicates that older participants will have a higher policy support for adaptation measures. The unstandardized B for income is 0.080, so for every one unit increase in income the policy support for a person increases by 0.080. The values for income range from 0 “I don’t want to say” to 3 more than 36.500, which indicates that participants with a higher income show a higher policy support for adaptation measures.

Table 9 Multiple regression output with dependent variable policy support

| | Model 1 | Model 2 | Model 3 |
|-------------------------|-------------------|-----------------|-----------------|
| Risk | .107** (0.049) | .089* (.049) | .093* (.048) |
| Environmental attitudes | .113 | .057 | .052 |

| | | | |
|-------------------------------------|--------------------|--------------------|--------------------|
| | (.071) | (.076) | (.076) |
| Awareness of consequences | .249 (.167) | .173 (.164) | .174 (.162) |
| Trust | | .272*** (.068) | .274*** (.067) |
| Social norm | | -.032 (.069) | -.044 (.067) |
| Living Area | | .012 (.141) | -.027 (.139) |
| Living in an area that can overflow | | .101 (.088) | .047 (.087) |
| Water board tax increase factors | | -.167 (.193) | -.212 (.191) |
| Having children | | .117 (0.095) | .237** (.100) |
| Gender | | | -.011 (.087) |
| Age | | | .097*** (.032) |
| Income | | | .080** (.035) |
| Education | | | -.034 (.043) |
| Constant | 3.402*** (.210) | 2.854*** (.289) | 2.502*** (.359) |
| Observations | 219 | 219 | 219 |
| R Square | .112 (.598) | .187 (.580) | .242 (.566) |

* p< 0.10, **p< 0.05, ***p< 0.01

5.3. Multiple regression analysis: Willingness to pay

A multiple regression was chosen to answer sub-research question 5 ‘Which factors influence the willingness to pay for adaptation measures in water management?’. Columns (2) to (4) in table 10 show the results from estimating willingness to pay for adaptation measures in water management. Column (2) reports the effect of only the attitudinal variables on willingness to pay. No significant correlations between willingness to pay and the variables risk, environmental attitudes and awareness of consequences was found. Model 1 has a R square of 0.014, which means that just 1% of the willingness to pay for adaptation measures can be explain by model 1, see table 10. In column (3) the contextual variables are added, which creates model 2. In model 2, living in an area that overflows and water board tax increase factors are significantly correlated with policy support. Model 2 has an R square of 0.064, which means that only 6.4% of willingness to pay can be explained by the attitudinal and contextual variables together. Column (3) adds the socio-demographic variables. Model 3 shows that living in an area that overflows and water board tax increase factors are significantly correlated with policy support. Model 3 has an R square of 0.086, which means that less than 10% of the willingness to pay for adaptation measures in water management can be explained by the full set of variables in this research. Model 3 is preferred over the other models, because this model includes the full set of independent variables and has the highest R square.

In model 3, the variable Living in an area that can overflow, and water board tax increase factors show a significant correlation with the willingness to pay for adaptation measures. Living in an area that can overflow has an unstandardized B of 22.303, so for every one unit increase in living in an area that can overflow the willingness to pay increases by 22.303 units. Since the variable “living in an area that can overflow” only has 2 values: 1 which is Yes and 0 which is No, the maximum unit increase is 1. This shows that people who answered yes will have a higher willingness to pay for adaption measures. Water board tax increase factors has an unstandardized B of 51.169, so for every one unit increase in water board tax increase factors the willingness to pay increases by 51.169 units. Here also applies that, since the variable “water board tax increase factors” only has 2 values: 1

which is Yes and 0 which is No, the maximum unit increase is 1. This shows that people who answered yes will have a higher willingness to pay for adaption measures.

Table 10 Multiple regression with depended variable willingness to pay

| | Model 1 | Model 2 | Model 3 |
|-------------------------------------|----------------------|----------------------|----------------------|
| Risk | -9.569 (6.307) | -7.829 (6.406) | -6.399 (6.423) |
| Environmental attitudes | -3.573 (9.123) | -1.673 (9.923) | -4.376 (10.096) |
| Awareness of consequences | 25.375 (-3.573) | 25.363 (21.367) | 20.749 (21.634) |
| Trust | | -4.686 (8.851) | -4.941 (8.901) |
| Social norm | | -6.568 (8.929) | -7.212 (8.984) |
| Living Area | | -4.999 (18.358) | -4.675 (18.566) |
| Living in an area that can overflow | | 24.255** (11.407) | 22.303* (11.595) |
| Water board tax increase factors | | 49.907* (25.179) | 51.169** (25.393) |
| Having children | | -7.935 (12.431) | -3.723 (13.319) |
| Gender | | | -3.610 (11.637) |
| Age | | | 2.651 (4.283) |
| Income | | | 5.797 (4.728) |
| Education | | | 9.224 (5.786) |
| Constant | 52.958** (26.825) | 63.987 (37.405) | 11.968 (47.880) |
| Observations | 219 | 219 | 219 |
| R Square | .014 (76.486) | .064 (75.581) | .086 (75.385) |

* p< 0.10, **p< 0.05, ***p< 0.01

5.4. Mann-Whitney test

The man-Whitney test was chosen to answer sub-research question (6) *What is the effect of varying the framing of the willingness to pay question for adaptation measures in water management in two alternative way?'*. To answer this sub-research question the following types of framing where compared during the analysis: Local framing vs. Distant framing (A), Local framing vs. Local framing with cheap talk (B), Distant framing vs. Distant framing + cheap talk (C) and Distant framing + cheap talk vs. Local framing + cheap talk (D). Analysis A and D are done to see if local framing can increase the willingness to pay, analysis B and C are carried out to understand if cheap talk influences the willingness to pay. The results of the Mann-Whitney test are shown in table 11.

Table 11 Results of Mann-Whitney U test and percentage mean difference between difference sorts of framing.

| | Type of framing (mean) | Total N | Sig. | Percentage mean difference |
|---|--|---------|------|----------------------------|
| A | Local framing (11.6905) vs. Distant framing (8.5769) | 94 | .969 | 27% |

| | | | | |
|----------|---|-----|------|-----|
| B | Local framing (11.6905) vs. Local framing +cheap talk (14.7347) | 91 | .540 | 26% |
| C | Distant framing (8.5769) vs. Distant framing + cheap talk (12.1429) | 115 | .557 | 42% |
| D | Distant framing + cheap talk (12.1429) vs. Local framing + cheap talk (14.7347) | 112 | .877 | 21% |

The results of the Mann-Whitney test show that for all cases A-D, the null hypothesis has not been rejected. It seems that the distribution of willingness to pay is the same across all 4 types of framing. These results show that the different types of framing do not seem to have an effect on the participants' willingness to pay. However, looking at the mean willingness to pay per group there is a notable difference. Table 11 shows that participants who received the local framing are willing to pay more than people who received the distant framing. The mean willingness to pay of the group who received local framing is almost 27% higher than the group who received distant framing. In addition, the mean willingness to pay of the groups who received cheap talk is also higher than the groups who did not. As show in table 11 cheap talk seems to have much influence on the mean willingness to pay for the group who received distant framing and cheap talk. With cheap talk the mean is around 42% higher. Although the results show that there is a difference in means the results of the test were not significant. Which means that it cannot be established that these differences are due to the different types of framing used in this study.

6. Discussion

In section 6.1 and 6.2, the results of this study will be compared with existing literature. Section 6.1 is ordered per sub-dimension starting with the attitudinal variables, secondly the contextual variables and lastly the socio-demographic variable. In section 6.2 the results of varying the framing of the willingness to pay question for adaptation measures is discussed. After which recommendations for policy makers will be drawn in section 6.3. However, this study comes with some limitations that should be considered, that are discussed in section 6.4, and suggestions for future research, section 6.5.

6.1. Analysis of the empirical results

This research provides insight into why people support climate adaptation policies in water management, using survey data from a representative sample of citizens from the province of Limburg. In general, there appears to be an agreement that adaptation measures in water management are important and necessary and generally people show high support for these measures. In chapter five, the results of the empirical research were presented. In sections 6.1. – 6.3., the results are analyzed in order to answer the fifth sub research question of this research:

6.1.1. Attitudinal variables

In this study two attitudinal factors were included, which are risk perception towards climate change and environmental attitudes, one of which has a proven correlation with policy support. The results reveal that there is a significant correlation between environmental attitudes and the policy support for adaptation measures, when only taking the attitudinal variables into account. However, the results show that when the full set of variables are included, environmental attitudes are no longer significantly correlated with climate policy support. Which demonstrates that individuals who feel strongly about the environment and climate change are not necessarily more supportive of adaptation measures in water management. In addition, it was expected that people who are aware of the climate change consequences would be more supportive of adaptation measures (Dietz et al., 2007; Rhodes et al, 2017; Park & Vedlitz, 2013). However, the results of this study show that awareness of consequences of climate change has not too little impact on climate policy support.

The results reveal that there is a significant correlation between risk perception and the policy support for adaptation measures. It was expected that people who experience a high-risk perception of negative impacts for climate change would show a higher support for adaptation measures than others (Frondel et al., 2017; Zaalberg et al., 2009). The results support this hypothesis. It is known that the Netherlands is below sea level and is therefore at greater risk of flooding due to global warming. The people of Limburg have been confronted with floods numerous times, see section 2.2.1., next to high water levels almost every year. Research shows that people who have experienced natural events caused by climate change experience a higher risk perception (Frondel, Simora, & Sommer, 2017). In addition, research has shown that people who have experienced a flood before are more likely to take adaptation measures (Frondel et al., 2017). This corresponds to the results of this study, people who perceive a higher risk perception of the negative impacts of climate change are more supportive of adaptation measures in water management. And besides, many people indicated that they live in an area that overflows during high water levels, which may explain why people see climate change as a major problem. The results of this study could be complemented with qualitative work to shed light on the exact reasons for a high-risk perception to better understand the outcomes.

6.1.2. Contextual variables

In this study six contextual variables were included: trust in the government and waterboards, social norm on positive attitudes towards the environment, living area, living in an area that can overflow, factors that increase the water board taxes and having children. Of these six variables, trust and having children have demonstrated a correlation with support for adaptation measures.

It was expected that people who show higher trust in the government and waterboards would be more supportive of adaptation measures than people who show less or no trust in the government and water boards (Hagen et al.,

2015; Rhodes et al., 2014; Rhodes et al., 2017). The results support this hypothesis, people who have a high trust in the government and the waterboards, show a higher support for adaptation measures. This could be explained by the fact that people who trust the government and the waterboards will also agree with their choices and actions. And so, they will trust them to take the right decisions and thus support the adaptation measures taken by waterboards. In addition, the results show that risk perception is also significant it could be that these two are linked. There could be a link between a high-risk perception and trusting the government. These people might feel that the government and waterboards should ensure a safe living environment and keep them safe from the negative effects of climate change. And therefore, trust that the government and water boards take the necessary measures to keep people safe and protect them from flooding. Further research could investigate this connection.

It was expected that people who have children would be more supportive of adaptation measures than people who don't have children. This because people with children would like to ensure that their children grow up in a safe environment and preserve the environmental for future generations. The results support this hypothesis; the results demonstrate that people with children show a higher policy support for adaptation measures.

6.1.3. Socio-demographic variables

In this study four socio-demographic were included: gender, age, income and education. Of these four variables, age and income showed a correlation with support for adaptation measures.

The results demonstrate that older and wealthy individuals show a higher support for adaptation measures in water management. In contrast to earlier research (Elliott et al., 1997; Rhodes et al., 2014; Rhodes et al., 2017), older citizens show more support for adaptation measures. The results are in line with the results of the research of Dietz et al. (2007) who found that older people were more supportive for climate policies. In addition, in this study wealthier people showed more support for adaptation measures, which is also supported by the results of Dietz et al (2007). Older people living in the Maas region probably experienced high water levels more often and perhaps also experienced the floods of the nineties. This could explain why they would be more supportive of adaptation measures in water management. Wealthier people can pay their taxes more easily and this could explain why they are more supportive of adaptation measures.

6.2. Framing the willingness to pay question

It was expected that local framing would have a positive influence on a person's willingness to pay for adaptation measures (Nolan & Tobia, 2019; Wiest et al., 2015). In addition, it was expected that cheap talk would have no influence on the willingness to pay for adaptation measures (Bergeron et al., 2019; Murphy et al., 2004). The results demonstrate that using local framing or distant framing has no influence on the willingness to pay for adaptation measures. According to the Mann Whitney test, there does not appear to be a difference in the willingness to pay of people who have been given different types of framing. In addition, cheap talk also demonstrates to have no significant effect on the willingness to pay for adaptation measures. This was expected and supported by previous research (Bergeron et al., 2019; Murphy et al., 2004).

However, looking at the mean willingness to pay per group, there is a notable difference. Table 11 in section 5.3. shows that local framing and the use of cheap talk creates a higher mean willingness to pay. This does not mean that it can be assumed that local framing does have an effect on the willingness to pay, but a trend is visible. The local framing increases the mean willingness to pay with around 25%, in addition the cheap talk increases the willingness to pay with around 30%. Further research should show whether a greater and more even sample size would expose the effect of framing on the willingness to pay.

Second, in this study the same set of variables was used to see if there are factors influencing the willingness to pay for adaptation measures in water management. Of these 13 variables only two show a significant correlation with willingness to pay and adaptation measures. People living in a rural and suburb area are willing to pay more for adaptation measures. This could be explained by the fact that people living in rural and suburb areas are more often confronted with high water and floods. These people will also benefit more from the adaptation measures

themselves, than other people living in an urban area. Which could also explain their willingness to pay more. Next, people who pay more water board taxes show to have a higher willingness to pay for adaptation measures. Which is strange and would mean people who already pay more are also willing to pay more in the future. Which could be explained by the fact that the variable is not distributed fairly. Of the 219 participants, 10 participants indicated that they pay more water board taxes, this unequal distribution could have led to incorrect results.

The model used only explains 8% of the variance, which is low, and it means that roughly 92% of the willingness to pay for adaptation measures cannot be explained by the model. There are thus many more factors explain the willingness to pay. A number of participants disclose that they feel that the water board does not handle their money well. In addition, they feel that there is too much money made with the extraction of gravel in the Maas, of which people do not see any benefits in return. It almost seems that the trust in the Limburg Water Board is not too high. However, the results show that there is no serious distrust in the government or the water boards. These feelings could ensure that people would not be willing to pay more for adaptation measures.

6.3. Recommendations for policy makers

This study achieves the goal of gaining insights into the policy support for adaptation measures and the effect of framing on the willingness to pay, the goal of this research was threefold. The third aim of this study was to write recommendations for policy makers, by assessing individuals' characteristics of support for climate policies. The set of variables used in this study explain around 24% of why people support climate adaptation policy. The results show that policy makers should focus on trust and risk perception. These variables have demonstrated a link between them and policy support. The waterboards should therefore focus to increase people's trust in the water board. Further research is needed on how the water boards could increase the trust from the population, this was not included in this study. People who trust the water boards will trust them to take the right decisions and this will ensure that there is less resistance when new measures or policies have to be taken in the field of climate adaptation.

Dietz et al. (2007) mention that risk perception and trust are related. Dietz et al. (2007) and others affirm that due to the complex nature of climate change, people tend to rely on information from others they trust to assess the risk of negative effects of climate change and potential benefits of climate policies. And so, trust in the government will have an impact on the risk evaluation and the amount of policy support. Next to this, Hagen et al., (2015) mention that individuals indicate to be unsure about the real danger of climate change today and in the future, which assures that they often don't know which source of information to trust. Due to this uncertainty, people are hesitant to indiscriminately support climate policies. A well-designed communication program could reduce these doubts (Hagen et al., 2015). The results show that the variables: risk, trust, age, income and having children have a significant impact on the policy support for adaptation measures in water management. To be specific, older and wealthier individuals without children that show high risk perception for negative impacts of climate change, high trust in the government will be more supportive for adaptation measure in water management. A well-designed communication program can increase the trust in the government, which will in the end impact the risk evaluation and eventually increase the policy support.

In addition, the result show that it is highly probable that framing can have an effect on the willingness to pay for adaptation measures. However, the results were not significant, so there is no proven effect that framing affects the willingness to pay this is all suggestive. Further research is needed to establish this relationship, but the initial results indicate that the use of local framing and cheap talk increase the willingness to pay for adaptation measures.

6.4. Limitations

This study provides insights into the policy support for citizens of Limburg on adaptation measures in water management. With this, it has achieved the aim of this internship project: "provide knowledge to the Limburg Water Board on factors influencing the support for adaption measures by analyzing which factors influence an individual's policy support for adaptation measures in water management for the province of Limburg, the

Netherlands.” Although this study is carried out as structured and complete as possible, it does have some limitations.

The most striking limitation, influencing this study most, is that the data for this study has been collected in times of COVID-19. After 2 months of severe measures in March and April, easing started gradually from May. From July there were almost no measures left, at that time the survey was launched. There is a chance that these events may have affected the results of the study to some extent. Research should show whether COVID-19 influenced the results and whether the results would have been different under normal conditions.

Second, the literature on which the factors are based, are not specifically aimed at adaptation measures. The variables chosen in this study have not been used on adaptation measures before, however they have been used in climate policy research before. The breakdown of the concept “climate policy support” in the three different subdimensions and the operationalization of these dimensions with indicators has been done based on available climate policy literature. Nonetheless, research into the suitability of these variables might possibly show that better variables exist, which are more tailored to explain the policy support for adaptation measures.

Third, older, highly educated individuals as well as individuals with a higher income and individuals living in a rural area were overrepresented in the sample population. Unfortunately using Facebook led to a high non-response bias. 375 individuals started the survey, of which only 219 completed the survey. Unfortunately, this ensures that it will be difficult to generalize these results to other parts than Limburg. Research should show whether a more equal sample population would create different results.

6.5. Further research

The current set of variables explains 24%, which means that roughly 76% has not been explained and more research will be needed to see which other factors could explain a person’s policy support for adaptation measures in water management. Further research is needed to look for other factors or theories that would be more suitable to explain the support for adaptation measures. For instance, Corner et al. (2014) acknowledge that, the success of adaptation strategies will depend on what people value to be worthy to be preserved. Several comments from participants show that there is a lack of understanding about some of the measures taken by the water board of Limburg, for example the felling of trees and shrubs along the dike. Some also feel that the adaptation measures implemented by the Limburg Water Board in recent years have damaged nature. This could mean that people consider for example, the conservation of nature an important aspect when implementing adaptation measures. Further research should show whether the support for adaptation strategies depends on what people value to be worthy to be preserved, for example nature conservation.

Corner et al. (2014) acknowledge that, the success of adaptation strategies will depend on what people value to be worthy to be preserved. This theory may be applicable in this research. Several comments show that there is a lack of understanding about the felling of trees and shrubs along the dike. They also feel that the adaptation measures implemented by the Limburg Water Board in recent years have damaged nature. This shows that people consider the conservation of nature an important aspect when implementing adaptation measures. Further research should show whether conservation of nature is one of these values which are considered worthy to be preserved and will increase the support for adaptation measures.

The Netherlands has 21 different water boards spread across the country. In principle, the water boards have the same tasks, but each region has its own issues and focus points. Further research should reveal whether the results of this study would be different for any other water board. This applies to the policy support for adaptation measures and also to the willingness to pay. It could be that individuals living in Drenthe or near the west coast have other thoughts regarding adaptation measures in water management and would show a higher willingness to pay. When further research reveals that the results are the same per region, a national communication program can be developed instead of per region, for example.

Lastly, as mentioned earlier the result show that there is a chance that local framing can have an effect on the willingness to pay for adaptation measures. However, the results were not significant, implying that it cannot be assumed that framing influences the willingness to pay for adaptation measures. Further research is needed to establish this relationship, for this it is important that there is a large sample population and even sample groups.

7. Conclusion

This study aimed to gain insights in the support of citizens of Limburg on adaptation measures in water management. In this chapter, the sub-research questions are answered, followed by the conclusion regarding the main research question: “Which factors influence an individual's climate policy support for adaptation measures in water management?”

According to literature, what adaptation measures are currently being taken by the Limburg Water Board and how are the water board taxes composed?

In the last decade the Limburg Water Board has taken multiple adaptation measures a few measures are mentioned in section 2.2.2., more information can be found on the website of the “water in balans” program. The water board taxes consist of two charges: a water system levy and a purification levy. For a more detailed composition see sections 2.1.2. and 2.2..

According to literature, which factors influence citizens to accept to pay taxes?

The literature shows that a rational taxpayer would outweigh the benefits and cost of paying taxes and then decide. In addition, trust or distributive fairness and social norms influence a person’s compliance. When a person’s trust the government to handle the tax money with care their compliance will be high. This also counts for a ‘good example’, when there is a social norm in place where people comply to paying taxes, others will follow.

According to literature, which factors could explain climate policy support?

After an extensive literature study, the following factors are included that could explain climate policy support. The factors have been divided into 3 subdimensions (attitudinal, contextual and socio-demographic variables) according to the ABC model from Stern (2000).

The literature shows that risk perception and environmental attitudes, which are attitudinal factors, could influence a person’s policy support. Research shows that people who perceive a higher risk from the negative impacts of climate change will have a higher support for climate policies (see 3.2.3.). In addition, people who have positive attitudes towards climate change could show a higher climate policy support. Second, a social norm, trust in the government and water board, living area, living in an area that can overflow and factors that increase the water board tax could influence a person’s policy support (see 3.2.2.). The literature agrees that knowledge will not influence a person’s policy support, however this needs to be tested. Where there is a social norm in place and trust in their government and water board this could, just like with tax compliance, influence a person’s climate policy support. Lastly, research shows that knowledge on climate change, gender, age and education have an influence on climate policy support. In addition, income and having children are also included as personal capabilities factors (see 3.2.1.).

What is the influence of attitudinal, contextual and socio-demographic factors on a person’s support for adaption measures in water management?

The attitudinal variables explain 11.2%, the contextual variables explain 14.9% and the socio-demographic variables explain 5.0%. Altogether, the three variable groups explain roughly 24% of why people support adaptation measures. The variables: risk, trust, age, income and having children show a significant correlation with policy support. The results show that these variables have a positive influence on the policy support for adaptation measures in water management.

Which factors influence the willingness to pay for adaptation measures in water management?

Living in an area that can overflow and factors that increase the water board tax show to have a significant influence on the willingness to pay for adaptation measures. People living in an area that can overflow are willing to pay more for adaptation measures. People who already pay more water board taxes show to have a higher willingness to pay for adaptation measures, however it is expected that the unequal distribution could have led to incorrect results. Unfortunately, the model used only explains 8%, which means that roughly 92% of the willingness to pay for adaptation measures cannot be explained by the set of variables used.

What is the effect of varying the framing of the willingness to pay question for adaptation measures in water management in two alternative ways?

The Mann Whitney test showed that there is no significant difference between the mean willingness to pay when using the different types of framing. However, looking at the mean willingness to pay between the groups there seems to be a notable difference. The mean willingness to pay when using local framing is around 25% higher, in addition the mean willingness to pay when using cheap talk is around 30% higher. Further research is needed to see if a bigger and more even sample size will show significant differences or whether the observed difference are due to chance.

This leads to answering the main research question: **Which factors influence an individual's climate policy support for adaptation measures in water management?**

Altogether, the model explains around 24% of why people support climate adaptation policies. In general, there appears to be an agreement that adaptation measures in water management are important and necessary. The regression analysis showed several factors associated with citizen support: risk, trust, age, income and having children. People who perceive a high risk from negative impacts of climate change will have a higher policy support for adaptation measures. In addition, people who trust the government and the water boards will have a higher policy support for adaptation measures. Last, it turns out that older, wealthier people with children will generally be more supportive of adaptation policies. In addition, the Mann Whitney test shows that there is no significant link between framing and a higher willingness to pay, however there does seem to be big differences between the mean willingness to pay of the different groups. Further research should show if a bigger and more equal sample size will show statistical significance.

Although this study provides important information on the factors motivating the support for climate adaptation policies, it should be considered as a starting point for understanding the topic. This research provides insight into why people support climate adaptation policies in water management, using survey data from a representative sample of citizens from the province of Limburg. This study forms the base for further exploring individual characteristics of support for adaptation measures in water management in the Netherlands.

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Appendix A – The full survey in Dutch

Mijn naam is Sanne van Asselt en ben student Milieustudies aan de Universiteit van Wageningen. Ik ben op het moment bezig met mijn afstudeeronderzoek. Ik doe onderzoek naar duurzaam waterbeleid van het waterschap Limburg, en onderzoek hoe burgers naar waterbeleid kijken. Tijdens dit onderzoek word ik begeleid door Universitair Hoofddocent Dr. Andries Richter.

Als u vragen heeft over het onderzoek of meer informatie wilt dan kunt u contact opnemen met sanne.vanasselt@wur.nl. Graag zou ik u willen uitnodigen deel te nemen aan deze vragenlijst. Uw gegevens zullen vertrouwelijk worden behandeld, ze zijn niet herleidbaar naar individuele personen en ze worden anoniem verwerkt. Uw deelname aan dit onderzoek is geheel vrijwillig. U hebt te allen tijde het recht te stoppen met de vragenlijst. Alvast bedankt voor uw medewerking.

Ik heb de informatie in deze vragenlijst begrepen en ik stem vrijwillig in met deelname aan de vragenlijst:

Nee (1)

Ja (2)

Zou u alstublieft iedere vraag goed door willen lezen en zo eerlijk mogelijk antwoord geven. Er bestaat in deze vragenlijst niet zoiets als een goede of fout antwoord, het gaat om uw mening. Denk niet te lang na over uw antwoord. Het antwoord dat als eerste in u opkomt, is meestal het beste.

De Nederlandse overheid en de waterschappen zijn al een aantal jaar bezig om door middel van goed klimaatbeleid Nederland klaar te maken voor het veranderende klimaat, dit met behulp van adaptatie maatregelen. Adaptatiemaatregelen zijn maatregelen die de effecten van klimaatverandering tegengaan. Voorbeelden zijn; het verhogen van de dijken, verstevigen van duinen en steden aanpassen zodat ze extreme regen en extreme hitte kunnen weerstaan. Tijdens deze vragenlijst zal de focus liggen op adaptatie maatregelen. Hieronder ziet u een lijst van adaptatie projecten waar het waterschap van Limburg mee bezig is of al heeft uitgevoerd.

- Buffers aanleggen zodat het overtollig regenwater langzaam de grond in zal verdwijnen. (in Meerssen and Oirsbeek)
- Aanzanding van de waterbodem verwijderen. Door het weghalen van het slib of zand wordt de beek weer dieper en zal deze meer water kunnen verdragen (de Eckeltsebeek)
- Verbreden van watergangen en het vergroten, verleggen en verwijderen van een aantal verbindingsbuizen tussen sloten. (de Schelkensbeek)
- Tijdelijk opslaan van water in bovenstroomse gebieden bij Breevennen, hierdoor neemt het waterpeil benedenstrooms in Oostrum minder (snel) toe en zo is de kans op een overstroming nihil
- Het stroombed van de Maas met zo'n 300 hectare verbreed, de oevers verlaagd en dijken op een traject van twaalf kilometer versterkt en verhoogd. En daarnaast wordt er ook een groot nieuw natuurgebied gecreëerd. (Het grensmaas project)
- Als laatste geeft waterschap Limburg ook allemaal tips zodat u zelf uw huis kunt aanpassen en op deze manier de kans op overstromingen en de kosten zo klein mogelijk kunt houden.

Q1-3 Geef aan in hoeverre u het eens of oneens bent met de volgende uitspraken over adaptatiemaatregelen.

| | Helemaal mee oneens (1) | Oneens (2) | Neutraal (3) | Mee eens (4) | Helemaal mee eens (5) |
|-------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Ik vind het belangrijk dat de | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| bovengenoemde maatregelen worden genomen (1) | | | | | |
| Ik vind het belangrijk dat het waterschap zich bezighoudt met adaptatiemaatregelen. (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Overstromingen horen er nou eenmaal bij, de bovengenoemde adaptatiemaatregelen zijn niet nodig (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q4-8 Geef aan in hoeverre u het eens of oneens bent met de volgende uitspraken over klimaatverandering.

| | Helemaal mee oneens (1) | Oneens (2) | Neutraal (3) | Mee eens (4) | Helemaal mee eens (5) | Weet ik niet (6) |
|---|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Koolstofdioxide (CO2) is een broeikasgas (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Klimaatverandering/opwarming van de aarde wordt veroorzaakt door overmatige hoeveelheden broeikasgassen (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| De belangrijkste oorzaak van toenemende concentraties broeikasgassen in de atmosfeer is de | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| verbranding van fossiele brandstoffen (zoals benzine) (3) | | | | | | |
| Klimaatverandering/opwarming van de aarde kan leiden tot extreme weersomstandigheden (zoals extreme hoos/regenbuien) (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Klimaatverandering/opwarming van de aarde is een ernstig probleem voor de samenleving en onmiddellijke actie is noodzakelijk (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q9 Hoe zeker bent u dat in de komende 30 jaar veranderingen in het klimaat een negatieve impact zullen hebben op:

| | Helemaal niet zeker (1) | Een beetje zeker (2) | Ietwat zeker (3) | Heel zeker (4) | Extreem zeker (5) |
|--------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| U en uw familie (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Uw dorp/ stad (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Uw provincie (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Nederland (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mensen over de hele wereld (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q10-14 Geef aan in hoeverre u het eens of oneens bent met de volgende uitspraken over vertrouwen in het beleid van de overheid en het waterschap.

| | Helemaal mee oneens (1) | Oneens (2) | Neutraal (3) | Mee eens (4) | Helemaal mee eens (5) |
|--|-------------------------|------------|--------------|--------------|-----------------------|
|--|-------------------------|------------|--------------|--------------|-----------------------|

| | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| De overheid heeft een goed klimaatbeleid (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ik heb er vertrouwen in dat waterschap Limburg zijn taken goed uitvoert (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ik heb vertrouwen dat de overheid/ het waterschap mij beschermen tegen overstromingen (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ik heb vertrouwen dat waterschap Limburg en de overheid goed met mijn belastinggeld omgaan (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ik vind het geen probleem dat ik meer (waterschap) belasting moet betalen voor klimaatbeleid (bijvoorbeeld voor: adaptatiemaatregelen) (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q15-22 Geef aan in hoeverre u het eens of oneens bent met de volgende uitspraken over het milieu en uw omgevingen.

| | Helemaal mee oneens (1) | Oneens (2) | Neutraal (3) | Mee eens (4) | Helemaal mee eens (5) |
|--|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Ik ben bereid een deel van mijn inkomen af te staan wanneer ik er zeker van zou zijn dat het geld zou worden gebruikt om | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | | | | |
|--|---|---|---|---|---|
| milieuvervuiling tegen te gaan (1) | | | | | |
| Het is gewoon te moeilijk voor iemand als ik om veel voor het milieu te doen (2) | 0 | 0 | 0 | 0 | 0 |
| Er zijn belangrijkere dingen in het leven dan het milieu beschermen (3) | 0 | 0 | 0 | 0 | 0 |
| Het milieu beschermen moet prioriteit hebben, zelfs als dit de economische groei vertraagt en banen kost (4) | 0 | 0 | 0 | 0 | 0 |
| Het heeft geen zin om me in te spannen voor het milieu als anderen niet hetzelfde doen (5) | 0 | 0 | 0 | 0 | 0 |
| Veel beweringen over klimaatverandering zijn overdreven (6) | 0 | 0 | 0 | 0 | 0 |
| Mensen in mijn omgeving (familie/ vrienden/ burens etc.) vinden klimaatverandering belangrijk. (7) | 0 | 0 | 0 | 0 | 0 |
| Mensen in mijn omgeving (familie/ vrienden/ burens etc.) proberen klimaatverandering tegen te gaan | 0 | 0 | 0 | 0 | 0 |

ring tegen te
gaan (8)

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Q23 Woont u in de provincie Limburg?

Ja (1)

Nee (2)

Q24 Betaald u waterschapsbelasting?

Ja (1)

Nee (2)

Q25 Weet u hoeveel waterschapsbelasting u betaald over 2020?

Ja (1)

Nee (2)

Q26 Om te achterhalen hoeveel waterschapsbelasting u op het moment betaalt wil ik u vragen hieronder aan te kruisen welke voor u van toepassing is.

Ik woon alleen in een huurhuis (1)

Ik woon met 2 (uzelf en een ander persoon) of meer in een huurhuis (2)

Ik woon alleen in een Koophuis (3)

Ik woon met 2 (uzelf en een ander persoon) of meer in een Koophuis (4)

Display This Question:

If Q11 = Ik woon alleen in een huurhuis

Op het moment betaald iemand in uw situatie ongeveer 116 euro aan waterschapsbelasting over het jaar 2020

Display This Question:

If Q11 = Ik woon alleen in een Koophuis

Op het moment betaald iemand in uw situatie ongeveer 172 euro aan waterschapsbelasting over het jaar 2020

Display This Question:

If Q11 = Ik woon met 2 (uzelf en een ander persoon) of meer in een huurhuis

Op het moment betaald iemand in uw situatie ongeveer 220 euro aan waterschapsbelasting over het jaar 2020

Display This Question:

If Q11 = Ik woon met 2 (uzelf en een ander persoon) of meer in een Koophuis

Op het moment betaald iemand in uw situatie ongeveer 276 euro aan waterschapsbelasting over het jaar 2020

Q27 In de afgelopen 10 jaar hebben steeds meer mensen last van waterschade door het extreme weer. Om deze waterschade te beperken kan het waterschap Limburg besluiten om speciale maatregelen te nemen om zo de overstromingskansen bij u in de buurt te verkleinen. Dergelijke maatregelen zijn echter kostbaar. Zou u hieronder aan willen geven wat de maximale waterschapsbelasting verhoging per jaar is die u voor de bescherming van uw buurt bereidt zou zijn om te betalen? Al het geld zal worden gebruikt om buffers aan te leggen/ dijken te verhogen etc.

Maximale waterschapsbelasting verhoging per jaar (in hele procenten): (1)

Q28

In de afgelopen 10 jaar hebben steeds meer mensen last van waterschade door het extreme weer. Om deze waterschade te beperken kan het waterschap Limburg besluiten om speciale maatregelen te nemen om zo de overstromingskansen bij u in de buurt te verkleinen. Dergelijke maatregelen zijn echter kostbaar. Zou u hieronder aan willen geven wat de maximale waterschapsbelasting verhoging per jaar is die u voor de bescherming van uw buurt bereidt zou zijn om te betalen? Al het geld zal worden gebruikt om buffers aan te leggen/ dijken te verhogen etc.

Let op: Dit is een hypothetische vraag! U hoeft het geld niet echt te betalen. Over het algemeen hebben mensen moeite met het beantwoorden van hypothetische vragen. Mensen bieden doorgaans meer geld dan dat ze echt bereid zijn om te betalen. Probeert u bij het beantwoorden van onderstaande vraag te bedenken of u dit bedrag werkelijk zou willen betalen om ervoor te zorgen dat uw buurt minder vaak overstroomd. Probeert u zich voor te stellen dat dit bedrag daarna niet meer beschikbaar zal zijn om andere aankopen mee te financieren. Zou u hieronder aan willen geven wat de maximale waterschapsbelasting verhoging per jaar is die u voor de bescherming van uw buurt bereidt zou zijn om te betalen? Al het geld zal worden gebruikt om buffers aan te leggen/ dijken te verhogen etc.

Maximale waterschapsbelasting verhoging per jaar (in hele procenten): (1)

Q29 In de afgelopen 10 jaar hebben steeds meer mensen last van waterschade door het extreme weer. Om deze waterschade te beperken kan het waterschap Limburg besluiten om speciale maatregelen te nemen om zo de overstromingskansen in Limburg te verkleinen. Dergelijke maatregelen zijn echter kostbaar. Zou u hieronder aan willen geven wat de maximale waterschapsbelasting verhoging per jaar is die u voor de bescherming van de provincie Limburg bereidt zou zijn om te betalen? Al het geld zal worden gebruikt om buffers aan te leggen/ dijken te verhogen etc.

Maximale waterschapsbelasting verhoging per jaar (in hele procenten): (1)

Q30 In de afgelopen 10 jaar hebben steeds meer mensen last van waterschade door het extreme weer. Om deze waterschade te beperken kan het waterschap Limburg besluiten om speciale maatregelen te nemen om zo de overstromingskansen in Limburg te verkleinen. Dergelijke maatregelen zijn echter kostbaar. Zou u hieronder aan willen geven wat de maximale waterschapsbelasting verhoging per jaar is die u voor de bescherming van de provincie Limburg bereidt zou zijn om te betalen? Al het geld zal worden gebruikt om buffers aan te leggen/ dijken te verhogen etc.

Let op: Dit is een hypothetische vraag! U hoeft het geld niet echt te betalen. Over het algemeen hebben mensen moeite met het beantwoorden van hypothetische vragen. Mensen bieden doorgaans meer geld dan dat ze echt bereid zijn om te betalen. Probeert u bij het beantwoorden van onderstaande vraag te bedenken of u dit bedrag werkelijk zou willen betalen om ervoor te zorgen dat de provincie Limburg minder vaak overstroomd. Probeert u zich voor te stellen dat dit bedrag daarna niet meer beschikbaar zal zijn om andere aankopen mee te

financieren. Zou u hieronder aan willen geven wat de maximale waterschapsbelasting verhoging per jaar is die u voor de bescherming van de provincie Limburg bereidt zou zijn om te betalen? Al het geld zal worden gebruikt om buffers aan te leggen/ dijken te verhogen etc.

Maximale waterschapsbelasting verhoging per jaar (in hele procenten): (1)

Q31 Wat is uw geslacht?

Vrouw (1)

Man (2)

Q32 Wat is uw leeftijd?

18-24 (1)

25-34 (2)

35-44 (3)

45-54 (4)

55-64 (5)

65+ (6)

Q33 Wat is uw huishoudelijk bruto jaar inkomen?

Minder dan € 36.500 (1)

€ 36.500 (modaal) (2)

Meer dan € 36.500 (3)

Zeg ik liever niet (4)

Q34 Wat is uw hoogst genoten opleiding?

Geen opleiding (1)

Basisonderwijs (2)

Voortgezet onderwijs (3)

Middelbaar beroepsonderwijs (MBO) (4)

Hoger beroepsonderwijs (HBO) (5)

Wetenschappelijk onderwijs (6)

Q35 Heeft u kinderen?

Ja (1)

Nee (2)

Q36 Woont u in een stad of dorp?

Stedelijk (stadscentrum, dicht bebouwd) (1)

Buitenwijk (net buiten een stad, met meer gespreide woningen) (2)

Landelijk (ver weg van een stad, met zeer gespreide woningen) (3)

Q37 Woont u in een gebied wat bij extreem weer overstroomt?

Ja (1)

Nee (2)

Q38 Kruis aan welke voor u van toepassing zijn!

Ik ben eigenaar van een agrarisch bedrijf (1)

Ik ben eigenaar van een natuurgebied (2)

Ik ben eigenaar van een gebied of bedrijf waar ik extra waterschapsbelasting over moet betalen (Als uw gebied of bedrijf niet valt onder de twee boven genoemde opties kruis dan deze optie aan) (3)

Geen van bovengenoemde is van toepassing (4)

Bedankt voor het invullen van de vragenlijst!

Als u op de hoogte gehouden wil worden van de uitkomsten van mijn afstudeeronderzoek en kans wilt maken op een van de VVV bonnen dan kunt u hieronder uw email adres achterlaten.

Als u opmerkingen of vragen heeft over het onderzoek of over een specifieke vraag dan kunt u die hier onder achterlaten!
