

Master's thesis

A discursive-institutional research into the discourses on water of the policy actors in the Meuse-basin during drought-periods

With the focus on Flanders, Wallonia and the Netherlands



Author

C. J. Bosch

Educational institution

Radboud University

Educational programme

Environment and Society - specialisation: Local Environmental Change and Sustainable Cities

Date

August, 2022

Educational institution

Radboud University

Educational programme

Environment and Society - specialisation: Local Environmental Change and Sustainable Cities

First reader and supervisor

dr. M. Kaufmann

Second reader

dr. F. Landau-Donnelly

Wordcount (excluding references)

22.590

Radboud Universiteit



Abstract

This master thesis conducted research into the discourses of policy actors in the Netherlands, Flanders and Wallonia along the Meuse-basin regarding waterquality- and quantity during drought-periods. The Meuse is a transboundary river and this transboundary river is possibly facing multiple drought-threats in the future. The aim of this research was to do a discourse-analysis of the policy actors of Wallonia, Flanders and the Netherlands and analyse if there are conflicting discourses which influence the policy agreements and social institutions that are in place in the current policy domain.

Results showed that there are no conflicting discourses in which there are ontological opposite views between the policy actors of Flanders, Wallonia and the Netherlands. It is clear that all respondents which were interviewed were aware that drought is a challenge for the Meuse-basin, on water-quantity as well as water-quality. Furthermore, a positive development is that results show that international cooperation on drought, especially with the help of the International Meuse Commission, in the Meuse-basin, has evolved in the last years, following the droughts between 2017 and 2020.

However, there seems to be a discursive difference which influences the institutionalisation of these discourses. Due to the societal and economic dependence on the Meuse-basin and due their downstream position, Flanders and the Netherlands experience the problem of drought more intensely than Wallonia. Results, furthermore, show that Wallonia lacks the institutional capacity to sometimes match the ambition of the Netherlands and Flanders.

Key words

Drought, climate change, transboundary river-basin, discourse analysis, discursive-institutionalism

Content list

List of figures	
List of abbreviations.....	
1. Introduction	1
1.1 Introduction to climate change and drought	1
1.2 Water scarcity due to human interventions	1
1.3 Problem statement	3
1.3.1 Problem statement.....	3
1.3.2 Research motivation	5
1.4 Research questions	6
1.5 Research aim	7
1.6 Societal and scientific relevance	7
1.6.1 Societal relevance.....	7
1.6.2 Scientific relevance	8
1.7 Reading guide	8
2. Theoretical framework.....	10
2.1 Definition of a discourse	10
2.2 Discursive institutionalisation.....	10
2.3 The Policy Arrangement Approach.....	12
2.4 Operationalisation and conceptual framework.....	14
2.4.1 Operationalisation of the discourse on water	14
2.4.2 Operationalisation of the institutionalisation of the discourse on water	15
2.4.3 Conceptual framework.....	17
3. Methodology.....	19
3.1 Research philosophy	19
3.1.1 Ontology	19
3.1.2 Epistemology	19
3.2 Research strategy	20
3.3 Research methods and data collection	21
3.3.1 Semi-structured interviews.....	21
3.3.2 Document analysis	21
3.3.3 Sampling strategy	22

3.3.4 List of respondents	22
3.4 Data analysis	25
3.5 Validity, reliability and research ethics	25
3.5.1 Validity.....	25
3.5.2 Reliability	26
3.5.3 Research ethics	26
4. Results.....	28
4.1 The discourse on water-quantity	28
4.1.1 Ontological layer	28
4.1.2 Normative layer	30
4.1.3 Strategic layer	31
4.1.4 Conclusion	32
4.2 The discourse about water-quality.....	33
4.2.1 Ontological layer	33
4.2.2 Normative layer	34
4.2.3 Strategic layer	35
4.2.4 Conclusion	35
4.3 The institutionalisation of the discourses on water	36
4.3.1 Institutionalisation of the water-quality discourse	36
4.3.2 Institutionalisation of the water-quantity discourse.....	38
5. Conclusion	44
5.1 Answering the main-research question	44
5.2 Conceptual attributions	45
6. Limitations and recommendations	46
6.1 Limitations	46
6.2 Recommendations for further research.....	47
References	49
Appendix I: Questionnaire of the research.....	54
Appendix II: Codebook	56

List of figures

Figure I (front cover): Bergsche Maas (Retrieved from: website Rijkswaterstaat)

Figure II: The Meuse (Retrieved from: website Wikipedia, subject: the Meuse)

Figure III: Usage of water pertaining to total stock of available water (Retrieved from: World Resources Institute (2019) in Willems, 2021).

Figure IV: Tetrahedron of the Policy Arrangement Approach (Retrieved from: Liefferink, 2006)

Figure V: Conceptual framework (Retrieved from: own work)

List of abbreviations

EU	European Union
EC	European Commission
IMC	International Meuse Commission
IPCC	Intergovernmental Panel on Climate Change
PAA	Policy Arrangement Approach
WAM	Werkgroep Afvoer Regulering Maas
WFD	Water Framework Directive
VNBM	Vlaams Nederlandse Bilaterale Maascommissi

1. Introduction

The first chapter will introduce the subject of this research.

1.1 Introduction to climate change and drought

Due to the emission of CO₂ in the atmosphere, the global mean temperature on the earth is rising. Currently, compared to pre-industrial levels, the global mean temperature has already risen to 1.07°C (IPCC, 2021). The authors of the IPCC report of 2021 state that: *"...it is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred"* (p. 4). Authors of this IPCC report warn that this change in global temperature already caused an increased frequency, intensity and duration in extreme weather-events, such as heatwaves, droughts and severe storm- and flood-events.

This research will specifically be focused on the weather-related phenomenon drought. The phenomenon drought can be defined as:

"...an interval of time, generally of the order of months or years in duration, during which the actual moisture supply at a given place rather consistently falls short of the climatically expected or climatically appropriate moisture supply" (Palmer, in Lloyd-Hughes, 2014, p. 607).

The rise in global mean-temperature will speed up the hydrological cycle, therefore the evaporation and precipitation will increase and thus, droughts are expected to intensify in the future (Mishra and Singh, 2010). According to Tannehill (1947, in Sivakumar et al, 2014) drought can be seen as a complex natural hazard and is usually defined as a 'creeping phenomena'. It is seen as a creeping weather-phenomena due to the length of its occurrence. According to Graham (2000) other natural hazards are mostly brief and short-lived, unlike the weather-phenomenon drought, which slowly takes hold of an area and strengthens its grip with time.

A severe drought can cause a reduction in water-supply and water quality, increased fire-hazard, crop failure and an increase in wild-life death rates, with several social-economic impacts as a consequence (Sivakumar et al, 2014). Due to its creeping character and the length of occurrence, there are a lot of authorities that are struggling to successfully cope with the impacts of drought on their society (Rossi, 2000). Wilhite and Vanyako (2000) argue that throughout history drought has been a threat to the survival of human societies and it has often been a trigger for massive human migration, famines and wars.

1.2 Water scarcity due to human interventions

Wilhite, Sivakumar and Pulwarty (2014) state that drought is a natural phenomenon, because evaporation and precipitation will automatically increase in spring- and summertime due to persistent large-scale disruptions in the global circulation pattern of the atmosphere and, therefore, it occurs in all climatic regimes. Drought, however, like all natural hazards, also has a social

dimension. Rossi (2000) states that a drought is perceived as a disaster when it affects the economic interests and social well-being of a community. The associated risks of all natural hazards, including drought, is a product of the region's exposure to a risk, the probability and severity of occurrence, and the vulnerability of a society to the event (Blaikie et al, 1994; in Wilhite, Sivakumar, Pulwarty, 2014).

According to Wilhite, Sivakumar and Pulwarty (2014) exposure to drought varies spatially and the occurrence of drought cannot be altered. On the other hand, vulnerability is determined by social factors, such as e.g. demographic characteristics, social behaviour, water use trends and government policies. These factors can change overtime and hence, the vulnerability of a society to the consequences of drought can increase or decrease.

This research will be focused on specifically one consequence of drought, (impeding) water scarcity during drought. This consequence is specifically chosen because socioeconomic developments, such as the growing world population, growing food demand and rise in living standards, increasingly put pressure on our global freshwater resources (Veldkamp et al, 2017). This societal pressure on these water-resources can lead to water scarcity, Veldkamp et al (2017, p. 2) define water scarcity as: *"...the temporal deficits in freshwater resources compared with anthropogenic and environmental demands."* This consequence of drought is a direct interplay between a changing environment and growing society and therefore an interesting research-object. From a governance perspective, this is also rather interesting, because drier conditions due to a changing climate and a growing societal pressure on these resources can lead to societal conflicts, as water is the essential resource of life (Donahue, 1998). Conducting research on this consequence of drought and generating new knowledge about it is important with the aim to create more drought-resilient governments and societies in the future.

To keep up with these growing demands as Veldkamp et al (2017) described large-scale human interventions in water-basins, throughout history, have taken place; e.g. land cover change to enable irrigation, dams and reservoirs to control the natural streamflow and withdrawals from water surface bodies and groundwater (Veldkamp et al, 2017).

Large-scale human interventions in water-basins can possibly lead to conflict between regions or countries, especially due to the fact that almost half of the global land area is covered with transboundary rivers and lakes (Veldkamp et al, 2017). These areas are home to 40% percent of the global population (Munia et al, 2016).

Intensifying droughts and pressure on water resources in the future will, likely, create political as well as societal tension about water-division between users of shared water-basins. Research, done by the World Meteorological Organisation (2021), concludes that in 2050 more than 5 billion people worldwide will have, at least temporarily, insufficient access to clean freshwater due to climate change. Furthermore, Gleditsch et al (2006) argue that countries that share a river have a higher chance to be involved in a (militarised) interstate dispute. Brochmann and Gleditsch (2012) explain that rivers are prone to interstate conflict because river-sharing relationships are inherently asymmetric. Hence, the upstream state is considered to have the upper-hand because that state has control over the headwaters of a basin. Consequently, Brochmann and Gleditsch (2012) argue, any action taken by the upstream state may result in a unidirectional consequence for the downstream

state, e.g. water scarcity due the placement of a dam or reservoir or water pollution. However, upstream states are not always favoured by the asymmetric relationship because downstream states can block upstream states from access to important harbours or the sea, which will negatively influence their participation in international trade (Brochmann, Gleditsch, 2012). Collier (2007, in Brochmann and Gleditsch, 2012) states that being landlocked is a critical development trap.

Policymakers as well as scholars are warning that transboundary water conflicts in the future are likely to occur or become more severe, due to population growth as well as climate change (Brochmann and Gleditsch, 2012)

1.3 Problem statement

In this section the research-subject and problem statement of this research will be elucidated.

1.3.1 Problem statement

The continent of Europe has been affected by a number of major drought events in the last couple of decades (Mishra and Singh, 2010). An example of a recent period of drought was the summer of 2018 . This 2018-drought caused severe crop damage, economic damage and fanned wildfires all through Europe (Dunne, 2020). Van der Wiel, Lenderink and de Vries (2021) from the Royal Netherlands Meteorological Institute (in Dutch: KNMI) argue in their research that; not only that future-droughts in the Netherlands and neighbouring countries (North-West Europe) are likely to become more severe, but the spatial extent of future events will also become larger. They argue that adaptation to drier conditions is inevitable and necessary to prevent large-scale drought-crises with all its disruptive consequences, like water scarcity and a damaged food production.

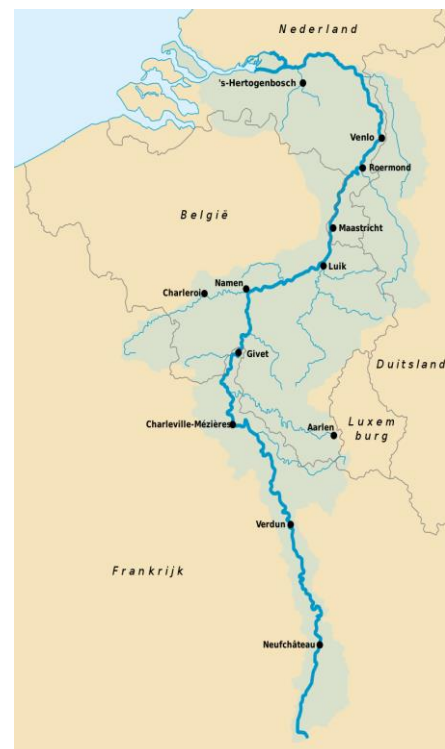


Figure II: The Meuse (source: Wikipedia, the Meuse)

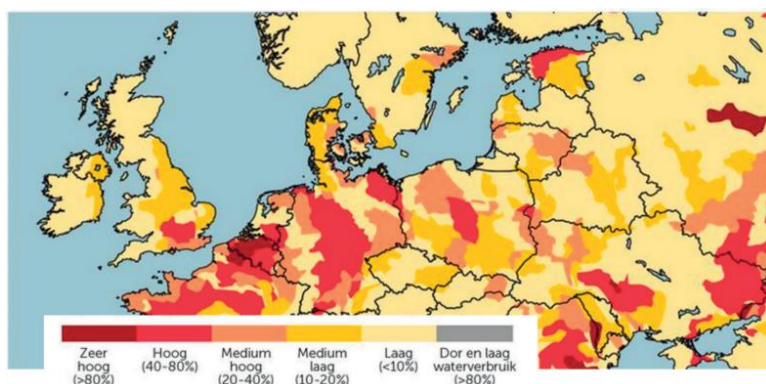
The continent of Europe is home to several transboundary rivers, like the Rhine, the Danube and the Meuse (Gupta & Bravard, 2010). The Meuse-river will be the subject of this research. The Meuse springs in Pouilly-en-Bassigny in France and after 953 kilometres it mouths into the sea in Haringvliet, the Netherlands (van Vliet & Zwolsman, 2008). According to the Wit et al (2007) the Meuse-basin, including tributaries, covers an area of approximately 33,000 km², including parts of France, Luxembourg, Belgium, Germany, and The Netherlands. The Meuse-river will be subject of this research because this river is a rain-fed river and characterised by a highly variable discharge regime and is therefore sensitive to drought (Zwolsman, 2008). Hence, in summer and autumn there are commonly low river discharges. Furthermore, the Meuse-basin stretches through five European countries; all of these countries make use of the Meuse-river and its tributaries. Therefore, during

drought this river-basin is, due to its transboundary character, vulnerable to possible water conflicts. The physical as well as governmental characteristics makes it an interesting and suitable research-object.

Although low river discharges are a natural phenomenon and not a problem in itself, the low river discharges in the Meuse are a problem because the river fulfils an important societal function. Water from the Meuse is extracted for domestic use and drink water supply for 6 million inhabitants of Belgium and the Netherlands (Van Vliet and Zwolsman, 2008). The water of the Meuse-river, furthermore, functions as irrigation water for agriculture and cooling water for power plants (Van Vliet and Zwolsman, 2008). Lastly, the river has an important economic function in Europe because the river connects the port of Antwerp and Rotterdam, through channels such as the Albert- and Julianachannel, with the European hinterland (de Wit et al., 2007).

This research will be focused on the part of the river from Liège to its mouth in Haringvliet. Especially on this part of the river there has been a lot of human-made interventions. This part of the river is regulated, deepened and canalised due to its capricious character (Arends, 2005). Belgium constructed the Albert-Canal in 1939 which connected Liege with Antwerp. The canal is part of the Kempische Kanalen, which is a system of seven channels, built between 1827 and 1947, to provide Flanders with fresh water. Water for these channels is extracted from the Meuse (Bastings, Jaskula and Maeghe, 2011). The Netherlands also built the Juliana Canal and the Zuid-Willemsvaart to improve navigability of the Meuse. Thus, as the Meuse flows downstream, the demand for Meuse-water and the societal pressure on the water increases (report IMC, 2020). The figure below presents the water usage pertaining to the total stock of available water. It is visible that the south of Netherlands as well as Belgium, especially Flanders, has a very high usage of water in relation to the total availability of water (Willems, 2021). Hence, both countries are vulnerable to more extreme droughts due to climate change.

Figure III: Usage of water pertaining to total stock of available water (World Resources Institute (2019) in Willems, 2021).



Moreover, a period of drought on the Meuse is a twofold problem which affects water in two ways; the water-quantity as well as the water-quality is affected. Due to drought and precipitation deficits,

the water-quantity on the Meuse will decrease (RIWA Maas, 2021). This will possibly put pressure on the policy actors that are dependent on water from the Meuse.

Furthermore, in a qualitative way; due to a decrease in water-quantity there is also a decrease in the quality of the Meuse-water (RIWA Maas, 2021). The Meuse-river is also used to offload waste products of industry, agriculture or medicine residues along the Meuse-basin in the water. If there is a decrease in water quantity there will be not enough water to efficiently dilute the waste products and therefore the quality of the water will worsen (RIWA Maas, 2021). If the water quality worsens due to drought, it can reach a point that the intake for water has to be stopped for a while. Furthermore, an increase in air temperature and the reduction of the flushing of water in river-systems enhances (toxic) algal bloom in the water (Mosley, 2015).

Due to the multiple drought-threats that this part of the Meuse-basin is facing, the policy actors in this part between Liège and Haringvliet will be the focus of this research. The canal system is included in this focus. Because these canals are part of the Meuse-basin and not the Meuse-river itself, the phrasing Meuse-basin will be used instead of the phrasing the Meuse-river.

1.3.2 Research motivation

The Meuse is a transboundary river and this transboundary river is possibly facing multiple drought-threats in the future. The difficulty of these threats are that many actors are involved and all have their own interest in using the Meuse-water. This can possibly complicate international cooperation, Mirumachi and Allan (2007) argue that the upstream-states with relatively more power in the basin, can determine the status quo of water allocation or water quality. Mirumachi and Allan (2007) therefore conclude that effective transboundary cooperation is difficult, because there is asymmetric power-relation and upstream states can dictate the pace of international cooperation. Donahue (1997, in Vij, Warner and Barua, 2020) states that water conflicts between states can possibly arise because water can, for example, be understood in different ways: as political good (for power), an economic good (in a marketplace) or a cultural good (difference in cultural value). Therefore, transboundary water interactions are inherently political (Vij, Warner and Barua, 2020).

Different understanding of water can result in discursive conflicts between policy actors. A discourse can be understood as a: *".....an ensemble of ideas, concepts and categories through which meaning is given to phenomena"* (Hajer, 1993). Discourses about drought and its complications, such as water scarcity, can differ. For example, according to West and Smith (1996) the labelling and identification of drought and its complications, in e.g. Australia, depends on an interplay of social and natural forces and is, therefore, not objectively. Several areas within Australia with low rainfall are not considered dry because of low economic activity (Heathcote 1973, in West and Smith, 1996). This can result in a discursive conflict, in which one country along the river-basin does not experience drought as the other actor does, for example.

Discourses on water can differ and, in the context of climate change and growing societal pressure on the water resources, these different discourses can possibly lead to (discursive) conflicts. It is, therefore, important to do research into the discourses of the involved policy actors of the Meuse-basin. The Meuse-basin is chosen as a research-object because of its societal relevance for Belgium, which Wallonia and Flanders are part of, and the Netherlands and its vulnerability to the multiple

drought-threats. Discursive conflicts can possibly originate because there are a lot of policy actors that make use of the Meuse-water and societal pressure on the basin is high.

1.4 Research questions

The Meuse-basin, especially the downstream part from Liège to its mouth, is facing multiple drought-threats with potentially far-reaching impact in the future due to climate change. Hence, the Meuse provides a great societal function and several policy actors are dependent on this river. This can possibly, in the future, create political as well as societal tension between these policy actors. Therefore, this research will research if there are indications of a discursive conflict and how the possibly conflicting discourses on water between the policy actors are influencing the current institutionalisation of the policy domain (that will be explained in the next chapter).

The main research question of this research will be:

Are there any conflicting discourses on water, during drought-periods, between policy actors in the Meuse-basin and how are these (possible) conflicting discourses influencing the institutionalisation of transboundary drought-related policies?

The objective of answering this research question is to understand how the discourses of these policy actors are influencing the current policy arrangements or social institutions that are in place regarding the Meuse-basin. The operationalization of the discourses will be set out in the next chapter. As stated above, the focus in the sub-questions will be on the policy actors in Wallonia, Flanders and the Netherlands, because the part from Liège is .

To answer the main-research question in a thorough way, sub-questions will have to be answered. These questions are:

- 1) *What are the discourses of the policy actors regarding water-quantity, during drought-periods, in the Meuse-basin?*

This sub-question will answer what the discourse is of the policy actors in the Meuse-basin regarding water quantity during drought-periods. Important to mention, the term water-quantity in this research will be related to the quantity of water during drought-periods and not related to other quantity-related issues like (flash)floods or high-water in the river-basin. Water-quantity can thus be seen as low-water in this research.

- 2) *What are the discourses of the policy actors regarding water-quality, during drought-periods, in the Meuse-basin?*

This sub-question will answer what the discourse is of the policy actors in the Meuse-basin regarding water-quality during drought-periods in the Meuse-basin.

- 3) *How are the discourses, on water quantity- and quality, of the policy actors in the Netherlands, Flanders and Wallonia, regarding the Meuse-basin during drought-periods, institutionalised?*

This sub-question will answer how the discourses of the policy actors, which are being discussed in the previous sub-questions, are institutionalised in the policy domain along the

Meuse-basin. According to Burstein (1991, p. 328) a policy domain can be defined as: “...*a component of the political system that is organised around substantive issues*”. The substantive issue, that this policy domain is organised around, is international water-management in the Meuse-basin. Within this policy domain there are policy agreements and social institutions, an explanation about that will be given in the next chapter. This sub-question has a transboundary focus, which means that this question is especially focused on the institutionalisation of these discourses on water on an international level.

After answering the sub-questions, which will create a thorough understanding of the discourses and the institutionalisation of the discourses, the main research question can be answered.

1.5 Research aim

The overall objective of this research is to create a deeper, exploratory understanding of the discourses on water during drought along the Meuse and, therefore, contribute to a better understanding of how these discourses are institutionalised in the current international policy arrangements that are in place. In this way, it is possible to create an insight at the dynamics at play and an understanding on how these discourses, possibly, differ between policy actors. With this newly-gathered knowledge about these discourses, e.g. policy measures can be inserted to improve future transboundary cooperation between the policy actors along the Meuse. This explorative research can, secondly, provide new recommendations for future in-depth research on specific fields of drought-related issues along the Meuse-basin. The third aim of this research is to gain knowledge for other countries with a shared water-basin about transboundary water cooperation and to, ultimately, create more drought-resilient societies.

1.6 Societal and scientific relevance

This section will set out the scientific as well as societal relevance of this research.

1.6.1 Societal relevance

The Meuse is a transboundary river which is possibly facing multiple drought-threats. Especially the part of the Meuse-basin from Liège till its mouth in Haringvliet, due to the high societal pressure on the basin. As stated above, Donahue (1997, in Vij, Warner and Barua, 2020) states that water conflicts between states or stakeholders can arise because water can be understood in different ways: as political good, an economic good or a cultural good. In a changing climate it is of utmost importance to conduct research into the discourses on water of the policy actors in a shared river basin, like the Meuse. Creating a better understanding about discursive dynamics can be valuable for all policymakers that are involved in the Meuse-basin or other transboundary river-basins; these discursive dynamics can give insight into how the indicators in the policy domain (which will be explained in chapter two) influence each other. This research will hopefully contribute to a better discursive awareness between policy actors. Information about discourses and (possible) conflicts enables policy actors to engage in conversation and cooperate together to ensure a resilient river-basin.

1.6.2 Scientific relevance

There has already been done a lot of discursive-research on the water-interactions of transboundary river-basins. According to Vij, Warner and Barua (2020) these interactions are inherently political, because water can be understood in different ways (Donahue (1997) in Vij, Warner and Barua, 2020) or the discourses about drought and its implications can differ (West and Smith, 1996). However, the focus of most of this discursive-research on water discourses is not the continent of Europe; like Hussein (2019) who did a discourse-analysis research on transboundary water governance in Jordan, Williams (2018) who did a transboundary discourse analysis on water-governance in Southeast-Asia or West and Smith (1996), who focused their discourse-research on Australia.

Regarding the European rivers, there has been discursive-research on transboundary river-basins as for floods (Wiering & Arts, 2006; van Eerd, Dieperink & Wiering, 2017, Kaufmann, 2017). However, there has been little attention paid to drought yet in discursive research with the scope of European rivers. The research that has been conducted on the Meuse regarding drought is largely technical of nature, e.g. predicting the effect of climate change on regime-discharges (de Wit et al, 2007; Sjerps, ter Laak & Zwolsman, 2017; de Wit et al, 2001; Arends, 2005). The approach of this research will be focused on discourse-level and has therefore this research will conduct a more social approach.

As stated in 1.3.1, drought affects the water in a river in two ways: the quality of the water deteriorates and the quantity of the water decreases. Previous research (Hussein, 2019; Williams, 2018; West and Smith, 1996) was mainly focused on the discourse on a decrease of water-quantity, as a consequence of drought. However, because drought affects the water in quality as well as quantity this research will also take the discourse on quality into account. Therefore, it adds scientific relevance, because it deepens the understanding of a discourse.

However, this research will build conceptually on the conclusion of Hussein (2019). The author stated that cooperation or conflict on a transboundary river is not shaped by the discourse on water-scarcity alone. It is important to take into account the broader context, like e.g. national agendas or interests. Therefore, this research will take indicators into account that add a broader understanding of the cooperation on transboundary rivers during droughts. By taking into account the broader context this research will add the asymmetrical nature of river-basin relationships to this research with the help of the dimensions of the Policy Arrangement Approach (will be discussed in the next chapter). Taking into account these broader dimensions will hopefully extend the understanding on how these discourses influence the policies or institutions that are in place.

1.7 Reading guide

In the first chapter the reader has been introduced to the subject and problem statement of this research. The second chapter will elaborate the theoretical framework on which this research will be based. In the third chapter the methodology will be explained. The methodology consists of an explanation of the methods that are used to acquire the research results. The fourth chapter will set out the acquired research results and answer the sub-questions. In the conclusion chapter, which is chapter five, the main research question will be answered. The sixth chapter, and besides the last, will reflect and discuss the conclusions and the process of doing this research. This discussion exists

out of a discussion about the limitations of the research and implications and suggestions that can be drawn from the research results.

2. Theoretical framework

In the following section the definition and theories about discursive institutionalism and the Policy Arrangement Approach by Van Tatenhove, Arts and Leroy (2000) will be set out. These concepts will be the theoretical foundation of this research.

2.1 Definition of a discourse

Hajer (1993) defines a discourse as: *"...an ensemble of ideas, concepts and categories through which meaning is given to phenomena"*. A discourse, according to Schmidt (2008), is the interactive process of conveying ideas. Ideas are the substantive content of a discourse. Schmidt (2008) argues that ideas exist at three levels - as policies, programs and philosophies. The first level is the 'policy solutions' proposed by policymakers to adopt in a society. The second level of ideas are the more programmatic beliefs or underlying assumptions that underpin those policy solutions, that operate in the space between worldviews and specific policy ideas. The public philosophies are the deepest level of ideas, which touches a deeper core of organising principles and values. According to Schmidt (2008) these underlying assumptions are rarely contested, except in times of crisis. These levels of ideas tend to have two types of ideas: cognitive and normative (Schmidt, 2008). Cognitive ideas are based on interest-based logic and necessity, while normative ideas are attached to values and define 'what is good and what is bad'. Therborn (1982, in Kaufmann, 2017) also distinguishes three layers, like Schmidt (2008), of a discourse; an 'ontological', a 'normative' and a 'strategic' layer. The ontological layer describes how a phenomenon is perceived in the world, i.e. if and how a severe drought in the Meuse-basin is perceived. The second layer that Therborn (1982) distinguished is the normative layer. According to Kaufmann (2017) the normative layers describe the elements that form the actor's preferences or values or what is considered good and bad. The last layer is the strategic layer, this layer describes which policies are realistic and feasible (Kaufmann, 2017).

According to Arts and Buizer (2009) policy controversies can be found in conflicting frames or assumptions which competing parties hold. In this research these conflicting frames could, for example, be a different understanding of water (Vij, Warner and Barua; 2020). These 'underlying frames' need to be identified to solve a conflict. Because identifying can lead to 'reframing', which is necessary to accomplish a joint solution. The aim of a discourse analysis is to uncover so-called 'underlying frames', understanding guiding principles is significant if we want to understand how policies are created and supported (Glenk and Fisscher, 2010, in van Eerd et al, 2017).

2.2 Discursive institutionalisation

Hajer (1997) argues that environmental conflicts have changed because it has become discursive. It no longer focuses on the question of whether there is an environmental crisis, but it is essentially about its interpretation (Hajer, 1997). Hajer continues:

"Environmental politics is only partially a matter of whether or not to act, it has increasingly become a conflict of interpretation in which a complex set of actors can be seen to participate in a debate in which the terms of environmental discourse are set." (Hajer, 1997, p. 15)

There has been a change in perception of language in politics, according to Hajer (1993). Hajer argues that in the positivist tradition in social science language was seen as a means, language was seen as a neutral system to describe the world. However, he argues that in the postpositivist tradition language has been recognized as a medium, a system through which actors not only describe but create the world with their language. As a consequence, environmental politics becomes a struggle for discursive hegemony in which the actors, that are involved in the policy domain, try to make the other actors see the problem according to their view and try to secure support for their definition of reality (Hajer, 1997). This argumentative game for discursive hegemony is based on three factors; it depends on the (i) credibility, (ii) acceptability and (iii) trust that others have in a certain discourse and its implications (Hajer, 1997).

This struggle of discursive hegemony takes place in existing institutional practices. Based on the structure of the three factors Hajer (1997) argues that discourses are socio-cognitive products. When these discourses are translated into certain practises and commitments and are routinely reproduced it creates social institutions. Wahlström and Sundberg (2018) state that institutions are not 'real' in a material way, but institutions are socially real and shape the social reality.

Institutions can be defined as:

"...the humanly devised constraints that structure human interaction. They are made up of formal constraints (e.g., rules, laws, constitutions), informal constraints (e.g., norms of behaviour, conventions, self-imposed codes of conduct), and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies." (North, 1994 in Miller, Rhodes and Macdonell, 1997, p. 159)

Discursive-institutionalism is the 'newest' sort of institutionalism whereby ideas and discourses have a more prominent role in institutional change and development instead of e.g. ratio or history. A discourse is institutionalised when it is translated into (i) concrete policies and (ii) institutional arrangements (Hajer, 1997). Hajer (1997) argues that one could speak of discursive hegemony in a certain domain when a discourse is institutionalised. According to the discourse coalition approach actors with various backgrounds, in the political arena, can form a coalition around a specific story line or discourse. If these coalitions have a discursive hegemony in a certain policy domain or a society in general, they are able to impose their view of reality onto others, create social practises and criticise alternative arrangements (Hajer, 1993).

This research will use the discursive-institutional approach as a theoretical framework. Due to the societal pressure on the water of Meuse-basin and the ever increasing pressure due to climate change, the Meuse-basin is an arena of different discourses between policy actors. This being the case, this research will conduct research into the different discourses on water of the policy actors and analyse how these discourses are shaped into or influence transboundary policy agreements or social institutions.

There has already been limited discursive research into drought in Europe. Salgado and Molina (2014) researched the resistance of social actors, which is called a discursive hegemony, to abandoning traditional planning practices despite the droughts in Spain with the help of a discursive

analysis. Urquijo, De Stefano and Calle (2015) researched which mechanisms are used to securitize a certain discourse around water-scarcity to shape public actions. The authors argued that securitization of the discourse is achieved using both linguistic and institutional mechanisms. Whereby creating the sense of urgency was the fast-track to the approval of measures.

2.3 The Policy Arrangement Approach

Another theoretical framework that will be used in this research, in combination with the discourse-institutional approach (DI), is the Policy Arrangement Approach (from now on: PAA). The concepts that are used in the PAA, which will be set out below, are suitable to be the conceptual foundation of this research.

This framework is developed by Van Tatenhove, Arts and Leroy (2000). According to the authors this framework was developed to assist understanding the dynamic between stabilisation and change in environmental policy. The reason this framework is used in this research is because the three theoretical concepts on which this framework is based are strongly linked to DI (see below). Furthermore, the four indicators of the Policy Arrangement Approach, which will be explained below, create a thorough yet organised picture of indicators that in a policy domain exists.

The Policy Arrangement Approach is based on three theoretical concepts:

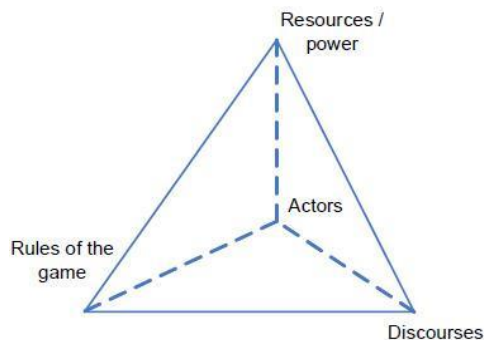
- 1) **Institutionalisation**; As already stated above (see: 2.2), this term refers to the phenomenon whereby patterns arise in the actions of people. These actions will, as a result, solidify into structures. Consequently, these structures will structure the behaviour of the people and create social institutions (Arts, Leroy, van Tatenhove, 2006);
- 2) **Policy arrangements**; Arts, Leroy and van Tatenhove (2006) define a policy arrangement as: *"...the temporary stabilisation of the content and organisation of a policy domain (p. 96)"*. It furthermore refers to how a policy is shaped, in terms of organisation and substance, in a bounded time-space context (Arts, van Tatenhove, 2004). Because a policy cannot exist without organisation (departments, division of tasks, procedures etc.) and substance (principles, objectives and measures).
- 3) **Political modernisation**; Refers to the processes of social change and their impact on the policy domain. According to the Arts et al (2006) political modernisation has a structural character because there are always social, economic and political processes and trends in society which can induce new ideas and practises that influence the policy domain.

According to Arts, Leroy and van Tatenhove (2006) these three theoretical concepts incorporate the development, (temporal) stabilisation and (continual) change of these structures. As stated above, these three theoretical concepts, which are the foundation of the PAA, are based on discursive-institutional principles. These concepts describe how social processes and discourses are continually changing and how this influences the policies that are in place. According to Bakker et al (2013) the PAA builds upon different frameworks of policy analysis e.g. discourse-analysis and it is a way to analyse processes of institutionalisation.

The substantial and organisational characteristics of a policy arrangement can be analysed with the help of four indicators, which are based on these three theoretical concepts. These indicators are interwoven, which means that if one indicator changes, it will also influence the other indicators.

Liefferink (2006) pictured these indicators in a tetrahedron (see: *figure III*). Each corner is one of those indicators and the tetrahedron symbolises the connection between these indicators. The author argues that if one of these indicators changes, whether through unintended or deliberate intervention, the rest of these indicators will automatically also change. This interconnection between the dimensions is why it is a useful framework for this research, because this framework gives the possibility to analyse how these indicators react to each other and how it influences the policy domain. This framework can therefore be applied to many issues within a policy domain.

Figure IV: Liefferink (2006), Tetrahedron of the Policy Arrangement Approach



In the section below the indicators of the PAA will be set out;

The first indicator is *actors*. The actors are the stakeholders that are involved in the policy domain. These actors could have different interests, resources and policy discourses. When there are a number of players that share the same policy objective or discourse, they could form a policy coalition. This formed coalition could share a dominant discourse and achieve, as Hajer (1993) would call it, a discursive hegemony. However, other actors in the policy arrangement could challenge these discourses. Van Tatenhove and Arts (2004) speaks, in this case, of challenging and supporting coalitions.

The second indicator is *resources*. According to Arts and van Tatenhove (2004) this indicator is strongly related to power in a policy domain. It refers to the ability of actors to mobilise resources in order to achieve certain policy outcomes in social relations.

The *rules of the game* are the third indicator. This indicator refers to the (in)formal rules or procedures of interaction between the actors in a certain policy domain. This research, as described above, will emphasise the connection between the indicators 'rules of the game' and 'discourses', because discourses can be institutionalised. When they are institutionalised, they are part of the indicator 'rules of the game'.

The last indicator is the *discourses*. As well as Hajer (1993) and Schmidt (2008) the authors Van Tatenhove, Arts and Leroy (2006) argue that this dimension relates to the views and narratives of all actors involved, which exist out of norms and values, solution to problems and views of the problem.

The Policy Arrangement Approach is used in scientific literature about transboundary river governance, especially related to flooding (e.g. Van Eerd, Wiering, Dieperink, 2017; Wiering, Arts; 2006; Kaufmann, Mees, Liefferink, Crabbé, 2016). Therefore, it seems to be a solid framework to use in transboundary research. Furthermore, there seems to be a gap in literature because the Policy Arrangement Approach has, so far, not been used related to transboundary river-governance on drought.

2.4 Operationalisation and conceptual framework

In this subsection there will be an explanation on how the concepts of discourse-institutionalisation by Hajer (1993) and Therborn (1982) and the Policy Arrangement Approach by van Tatenhove, Leroy and Arts (2000) are used in this research.

2.4.1 Operationalisation of the discourse on water

Firstly, the discourse that will be analysed during this research has to be defined. The discourse definition of Hajer (1993) is: “...a discourse is an ensemble of ideas, concepts and categories through which meaning is given to phenomena”. The phenomena, which is mentioned in the definition of Hajer (1993), in this research is; water-quantity as well as water-quality during drought-periods in the Meuse-basin.

The discourse in this research will be operationalised with the help of the three-layer theory of Therborn (1982). Therborn (1982, in Kaufmann, 2017) distinguishes three layers in a discourse: the ‘ontological’, the ‘normative’ and the ‘strategic’ layer (see: 2.1). The ‘ontological’ layer refers to world views or paradigms of the policy actors. Questions like ‘how do we see reality?’ or ‘how do we define problems?’ are ontological in nature (Wiering & Arts, 2006). In this research the ontological layer will be used to define how the policy actors see the phenomenon of drought and its implications for the (use of) water in the Meuse-basin. The normative layer of the discourse has to deal with the normative character of the discourse and refers to the values that are at stake. Regarding this research, this layer will research the norms and values actors have regarding water and what these policy actors consider good or bad regarding water(use). According to Therborn (1980, in Wiering and Arts, 2006) the strategic layer deals with the policy programs of the actors, and it refers to the question of what the policy actors conceive as feasible and desirable as a solution to a problem. This layer in this research will probe how actors define the policy that actors see as desirable on water-management during drought in the Meuse-basin. In using these three layers during this research, there will hopefully be an in-depth understanding of the water-discourses of the actors along the Meuse-basin.

In the table below the operationalisation of the discourse will be summarised

Operationalisation	
Discourse	The discourse in this research, which is analysed, is about the phenomena of water-quantity- and quality in the Meuse-basin during drought-periods. These discourses will be answered separately.
Ontological layer (Therborn, 1982)	This layer refers to worldviews or paradigms of the policy actors which are involved in the water-management or use of the Meuse-basin. It will be used to define how the policy actors see the phenomenon of drought (also in light of climate change) and its implications on water in the Meuse-basin.
Normative layer (Therborn, 1982)	This layer will research the norms and values actors have regarding water.
Strategic layer (Therborn, 1982)	This layer in this research will probe how actors define the policy that actors see as desirable on water-management during drought in the Meuse-basin.

2.4.2 Operationalisation of the institutionalisation of the discourse on water

The concepts of the Policy Arrangement Approach by van Tatenhove, Leroy and Arts (2000) are used because this framework clearly summarises all the main concepts and interlinked dynamics that are in place in a policy domain.

In terms of the Policy Arrangement Approach, the aim of this research is to research how the discourse of the actors, in the policy domain of the Meuse-basin, have been institutionalised (*rules of the game*, in terms of the PAA) and how these policy agreements or social institutions have been shaped. The focus will be international institutionalisation, because the Meuse is a transboundary river with many actors involved. According to Hajer (1997) a discourse is institutionalised when it is translated into (i) concrete policies or policy agreements and (ii) institutional arrangements or institutions. Arts, Leroy, van Tatenhove (2006) describe institutionalisation as the phenomenon whereby patterns arise in the actions of people. These patterns will structure their behaviour and create social institutions.

In this research there will be a difference in policy agreements and social institutions. Policy agreements will strongly relate to the definition of *rules of the game* and are, thus, related to the formal international agreements around water between the actors in the Meuse-basin. A social institution can be defined as an organisation which consists of an embodied structure of differentiated roles, occupied by human persons (Miller, 2010). So, the policy agreement indicator will focus on the formal international rules, while the social institution indicator will focus on the international cooperation-structures or institutions around water in the Meuse-basin.

In this research there will also be analysed if and in what way actors and resources influence the process of discourse-institutionalisation. In the conceptual framework (in the next section) there will be a visual representation. According to Wiering and Arts (2006) actors can be operationalised into stakeholders with a certain interest, their policy objective and actor-coalitions and oppositions (see: indicator *actors*, 2.3). The operationalisation of resources can be divided into political influence and power relations (Wiering and Arts, 2006). According to Arts and Van Tatenhove (2004) resources refer to the ability of actors to mobilise resources in order to achieve certain policy outcomes in social relations, be it with political influence or a power-relationship. The indicator power-relationship is included in this research, based on the theory of Brochmann and Gleditsch (2012); they state that rivers are prone to interstate conflict because river-sharing relationships are inherently asymmetric. Resources, in this example e.g. the geographical location of a country along a river-basin, can hypothetically influence the agreements or institutions that are in place.

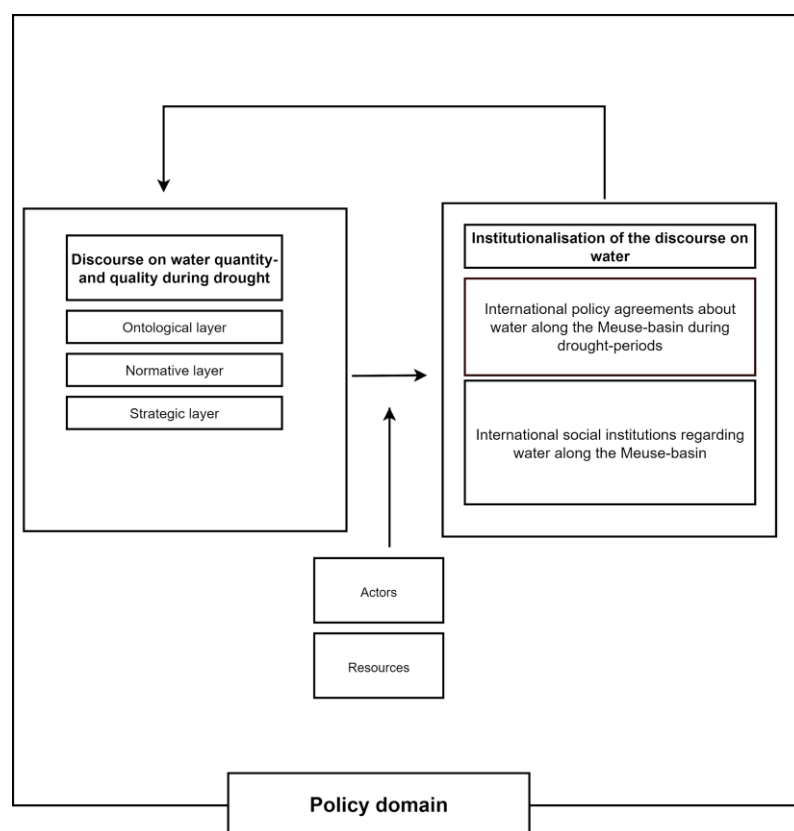
In the table below this operationalisation will be summarised.

Operationalisation	
Discourse	Discourse on water-quantity during drought
	Discourse on water-quality during drought
Institutionalisation	International policy agreements
	International social institutions
Actors	Interest of an actor
	Policy objective of an actor
	Actor coalitions or oppositions
Resources	Political influence
	Power-relationship

2.4.3 Conceptual framework

In the conceptual framework below there will be a visual representation of the expected relationship between the indicators in this research. This framework is based on the concepts of the Policy Arrangement Approach and the concepts of the discursive-institutional approach by Hajer (1995) and Therborn (1982). An explanation of the hypothetical relations between the indicators will follow after the figure IV.

Figure V: Conceptual framework (own work)



As visible in the conceptual framework, the discourse, for the water quantity as well as the water quality, will be operationalised through the layers of Therborn (1982). It is assumed that the water-discourse has an influence on the institutionalisation of the international policy agreements and international social institutions that are in place in the Meuse-basin regarding drought.

This conceptual framework also takes into account the influence of the indicators actors and their resources on the institutionalisation of the discourses. This can also relate to the theory of Brochmann and Gleditsch (2012), they state that rivers are prone to interstate conflict because river-sharing relationships are inherently asymmetric. Resources, in this example e.g. the geographical location of a country along a river-basin, can hypothetically influence the agreements or institutions that are in place.

Another assumption is that the discourse and the institutionalisation of the discourse are mutually influenced by each other. Hypothetically, if a policy actor is not content with how the discourse is institutionalised it can affect the discourse of the concerned actor and affect the cooperation between the policy actors.

3. Methodology

In this chapter the methodological choices of this research are discussed. First, the philosophy of this research is discussed, to explain from which perspective methodological choices are made in this research. Secondly, the strategy that is followed will be justified. Then, the methods and collection of data will be set out, to provide insight in how data is collected and analysed. This chapter will end with a section about validity, reliability and research ethics of the research.

3.1 Research philosophy

According to Saunders, Lewis and Thornhill (2019) the term research philosophy refers to “...*a system of beliefs and assumptions about the development of knowledge*” (p. 130). A philosophical perspective is a set of assumptions that structure the approach to research, it is underpinned by ontological and epistemological influences and determines how a researcher creates knowledge and derives meaning from their data (Moon and Blackman, 2014). Moon and Blackman (2014) state that two main branches are important in the research philosophy; ontology and epistemology. The first branch about ontology refers to the question on what reality is and about what people can know about. Epistemology, the second branch, is concerned about how people can gather knowledge.

3.1.1 Ontology

Moon and Blackman (2014) distinguish two ontological positions; realism and relativism. Realist ontology states that there exists one reality that can be studied, understood and experienced as a “truth” (Moses and Knutsen, 2012 in Moon and Blackman, 2014). On the contrary, relativist ontology argues that reality is constructed by the human mind. Therefore, multiple realities exist because each person experiences reality differently due to social and physical characteristics.

This research will take a relativist ontological approach. Due to the social and physical characteristics of the Meuse-basin, every policy actor can hypothetically experience a different reality and view on drought. This will be researched into the ‘ontological discourse-layer’ by Therborn (1982). This layer describes how a phenomenon is perceived in the world, i.e. if a severe drought in the Meuse-basin is perceived, for example, as a problem. The perception of a problem or phenomena can differ between actors. Therefore, a relativist approach is taken.

3.1.2 Epistemology

Epistemology is concerned with all the aspects and methods of acquiring (valid) knowledge (Moon and Blackman, 2014). The question of epistemology is; is knowledge something that exists for researchers to identify in an objective way with certainty or is knowledge value laden (Moon and Blackman, 2014)? Epistemology can be divided into three categories; objectivism, constructivism and subjectivism (Moon and Blackman, 2014). Objectivist epistemology assumes that there is an objective “truth” to be discovered. This “truth” is generalisable, verifiable and independent of social thought and social conditions. Constructivist epistemology, however, states that human beings construct knowledge as they engage with and interpret the world (Crotty, 1999 in Moon and Blackman, 2014). Reality comes into existence in and out of engagement with the realities of the world. According to the third category, subjectivist epistemology, knowledge is constituted through how people perceive the world and therefore, multiple realities exist. People impose meaning and

value in the world and interpret it in a way that makes sense to them (Crotty 1998; Pratt 1998 in Moon and Blackman, 2014). This research takes the subjectivist approach. Firstly, because this research has a social approach, this research conducts research into the different discourses and policies of the drought- and water phenomena in the Meuse-basin. This is consistent with Donahue (1997, in Vij, Warner and Barua, 2020) (see: 1.3.2), who stated that water can be understood in different ways and thus has a social component. Drought and its implications can also be experienced in different ways, depending on an interplay between social and natural forces (West and Smith, 1996). Therefore, it is not compatible with an objectivist point of view.

3.2 Research strategy

Considering the social and locally-specific conditions that can shape the realities of the respondents in this research, a qualitative research-approach for this research is chosen. According to Fossey et al (2002) qualitative research is a useful tool to develop an understanding of the meaning and experience dimensions of humans' lives and social worlds. Fossey et al (2002) argue that qualitative research has a focus on three areas: i) explore patterns of interactions and processes of communication within social groups, ii) the interpretation of subjective meanings attributed to situations and actions and, iii) theory-building through discovering patterns and connections in qualitative data. The aim of this research (also see: 1.5) is to create a deeper, exploratory understanding of the discourses on water during drought along the Meuse. Therefore, qualitative research is suited for this research. In the following section, the research methods, the methods on how this qualitative research will be conducted will be explained.

This is best done through conducting a case study. The case study-area will be the Meuse-basin downstream Liège. According to Crowe et al (2011, p. 1) a case study is: *"a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context"*. It can be considered a robust research method when an in-depth, holistic investigation is required (Zainal, 2007). This research will be a single-case design. A single-case design is chosen because according to Wilhite, Sivakumar and Pulwarty (2014) exposure to drought and its consequences, especially water scarcity, varies spatially. Vulnerability is determined by social factors, such as e.g. demographic characteristics, social behaviour, water use trends and government policies (see also: 1.2). The aim of this research is to create a deeper, exploratory understanding of the discourses along the Meuse-basin. In combination with the social factors that determine the impact of drought on water, a single-case study is the best option because a focus on a single case gives a possibility to dive deeper on all these factors. A single-case study will hopefully create a deep understanding of the research-object.

A drawback, however, of a single-case design is its inability to provide a generalising conclusion (Zainal, 2007). Although that is a limitation of single-case design, the advantage is that the detailed qualitative accounts of a single-case design not only help to explore data but also help to explain the complexity of the situation which would not be possible, for instance, with a survey research (Zainal, 2007). The Meuse-basin is a basin with a lot of societal pressure on the water and therefore it is important to describe the complexity of the situation.

Another criticism of a case study, according to Yin (1984, in Zainal, 2007), is that case studies are often accused of lack of rigour. Yin (1984, in Zainal, 2007) argues that often the results and conclusions of the researcher are influenced by equivocal evidence or biased views. However, there are measurements established, that are discussed in the section validity and reliability (see: 3.5), to prevent this from happening in this research.

3.3 Research methods and data collection

In the section below the research methods and methods for data collection will be set out.

3.3.1 Semi-structured interviews

Considering the research design, which is a qualitative case-study, the method that is best suited for conducting this case study is semi-structured interviews. Alsaawi (2014) states that it is very common for social science researchers to conduct this type of interview; in this type the questions are pre-planned (see: Appendix I) because an interview manual ensures that the conversation follows a fixed pattern, this replicability will increase validity and reliability of the research (van Thiel, 2014). However, in semi-structured interviews the researcher gives the possibility for respondents to explain and elaborate on particular issues, during the interview, through the use of open-ended questions that are not pre-planned. Bryman (2008, in Alsaawi, 2014) argues that a too structured format can hinder the depth and richness of the answers.

This is the reason why in this research the type semi-structured interviews is used, the aim of this research is how to create an in-depth understanding of the discourses that shape and influence the institutionalisation of the policy domain and therefore it is essential to create a setting, which semi-structured interviews provide, that stimulate depth and richness in the answers of the respondents. The content of the interview will be, on one hand, about the discourses on water quantity- and quality; how do these actors experience drought and its consequences for water regarding the Meuse and what do they think is desirable for the future. On the other hand, the content of these interviews will be about institutionalisation; how do the actors experience international cooperation and the current policies that are in place.

3.3.2 Document analysis

To ensure data triangulation in this research, policy documents will also be analysed during this research. According to Flick (2004) the term triangulation is used, in social research, to refer to the observation of a research issue from (at least) two different points. The choice to analyse policy documents is made because this research will analyse the institutionalisation. The content of these documents will be information about policy agreements or international cooperation in the Meuse-basin related to drought. This information can help to extend the understanding about the existing discourses, policy agreements and social institutions. Another common method for data triangulation is observations of the research-object (Flick, 2004). However, given the research-time and the sampling strategy which was followed, which was time-intensive, this was difficult to arrange.

3.3.3 Sampling strategy

To ensure a sufficient collection of data is attained there will be a sampling strategy. According to Onwuegbuzie and Collins (2007) the process of selecting participants for research is twofold: to decide the number of participants (sample size) and how to select these sample members (sample strategy). According to van Thiel (2014) there are no fixed rules for determining the ideal number and type of respondents. However, the respondents of this research will be specifically the employees of the organisations in Flanders, Wallonia and the Netherlands who are related to or working on the drought- and water-management in the Meuse-basin. The size of the sample size will be dependent on the point of data saturation. According to Fuss and Ness (2015, p. 1408) data saturation “...is reached when there is enough information to replicate the study when the ability to obtain additional new information has been attained”.

Due to the specific character of the respondents and the big size of the involved organisations there will be made use of the ‘snowball-sampling’ strategy. According to Noy (2008) a sampling strategy can be defined as ‘snowball-sampling’ when the researcher accesses informants through contact information that is provided by other informants. According to the researcher of this research this is the most precise strategy to interview the most suitable respondents which have access to the right information. The list below (see: 3.3.4) is the result of this snowball-sampling strategy. What stands out in this table, is that there seems to be an unequal distribution of the respondents between Wallonia and the Flanders and the Netherlands. The reason for this, will be set out in chapter 6, which is the discussion of this research.

3.3.4 List of respondents

A list of the interviewees is presented in the table below in. These respondents are personally anonymous but the organisation they work for is named in the research results, this choice has been made to ensure an open and transparent exchange of information. As stated above, this list is the result of the sampling strategy, which is explained in 3.3.3.

Table: List of respondents in this research

Respondents	Organisation	Function of the organisation	Date of the interview
Respondent 1 (R1)	Waterschap Limburg	The water council of Limburg is a regional governing body organised along the water-household system in the province of Limburg, responsible for maintenance and improvement of the system.	04/02/2022

Respondent 2 (R2)	Rijkswaterstaat (I)	Rijkswaterstaat is part of the Dutch Ministry of Infrastructure and Water Management and responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands. Rijkswaterstaat is responsible for the management and maintenance of the Meuse.	07/03/2022
Respondent 3 (R3)	RIWA - Association of River Waterworks	The RIWA is an international organisation that represents the interests of the drinking water companies in Belgium and the Netherlands that use the River Meuse as a source for their drinking water production.	23/03/2022
Respondent 4 (R4)	Programmabureau KRW/DHZ Maasregio	A facilitating organisation which helps the executive Dutch parties to implement the targets of the European Water Framework Directive.	06/04/2022
Respondent 5 (R5)	Rijkswaterstaat (II)	See: respondent 2.	07/04/2022
Respondent 6 (R6)	Vlaamse Waterweg nv	The VWW is an autonomous agency of the Flemish	07/04/2022

		government for the maintenance, operation, management and commercialisation of the inland waterways of the Flemish Region.	
Respondent 7 (R7)	International Meuse Commission (IMC)	<p>The International Meuse Commission (IMC) is a commission in which the Walloon Region, the Netherlands, France, Germany, the Flemish Region, the Brussels-Capital Region, Belgium and Luxembourg participate.</p> <p>The main tasks of the IMC are coordination of the obligations of the European Water Framework Directive.</p>	14/04/2022
Respondent 8 (R8)	Vlaamse Milieu Maatschappij (VMM)	The VMM is an agency of the Flemish government working towards a better environment in Flanders. The three main areas are water, air and the environment.	19/05/2022
Respondent 9 (R9)	Service public de Wallonie - Mobilité et Infrastructures (SPW)	The SPW is the main government body in the Walloon region. SPW exists out of eight entities, Mobilité et Infrastructures is one of these entities.	30/05/2022

Respondent 10 (R10)	Zuidelijke Land- en Tuinbouworganisatie (ZLTO)	An interest group for farmers and horticulturalists in the provinces Brabant, Zuid-Gelderland and Zeeland, which is the south of the Netherlands.	07/06/2022
Respondent 11 (R11)	Boerenbond	Boerenbond is the association for the agricultural sector in Flanders and East-Belgium.	17/06/2022

3.4 Data analysis

There are two general approaches of reasoning which may result in new knowledge; inductive or deductive reasoning (Hyde, 2000). By inductive reasoning the researcher commences with observations or interviews and seeks to establish generalisation or build a theory about that specific research object. Deductive reasoning starts from a generalisation or theory and seeks to see if and how these generalisations apply to the research object (Hyde, 2000). This research will follow an deductive approach as it commences from the theories of Hajer (1995), Therborn (1982) and Arts, Leroy and van Tatenhove (2000).

After collecting the data, the data will be structured. The structuration of the data will be done by means of coding. Coding is the act of assigning codes or labels to different pieces of texts, so that the data is subdivided and categorised and can be compared at a later stage (van Thiel, 2014). The programme Atlas.TI will be used to code the data.

In Appendix II a codebook is included, which describes the contents, codes and layouts of the data collection, also to increase the transparency of this research and thus the reliability. The codes will be assigned to the text according to the three-layer discourse theory of Therborn (1982) and the indicators of the Policy Arrangement Approach by Arts, Leroy and van Tatenhove (2000). In using this theory a thorough view on the discourses can be created.

3.5 Validity, reliability and research ethics

Validity, reliability and ethics are important criteria to ensure a sufficient quality of the research. In this section these criteria will be set out.

3.5.1 Validity

The validity of a research is subdivided into; internal validity and external validity. Internal validity refers to the cogency of the study and the question if the researcher has measured what he or she

intended to measure. External validity refers to what extent the research results of a research can be generalised (van Thiel, 2014).

To measure what the researcher is intended to measure, and enhance the cogency of the study, the interview manual and the operationalisation of the theoretical framework is reviewed and approved by the thesis supervisor (see for questionnaire: Appendix I). Furthermore, during the length of this research there will be meetings with the thesis supervisor which can function as reflection moments about the research process so far, to ensure that the researcher remains on the right track.

The external validity refers to what degree the research results can be generalised. As stated by Zainal (2007) a drawback of a single-case design case study, which this research will be, is its inability to provide a generalising conclusion. Therefore, the focus of this research will be more on a strong and sound internal validity rather than external validity because a generalised conclusion is hard to obtain anyway when conducting a case study.

3.5.2 Reliability

According to van Thiel (2014) a high level of reliability means that the explanation or answers on the research questions are certainly the right one. Reliability exists out of two elements: accuracy and consistency.

Accuracy refers to the measurement instruments that are used to precisely measure the variable of the research, which is the water-discourse. In this research the measurement instrument is the interview manual (see: Appendix I), which is approbated beforehand and discussed during the process of doing research by the thesis supervisor, who is experienced in the field of doing research.

The second element is consistency, which is harder to achieve in qualitative research according to van Thiel (2014). Repeatability of the research is the key factor of consistency. Repeatability is achieved when under the same circumstances the same measurement will lead to similar results. When the repeatability of a research is high, the reliability is also high, because it proves the point that the results that are found are indeed right (Van Thiel, 2014). Van Thiel (2014) argues that repeatability and consistency is harder to achieve in qualitative research because respondents can learn from past experiences or social factors can change, which means that repeating a study will not always produce the same results.

However, to enhance research reliability in this research the interview manual has been approved by my thesis supervisor. Furthermore, all steps and choices that are made during this research are explained and justified. Lastly, according to Creswell and Poth (2017) reliability is strengthened when the data, that has been recorded by audio-equipment, is transcribed. These recordings have been transcribed by the researcher.

3.5.3 Research ethics

This section will pay attention to the ethical considerations. Firstly, confidentiality is highly valued while conducting this research. The personal names of the participants will not be included in this research. Secondly, the researcher will ask the respondents if it is allowed to record the interviews.

These records will be used for this research only and are deleted after completion of this thesis. Lastly, the personal transcript of the interviews will be presented to the respondent to give them the chance to comment on this, with the aim to enlarge the reliability of this research.

4. Results

This section will outline the empirical findings that are found in relation to the case-study of the Meuse-basin from Liège. These results will be set forth by the means of the sub-questions (see: 1.4). The discourse-theory of Therborn will be used to give a structured answer of these sub-questions.

4.1 The discourse on water-quantity

The first sub-question of this research was: *“What are the discourses of the policy actors regarding water-quantity, during drought-periods, in the Meuse-basin?”*. The discourse-theory of Therborn will be used to give a structured answer of this sub-question.

4.1.1 Ontological layer

The first layer of the theory of Therborn (1982) is the ontological layer, which refers to the world views or paradigm views of the policy actors. Questions like ‘how do we see reality?’ or ‘how do we define problems?’ are ontological in nature (Wiering & Arts, 2006). This layer will define how the policy actors in the Meuse-basin look at the phenomenon of drought and its implications.

A possible decrease in water quantity is inherently connected with the weather-phenomenon drought. Therefore, the ontological layer on drought is discussed first. There seems to be a consensus that drought is a phenomenon that has already affected the Meuse-basin, which will be discussed later. It is more interesting, from an ontological point of view, to look at how respondents think how drought will affect the Meuse-basin in the future, in relation to climate change. This point of view is chosen because it can possibly affect the institutionalisation of the discourses.

4.1.1.1 Ontological view on the impact of climate change on water quantity

Several respondents are still unsure to what degree this will affect the Meuse-basin, this is mainly the case due to the uncertainty of the different climate scenarios that are published by the IPCC as well as the KNMI. R3 argues: *“If you take a look at the KNMI climate scenarios, which are based on the 2012 IPCC report, you see that the so-called warm scenarios can have a socially-disruptive effect. I am curious to see the development of the new scenario’s, as they are becoming more extreme. Even the moderate scenarios do show us real challenges in the area of water allocation and water use in the future”*. The respondents R2 and R5 both pointed to the climate scenarios as well. Respondent R5: *“The IPCC works with different climate models and even these models can differ hugely. If you take a look at the rain and the winter-season, it is quite clear, they expect more water in the winter. However, there is a lot of uncertainty concerning droughts, if it will become much more dry or just a little bit”*. This argumentation is in line with the argument of R7: *“I think both floods and droughts are supposed to be more extreme and more frequent. That is a big problem. If you read the report of the IPCC you see that it will happen more frequently and more severely. We had a study in the French part of the Meuse basin, concerning the Meuse-river itself, and it appears that we will have more precipitation in the winter and for the summer it is not so obvious concerning the different models they used. Some years can become more dry, others with much more flash-floods”*. Respondent R4 continues in the same direction: *“I think there will be a Meuse-river, which will deliver a low-flow of water for longer periods of time, then suddenly there will be periods with high precipitation in which the water will reach the edge of the dike, after that there will again be periods with no precipitation.*

Somewhere in between is where we will have to manoeuvre". R4, furthermore, states: *"The average annual precipitation will not change, but I think that the distribution of the precipitation will be distributed differently"*. To conclude, respondent R2 states: *"If we look into the climate developments, there are different scenarios. Most of these scenarios show us that the discharge-regimes will decrease. There is a scenario which shows us an unaltered scenario, but most of these scenarios show us a decrease. This means, in combination with an increase in water demand from different users, the problems with low discharge-regimes will increase"*. According to R3, the role of the tributaries for the water-quantity on the Meuse are important. The respondent argues that the climate scenarios can have a big impact on the Chiers, a tributary of the Meuse which flows through Luxembourg, Belgium and France. Furthermore, Germany warned the Netherlands that due to climate change in the future there will possibly be less water, from the Ruhr-river, available from their water-reservoirs (R3). According to R3 about a quarter of the discharge-regime of the Meuse-river in the Netherlands during drought-periods is coming from the tributary the Ruhr.

Thus, there seems to be a consensus among the respondents on the uncertain development of future-droughts in the Meuse-basin. The respondents base themselves on the different climate models of IPCC and the KNMI and argue that climate change will have an effect on the Meuse-basin, to what extent the droughts will affect the basin is not yet clear.

4.1.1.2 Ontological view on water quantity during drought on Meuse-basin

R3 concludes: *"Drought is a problem which impacts the whole Meuse-basin"*. However, there appears to be an ontological difference between policy actors on the impact of drought and the availability of water, related to the geographical location and the characteristics of the river. The respondents from Flanders and the Netherlands are worried about droughts and the reduction of water quantity. R6: *"The drought-problem has a huge impact on Flanders. The Meuse-river is of great economic importance because it delivers water for the Albert channel. In addition, even more directly, the Meuse provides drinking water for Flanders. The Meuse delivers drinking water for the city of Antwerp and big parts of Flanders"*. Respondent R6 continues that about 40 percent of the drinking water in Flanders is extracted from the Meuse. R3 states: *"If you look at the water-availability during drought pictures in Europe you will see that Flanders is a dark-red spot and the Netherlands a lot less"*. This difference is due to the groundwater and the presence of other rivers and lakes in the Netherlands according to R4: *"Look, we in the Netherlands are lucky, we can extract a lot of water from the ground. If we do that, we have amazing drinking water. However, it is difficult for Flanders because they do have a lot less groundwater packages, so a big share of their drinking water is extracted from the Albert channel, which is a branch of the Meuse-river"*. Although the Netherlands can make use of the groundwater, it does not mean that the Netherlands does not experience drought-stress on the Meuse-basin during drought-periods. Parts of the provinces Limburg, South-Holland and Zeeland are drinking Meuse-water and agriculture is extracting a lot of water for their economic activities (R2, R3)

In comparison with Flanders and the Netherlands, the ontological position of Wallonia regarding water-quantity on the Meuse-basin during drought-periods differ. R9, from Wallonia, state: *"Between 2017 and 2020 we mainly had four years of drought. It was the first time in our recording that we had such a situation. It is probably related to climate change. During the drought we managed everything, we have modified some management, mainly on the different reservoirs and*

the logs on the waterways. For the Meuse itself we had no big consequences". According to R2 this relates, for example, to the spatial design of Wallonia: "Wallonia is less susceptible for low-water regimes on the Meuse, because it is not spatially designed to make use of the water. For example, agriculture is extracting a lot of water in the Netherlands. However, in Wallonia it is physically not possible, due to the steep hills along the Meuse". R7 stated: "The Netherlands were very concerned with these extreme droughts, the last few years especially for drinking water. Whereas in the upstream countries they didn't have real problems because of the droughts". The Meuse-river has a different function for France. Although the researcher did not talk to respondents from France because it was initially not the focus. However, information about France in the Meuse-basin is still useful for the context of this research. The use of water for France is less intense than Flanders and the Netherlands and more focused on agriculture than on the industry (R3). However, France has stationed two power plants on the border and uses the Meuse-water to cool their powerplant, which is their priority (R3, R4, R9). Furthermore, Wallonia and France also use the Meuse-water for drinking water production, however to a lesser degree than the Netherlands and Flanders (R2, R9). R7 states: "The Netherlands, for example, is using a lot of water due to their big population along the Meuse".

Another economic function of the Meuse-basin, which is connected to water quantity and the economy, is navigation. As described in section 1.3.1 the Meuse-river is canalised and regulated due to its capricious character. A decrease in water quantity will impact the navigation because vessels cannot fully be loaded or the vessels will hit the bottom of the river. Due to the regulation of locks on the river this asks for coordination on the water level course between policy actors. The policy actors are all ontologically aware that this might form a problem during low-water periods (R2, R6, R5, R9). R9 stated that navigation, next to fish migration, is a priority regarding the Meuse for Wallonia. Concluding from the results of the interviews there is an ontological awareness that water quantity during drought-periods has an effect on the navigation on the Meuse-basin.

The ontological view regarding water-quantity in drought-periods seems to differ between the downstream and upstream countries. Although there is a consensus among the policy actors that climate change might have an effect on the quantity of the water in the basin in the future, the impact of it differs among the policy actors along the basin. Out of the results this seems to relate to the societal and economic dependency on the Meuse-river and its water, which is stronger in the Netherlands and Flanders than in Wallonia (R2, R3, R6). The Netherlands and Flanders seem to be more worried.

4.1.2 Normative layer

This section will set out the normative character of the discourse of water-quantity. The normative layer refers to the values, principles or norms that are in place regarding water-quantity.

4.1.2.1 Difference in institutional capacity

The previous section discussed the ontological difference on water-quantity, as the organisations in Flanders and the Netherlands seem to be more worried about the consequences of drought and its consequences on the Meuse-basin than Wallonia. From the data of the interviews there can be drawn a prudent connection between the amount of dependence on the Meuse, feeling of urgency

on the drought-problem and the amount of institutional capacity which is involved in the water-management on the Meuse-basin. Respondent R1 argues: *"Wallonia seems to be more focused on social services than on water, environment and ecology. So, they do have less time and capacity for that. It is not unwillingness, it is just the budget and capacity"*. This point is also brought up by R3: *"All questions that we can work on with ten people, there will be only one or two persons in Wallonia that can work on these same questions"*. The respondent R3 emphasised, like the respondent R1, that it is not unwillingness but just a difference in capacity. The summer-flash flood of the Meuse in 2021 have also had an effect on the availability of Wallonia in the cooperation between the policy actors on drought, according to several respondents in this research. R9, the respondent from Wallonia, argued that the last year they were mainly focused on the consequences of the flash flood in the summer of 2021. R2 states that low-water on the Meuse is not as acute for Wallonia, as for Flanders and the Netherlands. Therefore, the respondent (R2) states: *"So, if Wallonia has little trouble regarding low-water and has a lower capacity, there will be other priorities for them and the cooperation will be less tight"*. This observation in capacity-difference is sorted under the normative layer because a difference in work-capacity can be linked to the value which is attached to management of water on the Meuse-basin. This difference in capacity and labour force can possibly say something about a difference in economic and societal value which the countries, along the Meuse, ascribe to the Meuse-river and water-management in general.

4.1.2.2 Shift in awareness about water

However, there has been a shift in water-quantity awareness due to the droughts in the countries of the Meuse-basin from 2017 till 2020. R9, the respondent from Wallonia, argues: *"I mean, for the last ten years we had no big problem of drought in Wallonia, so it was not a problem if we lost some water due to the leaks in the logs or if we used water to fill the swimming pools. But, due to climate change and especially the impact between 2017 and 2020, I think there has been some change in the minds of many people. Due to this we have decided to optimise the water-management"*. This is not only the case in Wallonia, according to R1, from the Waterschap Limburg in the Netherlands: *"What is happening is that, every country, is becoming more aware that, for drought as well as floods, you have to retain water in the capillaries of your water system. That is a development you see in every country on EU-level and that is also something that everybody connects"*. So, there seems to be a transformation in the management of water, wherein water retention will occupy a more prominent place in the policy domain.

4.1.3 Strategic layer

According to Therborn (1980, in Wiering and Arts, 2006) the strategic layer deals with the policy programs of the actors, and it refers to the question of what the policy actors conceive as feasible and desirable as a solution to a problem. This indicator in this research will research which actions the policy actors see as desirable regarding the phenomenon of water quantity during drought.

Due to the shift in awareness, which was sparked by the droughts between 2017 and 2020, water retention has become more important for the policy actors in the Meuse-basin (R1, R6, R9, R2, R6, R8, R10). This is a unanimous strategy discourse of all the respondents. In the third sub-question, which will answer the institutionalisation of the discourses, this will be set out.

In the ontological layer as well as the normative layer it was visible that there was a discrepancy in feeling of urgency- and institutional capacity between the policy actors. This difference in the ontological layer also affects the strategic layer. As stated above, the Netherlands as well as Flanders use more water from the Meuse-basin than the upstream regions. Due to this difference in societal dependence, results show that the downstream countries are pushing more for strategic measures in the international context. R1, from the Netherlands: *“International cooperation is getting more and more attention (...) we are dependent on what happens upstreams. So, there is a strong focus on international coöperation, there are a lot of working groups, projects and fora on waterquality as well as waterquantity”*. R6: *“Within the IMC we see a lot of the times that Flanders and The Netherlands want to determine the same progressive direction, in which they are sometimes inhibited by Wallonia and France, which makes that Flanders and the Netherlands build a good relationship”*. R7 set out an example of a progressive, strategic measure which the Netherlands proposed before: *“I remember a few years ago there was an idea from the Dutch government they wanted to help the upstream countries to build a reservoir to save water in the winter so that they can release water in the summer, so there won’t be any problems in the Netherlands in the summer. That didn’t work, it is difficult for a country to accept that another country is building in your country”*.

It is difficult to say if this progressive direction is inhibited by the upstream states due to the discrepancy in institutional capacity or due to a possible discrepancy in ambition. There seems to be an explanation for both options, given the data. In section 4.1.2.1 the difference in institutional capacity is being discussed, whereby R1 as R3 state that it is not unwillingness, because there is cooperation (which will be discussed in the third sub-question) but just capacity. Furthermore, the results showed that Wallonia has less problems regarding drought on the Meuse unlike the policy actors in the Netherlands and Flanders (R9, R7, R2). Therefore, it seems logical that there could be a discrepancy in ambition between Flanders, the Netherlands and Wallonia. It is not possible to set out the position of the upstream state France, as this country was not included in the research focus.

However, all policy actors seem to have an equal discourse on the impact of drought on the water-quantity in the Meuse-basin, albeit a difference between policy actors in feeling of urgency due to a difference in societal dependence on the water of the Meuse. However, the shift in awareness (see: 4.1.2.2) created an urgency on the policy actors that the retention of rainwater was needed and that cooperation was necessary. The measurements and cooperation will be discussed in the third sub-question.

4.1.4 Conclusion

This sub-question mapped the discourse of the policy actors on water-quantity during drought periods on the Meuse-basin. On the ontological layer there seems to be a consensus on the influence of drought and climate change on the water-quantity in the Meuse-basin. However, there is an ontological difference regarding water-quantity in societal and economic importance of the Meuse-water between the up- and downstream countries. The normative layer showed that, although there is an ontological difference and a difference in institutional capacity, there has been a normative shift in water-quantity awareness. This shift, which was amplified by the droughts between 2017 and 2020, resulted in an increased awareness by all policy actors that retaining the water, not specifically on the Meuse-basin, is urgent. The strategic layer showed that the difference

in the ontological layer also affects the strategic layer, there seems to be a discrepancy in institutional capacity between the states. However, although there seems to be discrepancy, the policy actors unanimously stated that water retention as well as international cooperation was needed for the consequences of drought on water-quantity.

4.2 The discourse about water-quality

The second sub-question of this research was: *“What are the discourses of the policy actors regarding water-quality, during drought-periods, in the Meuse-basin?”*. This sub-question will also be analysed with the help of the discourse-theory of Therborn (1982).

4.2.1 Ontological layer

It is important to note that water-quantity and water-quality during droughts in the Meuse-basin are inherently intertwined because a reduction in the quantity of water automatically worsens the quality of the water. According to the respondents in this research and the results from the interviews a reduction in water-quantity because of drought inevitably worsen the water-quality in the Meuse-basin. Although there are worries about the reduction of water quantity, the results of the interviews show that the policy actors, currently, seem to be more worried about the deterioration of water quality than the reduction of water-quantity during drought (see quotes below). A reason for this is that a deterioration of the water quality during drought-periods already has had a huge societal impact during previous droughts. According to the R2 the water-quality during drought-periods already has caused intake stops for the production of drinking water. R3 mentions that when droughts are becoming more severe, these intake stops can endure for a longer time which endangers the drinking water production. The respondent R2 emphasises that the intake stops during droughts so far have always been related to the water-quality and not due to water-quantity. Furthermore, R2 argues that it is not only a problem for the production of drinking water, but it also impacts the ecology of the Meuse-basin. This is in line with the ontological view of other respondents. R9, from Wallonia, states: *“It will become more and more difficult to treat water for drinking water if the temperature is high because you have pollution of the water. It is quite expensive to treat the water. I know that the Netherlands and Flanders are very worried about that. I think there will be more and more focus on this point in the future. I think that it is not mainly a question of quantity but mainly a question of quality”*. Respondent R3 argues that water-quantity and quality are connected: *“The issue we are worried about is that during low-water periods, the contaminants in the river remain the same. But because there is less water, the concentration of the pollution is much stronger. It complicates the drinking water production. When there is a low river-discharge and there is a lot of pollution, the intake stop will endure for a long time. Especially during drought, when the temperature is high there is an increase in water demand. Well, you have to have a big buffer capacity to be able to bridge that period”*. According to R10 the water-quality has been a big issue and they have been working on it since the 90's. R3 and R8 state that drought has impacted the quality of the water bodies negatively, R8 about some of the water bodies in Flanders: *“...Drought does not have a good impact on it (...) there is a temporary decline which is due to drought in the last few years”*. R4, in addition, argues that in the last twenty years the scenarios about climate change have become more relevant and especially more tangible, R4: *“The water is monitored during the summer in the Meuse and what we see is that during summertime there is*

sometimes a big spike in pollution, which we do not want. It sometimes looks like the quality is declining compared to years back”.

To conclude this ontological layer, there is a general consensus among all the policy actors in the Meuse-basin, from Wallonia, Flanders and the Netherlands, that water-quality during drought-periods deteriorates and that it has a societal impact. The results of the interviews show, although they are interlinked, that respondents are currently more worried about the quality of the water during drought than the quantity of the water, because so far the intake stops for drinking water were related to the quality of the water. A possible explanation for this is that the deterioration of the quality of the water is an effect of drought whereby the effects are experienced more quickly than the problems on water-quantity.

4.2.2 Normative layer

This section will set out the normative character of the discourse of water-quality. The normative layer refers to the values, principles or norms that are in place regarding water-quality

Concluding from the ontological layer (4.2.1) there seems to be unanimous awareness that the water-quality during drought is of growing concern. However, the Meuse-basin is a very populated basin, in which there is a high pressure of societal and economic pollution. This dates back even to the Roman era, in which people situated themselves along the river, whereby the riversides were used for agricultural purposes. During the Middle Ages the Meuse helped to accelerate the trade in Europe, which triggered an intense process of urbanisation along the Meuse (Nienhuis, 2008). During the Industrial Revolution the economic development and the need for an increase in waterborne transportation on the Meuse-river grew to connect the North of Europe with the South of Europe (Nienhuis, 2008).

This societal pressure on the Meuse-river has not changed. Flanders and The Netherlands have a high percentage of economic activity along the Meuse. According to R4 the Meuse-basin is still designed for agriculture in the Netherlands, however that system has worked very well but is not future-proof according to the respondent. According to R8 there are very few water bodies in Flanders that are not impacted with waste-products by agriculture and industry. Although there is improvement in the quality, it also has to deal with a political component. R8 states that the agricultural sector in Flanders has a strong influence in Flanders and it also depends on the political course of Flanders. However, R8 emphasises that there are already a lot of regulations to which the agricultural sector has to fulfil, so the respondent does understand that it is not easy for this sector. R8: *“It is a vulnerable sector which strives for self-precipitation”*. However, its conservative posture can make it sometimes difficult to book progress on the water quality (R8). Wallonia also has a lot of industry around Liège (R2, R4, R9) and their main priority of the Meuse-river is navigation, which is economical in nature.

According to R3 a lot of discharge-permissions, in the Netherlands, are outdated and there is a need for regeneration of these permissions, especially in the light of climate change. R3, however, emphasised that Rijkswaterstaat in the Netherlands is making progress on that. Furthermore, next to economic activity, there is also a lot of domestic pollution, like medical residues (R10, R1). However, there has been an improvement in water quality due to water treatment plants, e.g. in Wallonia (R2,

R1). Although there is a lot of pollution impacting the Meuse-basin, it also has a political component which values economic prosperity (R4, R8). Concluding from these results, it seems that economic value still has a high priority, whereby changes and improvements are incrementally implemented.

Another development is the awareness of ecology in the river-basin. For France and Wallonia fish-migration is an important topic (R9, R1). According to R7, the respondent from the International Meuse Commission, there will be more work done in the field of ecology, which was partly incentives due to the European Green Deal.

Concluding, although the respondents are aware on the ontological layer that water-quality during drought is a problem; it seems that the economical aspect, agriculture and the industry, as well as societal impact remains to have a strong influence on the water-quality of the river.

4.2.3 Strategic layer

According to Therborn (1980, in Wiering and Arts, 2006) the strategic layer deals with the policy programs of the actors, and it refers to the question of what the policy actors conceive as feasible and desirable as a solution to a problem. This indicator in this research will research which actions the policy actors see as desirable regarding the phenomenon of water quality during drought. This paragraph is not so extended, because it intertwines with the institutionalisation of this discourse.

Because water-quality is a transboundary issue there seems to be among policy actors a need, next to improving the quality, to strengthen international cooperation and transparent communication, which is already sufficient (will be discussed in the third sub-question) (R1, R3, R4). R3: *“Especially during low-water it is crucial to know which residues enter the water (...) I think that that can be improved”*. R1: *“You need a good understanding, short lines, trust in each other that you have good intentions and lastly, a juridical incentive”*. Another approach could be that the companies could take responsibility according to R3, like Chemelot. Chemelot is the biggest chemical park in the Netherlands and home to 52 chemical companies and is situated along the Meuse. Recently, they upgraded the quality of their discharge permission and added a lot of parameters in collaboration with the drinking-water sector. R3: *“It is a good example of how you can take responsibility as a big company for your waste-streams and manage it correctly”*. The third sub-question about the institutionalisation of the water-quality discourse this juridical incentive will be set out.

4.2.4 Conclusion

To conclude, the ontological layer showed that respondents are worried about the water quality during drought-periods. It, furthermore, showed that water-quantity and water-quality are intertwined. However, the normative layer showed that the economical and domestic aspect, which causes the pollution, in the society is still prominently present. However, there seems to be incremental changes in the quality of water. The conclusion of the strategic layer was that the cooperation and transparent communication between the policy actors on the Meuse-basin is essential to improve the water quality.

4.3 The institutionalisation of the discourses on water

The third and last sub-question will answer how the current discourses are transboundary institutionalised along the Meuse-basin. This sub-question is: *“How are the discourses, on water quantity- and quality, of the policy actors in the Netherlands, Flanders and Wallonia, regarding the Meuse-basin during drought-periods, institutionalised?”*.

Because results showed water-quality and water-quantity are inherently intertwined and both a consequence of drought. Therefore, the policy agreements and social institutions can overlap each other and can be discussed in both sections. This sub question will be split up into two subsections; water-quality and water-quantity. These subsections will be split up into historical development and recent developments. Using this structuring it will be clear how a certain policy agreement or social institution came into being and how discourses are influencing its current functioning.

Within these subsections it will be the aim to create an overview on how both discourses, that has been set out in the previous sub-questions, are institutionalised in the policy domain.

4.3.1 Institutionalisation of the water-quality discourse

This subsection will describe the historical developments on the international institutionalisation of the Meuse-basin. It has been decided to start off with the institutionalisation of the water-quality discourse because the historical development of this institutionalisation intertwines with the institutionalisation with the quantity-discourse.

4.3.1.1. Historical developments

The floods in 1993 on the Meuse-river were a clear institutional starting point of international cooperation on the Meuse-basin. A social institution that has also been institutionalised in the policy domain in the Meuse-basin is the International Meuse Commission (IMC). The Meuse Commission was founded in 1994, after the floods in 1993 on the Meuse. However, this was only the main course of the river so The Netherlands, Belgium and France were joined (R7). It wasn't until 2002 that when the Water Framework Directive was introduced by the European Commission that the Meuse Commission had to include all the regions in the whole basin. Therefore, the IMC included Luxembourg and Germany in the agreement in 2002, by an agreement in Ghent (R7). In 2002, the International Meuse Commission was a fact. This commission exists out of five permanent working groups and additional project groups, which all work on different subjects on the Meuse-river, especially related to the quality of the water (R7).

In 2000 the European Commission introduced the Framework Directive (WFD). The aim of this legally binding directive was to protect, restore and enhance the quality of Europe's transboundary water, especially rivers, and bring it back to good quality by 2015 and its very latest at 2027. To meet the 2015 deadline, water authorities in each river-basin district in Europe had to agree on a coherent programme of measures by 2009. Where a river basin district includes more than one member state, a transboundary management-plan must be drawn up (Kristenen et al, 2018). Therefore, the International Meuse Commission decided to include all regions and countries along the Meuse-basin to collectively work on these obligations (R7). According to the Kristenen et al (2018) good quality meeting certain standards for the ecology, chemistry and quantity of waters.

Regarding the conceptual model (see: 2.4.3) the European Commission can be seen as the actor which can influence the institutionalisation of the water-quality policy. Furthermore, this actor has the resources (see: conceptual model) to influence the policy domain because the objectives of the European Framework Directive are enshrined in the European Law. The states are obligated to reach the objectives and can be fined if they do not reach these objectives (Report EEA, 2018). This EU Water Framework Directive is divided into three periods; 2009-2015; 2016-2021 and 2022-2027 (website Rijksoverheid, n.d.). The member states are obliged to deliver a River Basin Management Plan each six year to set out their strategy to reach their targets, a basin-overarching plan and a national plan (website Rijksoverheid, n.d.). Therefore, transboundary partners are obliged to work together on water-quality at the Meuse-basin. Another Directive to which the countries along the Meuse is the Floods Directive. This directive came into effect in 2007. It is regarded as an important legal instrument for coordinating objectives and measures pertaining to mitigating flood risk with the catchment partners and/or neighbouring countries (Website STOWA, n.d.).

4.3.1.2 Recent developments

Because the policy actors along the Meuse-basin are obliged to the European Water Framework Directive, this sub-question will try to answer how their discourse is influencing their current progress to reach their objective. R7 states that in the last 22 years they have made progress. An example, which is given by R7, is the homogenous monitoring network. Due to this network all delegations are measuring the same parameters with the same standards, which means that they are looking at the same data and picture. R7 adds that for most of the parameters they see that the quality is improving, however there is a discrepancy in resources between delegations available to measure these parameters. R7: *"(..) we cannot measure all the parameters on all the stations because some delegations do not have the means to measure all the same frequency of some others. However, we still manage to have a consensus and the same basis"*. Out of the results it is not clear which country was meant by this quote.

A reason for this is the adding of new parameters by the European Commission, the European Commission can add new parameters or fine countries. Out of the results from the interviews this reason seems to be the most important. The European Commission has the ability to add parameters to the Water Framework Directive. R4 states: *"...it is like a game in which the rules of the games change during the game"*. R7 mentions: *"...if we had the same parameters, which we had in 2000, we would be at 80 percent. Now, we are only at 30 or 40 percent"*.

Although the objective in 2027 may not be reached, the respondents do see the European Framework Directive as a good tool to reach good ecological status of the water. The framework can be seen as a juridical incentive to improve the water-quality (R1, R4, R7).

Although there is a shared ontological view on the problem of water quality on the Meuse-basin during drought, there appears to be a difference in the norms regarding water-quality according to R4. The downstream countries are dependent on the upstream countries regarding water quality. This difference is mainly due to the difference in population and societal pressure along the Meuse. The Netherlands and Flanders are heavily populated and therefore pursue more strict discharge permissions than upstream regions Wallonia and France (R8, R11, R4). The river the Meuse has a

more rural character in Wallonia and France. Respondent R2, like R11 and R1, argues that Wallonia is currently catching up on water-quality, with the installation of more water treatment plants and the regulation of the discharge permissions (R1, R2, R11).

Within the cooperation on the WFD Flanders and the Netherlands seemed to be pro-active. An example of working together on water-quality is that the Netherlands and Flanders were worried about the pollution of PFAS and needed to know more about that parameter. Therefore, the delegates decided to work together on it in a working group at the IMC (R7). This is also an example of the different experienced intensity of the discourse between the down- and upstream delegates.

The European Commission can fine the countries if they think that a country is not booking enough progress (R1, R4). However, according to R4 they are reserved in handing out fines to the countries. A clear reason therefore is not given by the respondent. However, according to R7 the EC is actively involved in the planning of the basin-management plans. R7: *"...they are reading very carefully every management plan concerning the directives. When they consider that one country cannot reach the objective of the directives, they just refuse the plan and say no, you have not enough measures, you are not going far enough, work again on your plan and do it again"*.

4.3.1.3 Conclusion

The institutionalisation of the water-quality discourse is done by the European Commission, related to the conceptual framework of this research, the European Commission can be seen as the actor that influenced the institutionalisation of the discourse. This actor has the resources and the ability to influence the policy domain. However, it is seen by the respondents as a good tool and good incentive to ensure that the water quality, regarding future drought, will improve. Furthermore, this framework stimulates transboundary cooperation among the countries along the Meuse-basin to reach their objective, which happens accordingly.

4.3.2 Institutionalisation of the water-quantity discourse

In this section the institutionalisation of the discourse regarding water-quantity will be set out. The first section will discuss the historical development, the second section will discuss the current developments.

4.3.2.1 Historical development

The first known policy agreement in the Meuse-basin regarding water-quantity, below Liège, during drought is the "Meuse Discharge Treaty" (in Dutch: Maasafvoerverdrag) which was signed in 1995. In 1995 the Netherlands and Flanders signed "the Meuse Discharge Treaty" (in Dutch: Maasafvoerverdrag), in which the countries agreed upon sharing water during low river discharges (lower than 130 m³/s per second). Aim of this treaty is to ensure an equal use of water for economical purposes and a mutual responsibility to prevent ecological damage at the Grensmaas. The Grensmaas, also known as the Common Meuse, is a part of the river, of 55 kilometres, on the Dutch-Belgian border (Bastings, Jaskula, Maeghe, 2011). R2: *"The signing of this treaty was the start of an intensive cooperation with Flanders in terms of low-water periods"*. To monitor and cooperate on this treaty there is a Dutch-Flemish workgroup which is called the "Werkgroep Afvoerregulering Maas". This workgroup meets twice a year. (R5, R2). Wallonia is not a participant in this workgroup,

however Wallonia functions as an observer (R1). Wallonia has signed an agreement with France relating to the allocation of water for the Chooz powerplant at the French border in 1998. The aim of this treaty is to protect the ecology in Wallonia (Report IMC, 2020) (R3, R9).

This cooperation between Flanders and the Netherlands has evolved through the years. According to respondents the cooperation is much more intensive than with Wallonia. According to R1 there are not many cultural differences between Flanders and the Netherlands and there is mutual understanding between each other. Apart from the cultural similarity, it is also due to their geographical position along the Meuse-basin as downstream countries in which they are dependent from the upstream states (R4, R6).

The workgroup about “the Meuse Discharge Treaty” is focused on low-water, however there are other Flemish-Dutch fora which meet (R2, R5, R6). Another important social institution is the “Vlaams-Nederlandse Bilaterale Maascommissie”, focused on the integral management of the river, especially concerning the “Grensmaas”, which is part of a river that is shared along the Dutch-Belgian border. The VNBM was founded in 2005, following up on the coordination on the Meuse Discharge Treaty. The VNBM is a workgroup on the administrative level between Rijkswaterstaat and de Vlaamse Waterweg, which is split up in working groups for each aspect of the river to strengthen bilateral alignment, on quality- as well as quantity (R5, R6). R6: *“It really works well and it has already paid off in results”*. For example, the VNBM installed a low-water coordinator last year, to coordinate an integral approach on low-water between all the different workgroups within the Vlaams-Nederlandse Bilaterale Maascommissie (R6). Next to the WAM and the VNBM there is also regular informal contact between Flanders and the Netherlands, which meets once or twice a year (R2).

Apart from the bilateral development below, drought seemed to have a low-priority in international cooperation along the Meuse-basin until the AMICE-project, which stands for *“Adaptation of the Meuse to the Impacts of Climate Evolutions”*. This was an EU-funded project which took place between 2009 and 2012 between 17 partners in the Meuse-basin. One of the conclusions of this project was that there was too little done yet regarding low-water (R2). In 2010, the delegates of the IMC decided to endorse a Plan of Approach on low water events. The aim of this plan of approach was to anticipate as best as possible situations of extreme low water events and the resulting water shortage in the Meuse basin and thus to limit the damage caused by them as much as possible (Report IMC, 2020).

4.3.2.2 Recent developments

However, the droughts between 2017 and 2020 along the Meuse-basin can be seen as a tipping point on institutionalisation of the water-quantity discourse during drought along the Meuse-basin. The results of the interviews show that the discourses seem to be institutionalised in two different ways. In the section below these developments will be set out.

4.3.2.2.1 Water-retention measures

The empirical findings pointed out that there has been a shift in awareness among the policy actors along the Meuse-basin regarding the retention of water which was sparked due to the droughts between 2017 and 2020 (R1, R6, R9, R2, R6, R8, R10). Although the focus of this sub-question is the

transboundary level, it is interesting to shortly zoom into the national level, as it also creates a deeper understanding on the transboundary level and it creates an insight in the dynamics of the policy domain.

Following the drought the government of Flanders created a proactive as well as a reactive approach regarding drought. Flanders launched the so-called Blue Deal in the summer of 2020. According to R8 it is an action-plan to reduce the primary water demand by retaining (rain)water and thus strengthen the water availability. This is done by structural measures like the construction of blue-green networks, adjustments in the agricultural sector and less concretion and creating a circular use of water. The budget is 343 million euros and all measurements have to be done by 2026 (R8). Furthermore, regarding the reactive approach on drought; Flanders is working with the so-called 'Reactief afwegingskader voor prioritaair watergebruik' (R8), which is not legally established in Flanders but rather a decision-making tool. This assessment-framework exists out of several indicators which gathers information about the drought-situation and create a thorough image of the drought-situation. This framework is designed between 2020 and 2021, following the years of drought (R8).

In contrast to Flanders, The Netherlands has a legally established framework, the so-called 'Verdringingsreeks'. This framework is activated during impending water-scarcity on the national surface waterways, like the rivers and the lakes. The 'Verdringingsreeks' provides a framework on how to allocate water during a reduction of water-quantity during drought-periods. This is an order in priority of economical and societal water needs for the Netherlands, which determines the allocation of the available surface waters during drought (Handleiding Verdringingsreeks, 2020). Furthermore, there is a so-called Deltaprogramma Zoetwater in the Netherlands, the aim of this program is to enlarge smart water management during drought-periods. What is interesting is that Flanders and the Netherlands were cooperating together on creating these allocation-frameworks; policy actors from the Netherlands, Rijkswaterstaat and the adjacent regional water authorities, were also informed and involved during the process of creating the 'afwegingskader' in Flanders (R6, R8). This cooperation is an example of the intensive bilateral cooperation between Flanders and the Netherlands, which was discussed in 4.3.2.1.

Wallonia also decided to optimise the water management system. There is currently a project in which all the water-management will be managed from one central point instead of decentral, localised management. So, that the different water-structures are managed by the same people in the same place (R9). Another development, next to the creation of a central overview, is the development of a model, which combines all the weather-predictions and water information, to assist in the decision-making during the management of water-quantity during drought (R9).

Lastly, according to R6, along the Albert-channel investments are made to also strengthen the retention capacity during drought-periods. This is done by building or improving the pump stations at the locks to pump back water which is lost by the process of transferring ships at the lock. The policy actors in the Netherlands are also working on creating more retention capacity. According to respondent R5 the locks, along the Meuse in the Netherlands, are old and are sensitive for leaks. Therefore, Rijkswaterstaat is working on replacement of these locks, however, the respondent emphasised that it is a difficult, technical process (R5).

This section showed how the normative layer on water-quantity, which discussed the shift in water-awareness, had a strong influence on the national institutionalisation regarding drought. Furthermore, this section also showed the cooperation between Flanders and the Netherlands. The involvement of Dutch policy actors in the process of making the Flemish allocation framework on water allocation is an example of the strong cooperation between the Dutch-Flemish policy actors.

4.3.2.2 Institutionalisation of the discourses on a transboundary level

The droughts in the period between 2017 and 2020 also have had their effect on the discourse-institutionalisation on a transboundary level on the Meuse-basin. This section will set out how the discourse has influenced this.

The results show that the droughts between 2017 and 2020 have had an impact on the water-quantity discourse of the policy actors, which consequently influences institutionalisation on a transboundary level. It created an urgency by the policy actors that drought is an urgent threat on the water-quantity on the Meuse-basin.

The transboundary institutionalisation of the discourse on water-quantity seems to happen in two different ways; due to bilateral or trilateral agreements and secondly, through the International Meuse Commission.

First, the use of agreements; The Netherlands, Flanders and Wallonia are currently working on a trilateral agreement, besides the bilateral "Meuse Discharge Treaty" between Flanders and the Netherlands (R2, R6, R9). It is apart from the IMC, because it is focused on the Meuse-basin below Liège (R9). This agreement was initiated because of the opening of a new lock in Ternaaien in 2015, near the border of Maastricht. Due to this, Wallonia could have an influence on the "Meuse Discharge Treaty". Therefore, the parties Wallonia, Flanders and the Netherlands came together to make a trilateral agreement (R2, R9). R9: *"It is not especially to make or create fixed rules. It is mainly to indicate that we have to collaborate, that we have to exchange information and so on"*. This process is already taking years due to some legal complications from the Netherlands, before signing the agreement. When that was set, signing the agreement was delayed due to the consequences of the flash-flood in 2021 in Wallonia because Wallonia was focused on the aftermath of the flash-flood, which occurred in the summer of 2021 (R2, R6, R9).

Secondly, cooperation via the International Meuse Commission. The main goal of the International Meuse Commission is to organise the cooperation and basin-wide coordination around the Water Framework Directive and the Flood Directive (R7). The main focus of the WFD, however, is water-quality and not quantity (Stein et al, 2016). However, article 19 of the WFD state that: *"...the Directive aims at maintaining and improving the aquatic environment in Europe. This purpose is primarily concerned with the quality of the waters. Control of quantity is an ancillary element in securing good water quality and therefore measures on quantity, serving the objective of ensuring good quality, should also be established"*. The provisions of the WFD imply that drought planning and management should be implemented at the level of river basins and therefore drought scenarios must be clearly defined in the River Basin Management Plans (Stein et al, 2016). Stein et al (2016) argue that: *"...the focus on quality and not quantity leaves provisioning of the amount of water*

resources too general and insufficient to tackling issues of drought and water scarcity management (p. 31)”. However, like water-quality, the WFD seemed to have an influence on the institutionalisation of water-quantity policies in the Meuse-basin, albeit in varying degrees.

As results showed before, focus on retention-measures along the Meuse-basin is mostly on national level, according to the WFD. However, results show that the International Meuse Commission is taking on a coordination role regarding international cooperation on water-quantity during drought. An example is the publication of the report “Plan of approach for exceptional low water events in the Meuse basin” which was published in 2020. This plan was based on legal framework is the Water Framework Directive. The International Meuse Commission is taking on the role as information- and communication hub. However, results show that most waterallocation- and retention issues are mutual arranged between countries. Furthermore, the 2020 IMC report state that: “...*measures for quantitative management of surface water resources such as limiting or stopping uses (water abstractions, discharges, hydroelectric production, etc.) remain the sole competence of the States in application of the legal and regulatory provisions in force, which differ from one country to another*” (p. 61).

Another project that is currently in progress is a sequel of the AMICE-project in the Meuse-basin. The delegates are currently working on submitting a new proposal for a project, which is called MICCA; Meuse Initiative for Climate Change Action, which is focused on the strengthening of the climate change adaptation with a special focus on low-water (R2).

R2: “*The IMC has a very important role. A lot of current actions in the field of low-water all began within the IMC and are all pulled by the Commission*”. These current actions are focused on communication and information and data exchange, like the new management plan regarding low-water periods, in which the delegates introduced a monitoring system on low-water during drought-periods using the same parameters (R2, R6, R7). Furthermore, this communication is improved to improve the communication between the delegates for the international regulation of the locks and navigation. R9 states that the situation is different from 2011: “*...but for instance, in 2011, eleven years ago, the situation was very different. There was less communication between us and Flanders and we had some problems. And the water level dropped one meter below the water level for navigation. So we had to reduce the capacity of the ships, to avoid the ships touching the bottom of the river*”. R6: “*The cooperation is hugely evolved in recent years. Before, there was no question of exchanging measuring data, especially not real-time. However, that is over now and sharing data is no problem anymore. So, there is good cooperation*”. R2 and R4 state that there are good relationships mutually, an example of respondent R4: “*...for example, we can email to the secretary-general of the IMC with his first name, so you can say that the relationship is pretty good*”. R9 also confirmed this: “*I think there has been a lot of improvement between different partners. The main reason I think is that we have improved all communication. Thanks to the different working groups, I think it is one of the reasons why the management is better (...) I think it is easier to exchange information because we have created this communication network*”.

R7 stated that regarding drought the downstream countries were more involved in this topic, which is in line with the empirical findings on the ontological layer of water-quantity. R7: “*France and*

Wallonia accepted to work together because the Netherlands was really asking for it, they have real big problems concerning droughts”. Furthermore, regarding the plan, which was published in 2020, there seemed to be a discrepancy in institutional capacity and ambition. Flanders and the Netherlands wanted to involve more topics in the plan. However, the delegates agreed to split up the plan in two parts. R7: *“So that means we will have an upgrade of this plan in the future years, just because they didn’t agree to work on all the topics at the same time”*. According to R7 partly because working on all the topics would require much institutional capacity.

Although the IMC is functioning as information- and communicationhub and international cooperation has improved, the influence and mandate of the IMC is limited, on quality as well as quantity level. The cooperation within the IMC is based on voluntary participation (R1, R2, R4). R2 states: *“Participation within the IMC is voluntary. The Commission cannot force countries. If the priorities of Wallonia and France are different, they can pump the brakes. In that situation there will be less done than Flanders and the Netherlands would like. In that case the Commission cannot do anything other than to stimulate cooperation. However, there has been an improvement on that stimulation with the new secretary and secretary-general”*.

Results above has shown that the influence of the IMC remains rather limited and that water-retention measures has been arranged mostly on national level. R3 argues for a more basin-wide approach: *“The drought measures are mostly arranged on national level (...) I think it would be good to think about a basin-wide allocation-series”*. This is also in line with a recommendation in the 2020 IMC report, whereby a recommendation was made to further examine the current and future needs for bi- or multilateral coordination in the field of crisis management during exceptional low water situations.

Although retention measures are currently mainly arranged on national levels and allocation-agreements between countries mutual, the International Meuse Commission currently seems to function as a information- and communication hub, which is experienced positively by the respondents of this research.

4.3.2.2.3 Conclusion

As results shown above is that in recent years there has been a lot of progression on transboundary cooperation related to drought-related policy agreements and institutions. The empirical findings pointed out that there has been a shift in awareness among the policy actors along the Meuse-basin regarding the retention of water which was sparked due to the droughts between 2017 and 2020 (R1, R6, R9, R2, R6, R8, R10). This discourse-shift influenced national institutionalisation as well as transboundary institutionalisation. The national or mutual institutionalisation of Wallonia, Flanders and the Netherlands are mostly focused on water-retention or allocation, whereas transboundary cooperation on the IMC is mostly focused on the exchange of information and communication. The International Meuse Commission is taking on a coordination role regarding international cooperation on water-quantity consequences on drought, partly based on the Water Framework Directive. The Commission currently functions as a communication network. Furthermore, there seems to be a discrepancy in ambition- and institutional capacity between Flanders, Wallonia and the Netherlands regarding measures on drought-related consequences.

5. Conclusion

This chapter will answer the main-research question. Furthermore, in this section the conceptual attributions and recommendations for further research will be set out.

5.1 Answering the main-research question

After discussing the sub-questions in the results-chapter, the main-research question can be answered. This research-question is especially focused on the Meuse-basin downstream of Liège. The main-research question is:

Are there any conflicting discourses on water, during drought-periods, between policy actors in the Meuse-basin and how are these (possible) conflicting discourses influencing the institutionalisation of transboundary drought-related policies?

To answer the main-research question, the results showed that there are no conflicting discourses in which there are ontological opposite views between the policy actors of Flanders, Wallonia and the Netherlands. It is clear that all respondents which were interviewed were ontologically aware that drought is a challenge for the Meuse-basin, on water-quantity as well as water-quality. Furthermore, a positive development is that results show that international cooperation on drought, especially with the help of the International Meuse Commission, in the Meuse-basin has evolved in the last years, following the droughts between 2017 and 2020. Results showed that the Water Framework Directive is used as a starting point for cooperation and is used as a legal framework.

However, there seems to be a discursive difference which influences the institutionalisation of these discourses. Due to the societal and economic dependence on the Meuse-basin and their downstream position, Flanders and the Netherlands experience the problem of drought more intensely than Wallonia. This was most visible in the results of the ontological layer, where it was clear that there is difference in experienced intensity of the drought-problem and its consequences related to water.

This ontological difference results in a discrepancy in ambition between the downstream-regions Flanders and the Netherlands and Wallonia. Results showed that the Netherlands and Flanders are more worried about drought and had more ambition to undertake action, e.g. within the International Meuse-Commission on quality- as well as quantity-related issues, in which they are sometimes inhibited by Wallonia and France. Regarding the conceptual framework, Wallonia does have the geographical location of being an upstream region, which is a resource, to influence the institutionalisation of the discourse of the Netherlands and Flanders. Furthermore, they lack institutional capacity to match the ambition of the Netherlands and Flanders, which can also be considered a resource that influence the institutionalisation of the discourse of Flanders and the Netherlands. This research could only state this for Wallonia, as France is not included in this research.

However, concluding from the results, this is for Wallonia not unwillingness but partly due to difference in ambition- and institutional capacity. Wallonia is open for cooperation and participation, which is visible because Wallonia is participating in different multiple agreements and workgroups, within the IMC, and regarding the trilateral agreement with Flanders and the Netherlands.

The discrepancy in ambition- and institutional capacity is not a conflict yet, however, if droughts and floods continue to intensify due to climate change this might be a problem for future cooperation. The flash-floods in the summer of 2021, which impacted the Meuse-basin, certainly had a negative influence on institutional availability regarding drought-related actions. However, apart from this, there seems to be a solid willingness to cooperate along the Meuse-basin, which is hopeful for the future.

5.2 Conceptual attributions

The aim of this research was to conceptually build on the conclusion and recommendation of Hussein (2019). The author stated that cooperation or conflict on a transboundary river is not shaped by the discourse on water-scarcity alone. It is important to take into account the broader context, like e.g. national agendas or interests.

This research has created a conceptual framework in which it is possible to research how the institutionalisation of the discourses is influenced, by external factors like actors and their resources, in transboundary water bodies and how these indicators influence institutionalisation of discourses regarding drought. This research has shown that the discourse of a policy actor is influenced by their interests on using the water, and their geographical location and characteristics. This research furthermore showed that discourses could be the same, albeit in a different degree. However, that coöperation could be influenced by a discrepancy in institutional capacity.

Results show that Flanders and the Netherlands are more worried about drought on the Meuse-basin than Wallonia, as Flanders and the Netherlands have a higher societal dependence on the Meuse. If these results are reflected to the theory of Hajer (1997), it is visible that Flanders and the Netherlands struggle for discursive hegemony of drought-consequences in the IMC to try to make other actors see the problem accordingly to their view and try to secure support for their definition of reality.

However, this research also has shown that institutionalisation of a discourse regarding water also could be influenced by an overarching, transboundary actor, which is the European Commission. So, the researcher would like to argue that for further research it is also important to take into account the already existing (transboundary) policies and research how these policies influence the discourses of the policy actors.

For further research on drought-discourses, it is necessary to indeed take the broader context into account. This research would add the indicators an 'overarching actor' and 'institutional capacity' to that context.

6. Limitations and recommendations

This final section reviews some limitations and shortcomings of this research-project. A critical reflection will help to strengthen the research reliability. This reflection will discuss the limitations that surfaced during the research-process. The second part will, based on this research, make recommendations for further research.

6.1 Limitations

First of all, it is important to note that this research has several limitations. This has several reasons, which will be explained below. Doing research is an iterative process and during the process of doing research there have been changes that did influence the findings of this research. Furthermore, it did influence the process of doing research and gathering research-data.

Firstly, as discussed with the thesis-supervisor the initial focus of this interview was the cooperation between Wallonia, Flanders and the Netherlands during drought with a focus on water-quantity and the functioning of their cooperation during previous drought. However, after conducting the first three interviews, the realisation came that water-quality was evenly, if not more, important during drought. After a thesis-appointment in consultation with the thesis supervisor the researcher decided to focus on both aspects. The advantage is that it will construct a more general, exploratory image of the situation. The disadvantage was that the focus sometimes was too wide. Furthermore, there was an information-gap, because the focus on the discourse on water-quality was introduced later. Therefore, valuable information among the first three respondents can possibly be missed.

Secondly, the discourse framework of Therborn (1982) was introduced half-way during the research-process after consultation with the thesis-supervisor. The exact date of the consultation was the 13rd of April, after which already six respondents were being interviewed. Therefore, it was difficult to create a clear overview of the discourse-results of each respondent separately, on the basis of the theory of Therborn (1982). The initial framework of this research, which was changed, was comparable with the ontological layer of the theory of Therborn. Therefore, this layer could be filled-in more accurately than the normative and strategic layer. In these layers there is an information-gap, which can influence the results because valuable information again could be missed. However, to tackle this problem, the strategy of the researcher was to create the general overview, per region or county, of the respondents and focus mainly on differences and similarities in the discourses in an explorative, general way.

The third remark is that the research-focus was the area downstream of Liège, which was in practice quite difficult to maintain during the writing of the results, because of a lot of policy agreements and social institutions are basin-wide. To still use the valuable information the respondents provided, this focus was not too strictly maintained in the result-section. However, just like the discourse about water-quality and quantity, enlarging the focus area automatically means more general information and less details, which could have influenced the results and conclusions.

The fourth remark is that respondents of Wallonia seem to be underrepresented. The aim was to have an equal share of respondents between the regions and countries. But because the focus area was downstream of Liège, respondents from France were not deemed as options. The interview with R9, from Wallonia, was very helpful and information-rich. However, the subject of the interview was mainly on water-quantity. To know more about the quality discourse of Wallonia another respondent was approached, using the snowball-sampling strategy, unfortunately this respondent was timewise not available. Due to a lack of left research-time, it was unfortunately not possible to plan another meeting. Given this, the point of data-saturation, which was being discussed in section 3.3.3, is unfortunately not attained. Therefore, there could be an overrepresentation of respondents from downstream-countries and an underrepresentation of respondents on the upstream-state. This unequal distribution of respondents might have influenced the internal validity. Whereas more respondents on the upstream-regions might have, for example, nuanced the research results and have strengthened the internal validity.

The last remark is related to the snowball-sampling strategy. In using this strategy there is always a chance that the respondents that are interviewed are in-hindsight not that connected to the focus of the research, which is a disadvantage of the snowball-strategy. This has also been the case in this research. Although some of these interviews are not presented that much in the result-section, these interviews provided useful context. Because the sampling strategy as well as doing qualitative research is time-intensive and there was a limited time left to do the research, there could be an overrepresentation of some respondents in the result-section. Hereby, the researcher wants to state that this might have influenced the research results and that there is a possibility that the conclusions in the conclusion-section could be nuanced when further research has been conducted. However, the researcher is convinced that the exploratory findings of this research, for now, are conclusive enough to present in this research.

6.2 Recommendations for further research

This section will provide recommendations for further research.

Firstly, as the results showed that the objectives of the Water Framework Directive regarding water-quality will not be completed in 2027. The respondents of this research are, on the ontological layer, worried about the quality of the water during drought. Further research could be done on how the objectives of the Water Framework Directive can be met as quickly as possible with good international cooperation along the Meuse-basin.

Second, this research was focused especially on the policy actors below Liège. Further research could take into account other upstream-states, like France and Germany and Luxembourg. Thereby, it is possible to create a more integral discursive image of the policy actors in the whole Meuse-basin.

Third, as the recommendation of the IMC also suggests, further research could be done on how bi- or trilateral coördination could work during severe drought-periods, especially on the field of water allocation.

Lastly, in section 4.1.1.1 results showed that scenarios of the IPCC regarding climate change were being named; floods as well as drought are expected to be more frequent and these weather-phenomena will alternate with each other more quickly. The floodings of the summer of 2021 were an example of that, the results showed that Wallonia institutional availability on drought was very limited due to the consequences of the Meuse-floods in July 2021. For further research it would be interesting to research how future international cooperation could manoeuvre in the best possible way between floods and droughts on the Meuse-basin.

References

- Arends, M., UT, M. K., & UT, M. B. (2005). Low flow modelling of the Meuse. *Retrieved from*.
- Alsaawi, A. (2014). A critical review of qualitative interviews. *European Journal of Business and Social Sciences*, 3(4).
- Arts, B., & Van Tatenhove, J. (2004). Policy and power: A conceptual framework between the 'old' and 'new' policy idioms. *Policy sciences*, 37(3), 339-356.
- Arts, B., & Buizer, M. (2009). Forests, discourses, institutions: A discursive-institutional analysis of global forest governance. *Forest policy and economics*, 11(5-6), 340-347.
- Arts, B., Leroy, P., & Van Tatenhove, J. (2006). Political modernisation and policy arrangements: a framework for understanding environmental policy change. *Public organisation review*, 6(2), 93-106.
- Bakker, M. H. N., Hegger, D. L. T., Dieperink, C., Driessen, P. P. J., Raadgever, G. T., & Wiering, M. (2013, March). Flood risk management strategies across boundaries: a research approach. In *TWAM 2013, Transboundary Water Management Across Borders and Interfaces-present and future challenge conference*.
- Bastings, S., Jaskula, A., & Maeghe, K. (2011). Maasafvoeroverdrag Vlaanderen-Nederland: 15 jaar ervaring. *H2O: Tijdschrift voor Watervoorziening en Waterbeheer*, (2).
- Brochmann, M., & Gleditsch, N. P. (2012). Shared rivers and conflict—A reconsideration. *Political Geography*, 31(8), 519-527.
- Burstein, P. (1991). Policy Domains: Organisation, Culture, and Policy Outcomes. *Annual Review of Sociology*, 17, 327–350. <http://www.jstor.org/stable/2083346>
- Creswell, J. W., & Poth, C. N. (2017). *Qualitative Inquiry and Research Design (international Student Edition): Choosing Among Five Approaches*. Sage Publications.
- Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC medical research methodology*, 11(1), 1-9.
- De Wit, M., Warmerdam, P. M. M., Torfs, P. J. J. F., Uijlenhoet, R., Roulin, E., Cheymol, A., ... & Buitenveld, H. (2001). *Effect of climate change on the hydrology of the river Meuse* (No. 104). Wageningen University.
- De Wit, M. J. M., Van Den Hurk, B. J. J. M., Warmerdam, P. M. M., Torfs, P. J. J. F., Roulin, E., & Van Deursen, W. P. A. (2007). Impact of climate change on low-flows in the river Meuse. *Climatic change*, 82(3), 351-372.
- Donahue, J. M., Donahue, J., & Johnston, B. R. (Eds.). (1998). *Water, culture, and power: local struggles in a global context*. Island Press.

- Dunne, D. (2021, 7 april). *Warm spring worsened Europe's extreme 2018 summer drought, study says*. Carbon Brief. <https://www.carbonbrief.org/warm-spring-worsened-europes-extreme-2018-summer-drought-study-says/>
- European Commission, Directorate-General for Environment, *The EU Water Framework Directive*, Publications Office, 2014, <https://data.europa.eu/doi/10.2779/75229>
- Flick, U. (2004). Triangulation in qualitative research. *A companion to qualitative research*, 3, 178-183.
- Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The qualitative report*, 20(9), 1408.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*, 2(163-194), 105.
- Hyde, K. F. (2000). Recognising deductive processes in qualitative research. *Qualitative market research: An international journal*.
- IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press
- Gleditsch, N.P., K. Furlong, H. Hegre, B. Lacina, and T. Owen (2006). "Conflicts over Shared Rivers: Resource Scarcity or Fuzzy Boundaries?" *Political Geography* 25: 361–382
- Graham, S. (2000). *Drought: The Creeping Disaster*. Earth Observatory NASA. <https://earthobservatory.nasa.gov/features/DroughtFacts>
- Gupta, A., & Bravard, J.-P. (2010). Introduction to management of large European rivers. *Geomorphology*, 117(3-4), 217–218. <https://doi.org/10.1016/j.geomorph.2009.01.013>
- Hajer, M. (1993). Discourse Coalitions and the Institutionalisation of Practice. DOI: 10.1215/9780822381815-003.
- Hajer, M. (1997). *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. Oxford University Press.
- Hussein, H. (2019). Yarmouk, Jordan, and Disi basins: Examining the impact of the discourse of water scarcity in Jordan on transboundary water governance. *Mediterranean Politics*, 24(3), 269-289.
- International Meuse Commission. (2020, December). *Plan of approach for exceptional low water events in the Meuse basin*. IMC. http://www.meuse-maas.be/getattachment/25abc7a4-c407-4278-ac7d-f2f17e0fdc83/Plan_approche_19_21def_en.aspx
- Kaufmann, M. (2017). *Governing Floods Discursively-An institutional approach to understanding dynamics in flood risk governance* (Doctoral dissertation, [Sl: sn]).

- Kristensen, P., Whalley, C., Zal, F. N. N., & Christiansen, T. (2018). European waters assessment of status and pressures 2018. *EEA Report*, (7/2018).
- Liefferink, D. (2006). The dynamics of policy arrangements: turning round the tetrahedron. In *Institutional dynamics in environmental governance* (pp. 45-68). Springer, Dordrecht.
- Lloyd-Hughes, B. (2014). The impracticality of a universal drought definition. *Theoretical and Applied Climatology*, 117(3), 607-611.
- Mirumachi, N., & Allan, J. A. (2007, November). Revisiting transboundary water governance: Power, conflict cooperation and the political economy. In *Proceedings from CAIWA international conference on adaptive and integrated water management: Coping with scarcity*. Basel, Switzerland (Vol. 1215).
- Mishra, A. K., & Singh, V. P. (2010). A review of drought concepts. *Journal of hydrology*, 391(1-2), 202-216.
- Miller, 2010, *The Moral Foundations of Social Institutions: A Philosophical Study*, New York: Cambridge University Press.
- Moon, K., & Blackman, D. (2014). A guide to understanding social science research for natural scientists. *Conservation biology*, 28(5), 1167-1177.
- Mosley, L. M. (2015). Drought impacts on the water quality of freshwater systems; review and integration. *Earth-Science Reviews*, 140, 203-214.
- Munia, H., Guillaume, J. H. A., Mirumachi, N., Porkka, M., Wada, Y., & Kummu, M. (2016). Water stress in global transboundary river basins: significance of upstream water use on downstream stress. *Environmental Research Letters*, 11(1), 014002.
- Nienhuis, P. H. (2008). *Environmental history of the Rhine-Meuse Delta: an ecological story on evolving human-environmental relations coping with climate change and sea-level rise*. Springer Science & Business Media.
- Noy, C. (2008). Sampling knowledge: The hermeneutics of snowball sampling in qualitative research. *International Journal of social research methodology*, 11(4), 327-344.
- Onwuegbuzie, A. J., & Collins, K. M. (2007). A typology of mixed methods sampling designs in social science research. *Qualitative Report*, 12(2), 281-316.
- Paneque Salgado, P., & Vargas Molina, J. (2015). Drought, social agents and the construction of discourse in Andalusia. *Environmental Hazards*, 14(3), 224-235.
- Rijksoverheid. (n.d.). *Wat is de KRW?* Helpdesk Water. Retrieved from <https://www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/kaderrichtlijn-water/uitvoering/rijn-west/we/krw/>
- RIWA. (2021, September). Jaarrapport 2020 De Maas <https://www.riwa-maas.org/publicatie/riwa-jaarrapport-2020-de-maas/>

- Rossi, G (2000) *Part 6: Drought Mitigation Strategies* in Vogt, J. V., & Somma, F. (2000). *Drought and Drought Mitigation in Europe*. Springer Publishing.
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (Eighth). Pearson.
- Schmidt, V. A. (2008). Discursive institutionalism: The explanatory power of ideas and discourse. *Annu. Rev. Polit. Sci.*, 11, 303-326.
- Sivakumar, M. V., Stefanski, R., Bazza, M., Zelaya, S., Wilhite, D., & Magalhaes, A. R. (2014). High level meeting on national drought policy: Summary and major outcomes. *Weather and climate Extremes*, 3, 126-132.
- Sjerps, R. M., Ter Laak, T. L., & Zwolsman, G. J. (2017). Projected impact of climate change and chemical emissions on the water quality of the European rivers Rhine and Meuse: A drinking water perspective. *Science of the Total Environment*, 601, 1682-1694.
- STOWA. (n.d.). *Floods Directive*. Retrieved from <https://www.stowa.nl/deltafacts/waterveiligheid/delta-facts-english-versions/floods-directive>
- Stuurgroep Management Watercrises en Overstromingen. (2020, March). *Handleiding verdringingsreeks*. Ministerie van Infrastructuur en Waterstaat.
- Stein, U., Özerol, G., Tröltzsch, J., Landgrebe, R., Szendrenyi, A., & Vidaurre, R. (2016). European drought and water scarcity policies. In *Governance for drought resilience* (pp. 17-43). Springer, Cham.
- Urquijo, J., De Stefano, L., & La Calle, A. (2015). Drought and exceptional laws in Spain: The official water discourse. *International Environmental Agreements: Politics, Law and Economics*, 15(3), 273-292.
- Van der Wiel, K., Lenderink, G., & de Vries, H. (2021). Physical storylines of future European drought events like 2018 based on ensemble climate modelling. *Weather and Climate Extremes*, 100350.
- Van Eerd, M. C., Wiering, M. A., & Dieperink, C. (2017). Solidarity in transboundary flood risk management: A view from the Dutch North Rhine–Westphalian catchment area. *Climate Policy*, 17(3), 261-279.
- Van Tatenhove, J., B. Arts and P. Leroy (eds.), (2000). *Political Modernisation and the Environment. The Renewal of Environmental Policy Arrangements*. Dordrecht/Boston/London: Kluwer Academic Publishers.
- Van Thiel, S. (2014). *Research methods in public administration and public management: An introduction*. Routledge.
- Van Vliet, M. T. H., & Zwolsman, J. J. G. (2008). Impact of summer droughts on the water quality of the Meuse river. *Journal of Hydrology*, 353(1-2), 1-17.
- Veldkamp, T. I. E., Wada, Y., Aerts, J. C. J. H., Döll, P., Gosling, S. N., Liu, J., ... & Ward, P. J. (2017). Water scarcity hotspots travel downstream due to human interventions in the 20th and 21st century. *Nature communications*, 8(1), 1-12.

- Vij, S., Warner, J., & Barua, A. (2020). Power in water diplomacy. *Water International*, 45(4), 249-253.
- Wahlström, N., & Sundberg, D. (2018). Discursive institutionalism: towards a framework for analysing the relation between policy and curriculum. *Journal of Education Policy*, 33(1), 163-183.
- West, B., & Smith, P. (1996). Drought, discourse, and Durkheim: a research note. *The Australian and New Zealand Journal of Sociology*, 32(1), 93-102.
- Wiering, M. A., & Arts, B. J. M. (2006). Discursive shifts in Dutch river management: 'deep institutional change or adaptation strategy?'. In *Living rivers: trends and challenges in science and management* (pp. 327-338). Springer, Dordrecht.
- Wiering, M. A., & Arts, B. J. M. (2006). Discursive shifts in Dutch river management: 'deep institutional change or adaptation strategy?'. In *Living rivers: trends and challenges in science and management* (pp. 327-338). Springer, Dordrecht.
- Wilhite, D. A., & Vanyarkho, O. V. (2000). Drought: Pervasive impacts of a creeping phenomenon.
- Wilhite, D. A., Sivakumar, M. V., & Pulwarty, R. (2014). Managing drought risk in a changing climate: The role of national drought policy. *Weather and climate extremes*, 3, 4-13.
- Williams, J. M. (2018). Stagnant rivers: transboundary water security in South and Southeast Asia. *Water*, 10(12), 1819.
- Willems, P. (2021). Vlaanderen pakt grote kwetsbaarheid voor droogte aan. *International Journal of Water Governance*, 81-87.
- World Meteorological Organisation (WMO). (2021). *2021 State of Climate Services* (WMO-No. 1278). https://library.wmo.int/index.php?lvl=notice_display&id=21963
- Zainal, Z. (2007). Case study as a research method. *Jurnal kemanusiaan*, (9), 1-6.

Appendix I: Questionnaire of the research

I) The email to the respondents

Dear mr/mrs,

I am Caspar Bosch and currently a master-student of Environment and Society at the Radboud University in Nijmegen, the Netherlands. For my master-thesis I am doing research into the international cooperation on water during droughts on the Meuse-basin, especially focused on the part from Liège till its mouth. The aim of this research is to interview multiple actors that are involved in the Meuse-basin during drought. I would like to, if it is possible, interview you as a respondent. The length of this interview is about one hour. Personal participation is anonymous, however if you agree, I would like to name your organisation in the results.

I would like to hear from you,

Best regards,

Caspar Bosch

II) Questionnaire of the research

Sidenote: Doing research is an iterative process, therefore a questionnaire can be subject to change during the process of doing research. This questionnaire is the most recent version that is used in this research. This is the most recent version from 13rd of April. The questions that are shaded in red are added along the process of doing research (see 6.1 for implications)

I - Introduction	Can you introduce yourself and explain what your function is within your organisation?
	In what way is the Meuse relevant or important for your organisation?
II - Drought	How have you or your organisation experienced previous droughts in the Meuse-basin?
	How do you perceive the risks of drought, in the light of climate change, for the Meuse-basin?
III - International coopération on drought	How was the coopération between policy actors from Flanders, Wallonia and the Netherlands during previous droughts? What went well and what were problems? If so, what were exactly the problems or conflicts that occurred?
	Is there a difference between policy actors of

	the Netherlands, Flanders and Wallonia in the perception of (future) risks of droughts in the Meuse-basin? If so, why?
	Related to drought, what do you think can be improved on international cooperation and policies?
	If droughts in the Meuse-basin become more severe, do you think that the cooperation will become better or do you think it will worsen? Why or why not?
IV - Institutionalisation on water quantity and water quality	Which policy agreements or social institutions are in place regarding water quantity during drought? How do you experience their functioning? What are the positive and negative characteristics?
	Which policy agreements and social institutions are in place regarding water quality during drought? How do you experience their functioning? What are the positive and negative characteristics?
	Are there any discussions about the functioning of the existing agreements or institutions? If so, why?

Appendix II: Codebook

In this appendix the codebook is included.

Research indicators	Code group	Meaning
Discourse about water quantity during drought (based on three-layer discourse analysis, Therborn (1982))	Ontological_quantity (O_Quantity)	Definition and paradigm view on drought, climate change and the reduction of water quantity.
	Normative_quantity (N_Quantity)	Norms and values regarding the reduction of water quantity and the use of water.
	Strategic_quantity (S_Quantity)	The view of stakeholders on which practical measures are solid for the phenomenon and if they are feasible.
Discourse about water quality during drought (based on three-layer discourse analysis, Therborn (1982))	Ontological_quality (O_Quality)	Definition and paradigm view on the influence of drought on the water quality.
	Normative_quality (N_Quality)	Norms and values regarding the quality of water during drought-periods.
	Strategic_quality (S_Quality)	The view of stakeholders on practical strategic measures for the phenomenon.
Influence of actors on institutionalisation	Influence_actor (Influence_Actor)	The actors that influence the institutionalisation of discourses on water quantity or water quality.

Influence of resources on institutionalisation	Influence_resource (Influence_Resource)	The resources that influence the institutionalisation of the discourses on water quantity or water quality.
Mutual influence institutionalisation on the discourse	Influence_institutionalisation (Influence_InOnDI)	The influence of the institutionalised discourses on the current discourses.
Current institutionalisation of the discourses	Policy_Agreements	Policy_Agreements_Netherlands Policy_Agreements_Flanders Policy_Agreements_Wallonia Policy_Agreements_International
	Social_Institutions	Soc_Ins_Netherlands Soc_Ins_Flanders Soc_Ins_Wallonia Soc_Ins_International