The reflection of normative principles in catchment policies: lessons from the Rhine basin

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Preface

Wednesday, May 2nd, 2012 marked the start of Swiss extreme athlete and water activist Ernst Bromeis's attempt to swim the entire length of the Rhine from its source in the Swiss Alps to the river's mouth in Rotterdam, the Netherlands. The attempt was set up to draw attention to the beauty of the Rhine, its fragility as a water resource, and its importance for the approximately 50 million people that depend on the river's water. Although very positive about swimming the more than 1,000 km from his village in the canton of Graubünden to the North Sea in just one month, the quest proved to be more challenging than Bromeis had imagined. After nearly two weeks, the swimmer was forced to cut off his attempt due to health concerns. However, Ernst Bromeis did not give up: he took a kayak and continued his journey to the North Sea.

The aim of my research was to shed light on the importance of international normative principles for the governance on the Rhine. During my research project, it became clear that the river basin and its more than 50 million inhabitants are under pressure due to the expected effects of climate change. Similar to the quest of Ernst Bromeis, my attempt to fulfil a research project proved to be quite demanding. Then again, sometimes you have to find inventive ways to complete such a challenge.

I would like to thank a number of people that made it possible for me to conduct this research project. The experts that were willing to spend their time on an interview in order to provide me with case-study results: Gert Becker, Erik Buschhüter, Bob Dekker, Heide Jekel, Erik Mostert and Mark Wiering. Andrea Keessen for her help in setting up the selection of the normative principles. My mother, Pauline Maarsen, for her practical support on my trip to Bonn and Düsseldorf. Adinda Verburg, for translating the interview with Erik Buschhüter. My sister, Lotte de Kruif, for her support in the final stages of my writing process. Elsje Vroege-Moulijn from Switzerland for providing me the story of Ernst Bromeis. And of course my supervisor, Carel Dieperink, for his support during eight months of research.

Sebastiaan de Kruif
Alphen aan den Rijn, the Netherlands, October 15, 2012

Chapter 1
Introduction

1.1. The transboundary problem of climate change adaptation

Climate change adaptation is a transboundary problem that requires international cooperation on different levels of governance. These levels are the global scale, the European scale, bilateral scale and regional level. The general impression in the scientific community is that climate change requires the timely development of and implementation of action plans. This is because climate change will – in most cases – amplify risks such as flooding and heat stress. The development and implementation of action plans is called *governance of climate change-related risks* (Runhaar et al., 2012). In this research project we adopt this definition and also refer to it as *climate change adaptation* with a focus on water quantity issues.

There is a number of reasons that make adaptation to climate change complex. Uncertainty and ambiguity make it hard to define the problem of climate change adaptation. Some of its effects have causes not necessarily related to climate change. Moreover, the size, scale and magnitude of the expected effects are far from certain, and also the effects may differ considerably across regions. It is unclear what strategies on the short or medium term best anticipate the long-term issue of climate change. Besides, not evidently clear is to what extent the government is responsible for climate change adaptation, and what the responsibilities of citizens and private parties are (Driessen et al., 2009; Driessen & Van Rijswick, 2011). For these reasons, additional research on transboundary climate adaptation is required.

This research project is about the reflection of *normative principles* in the practice of transboundary water management. For this purpose, a case-study is conducted. This is because, in order to have an assessment of principles at policy levels, the principles have to be confronted with a limited set of policies. In this particular research, the river Rhine is taken as a case-study. Because the Rhine crosses the borders of Switzerland, Germany, and the Netherlands, it is clear that governance dealing with climate change adaptation in the Rhine catchment should be seen in a European context. The outcomes of various strategies of climate change adaptation therefore have their impacts in multiple riparian states. It may therefore be argued that normative principles defined at international level can be retrieved at lower policy levels.

Until recently, little attention had been paid to the normative aspects of climate change adaptation. Governance of climate change adaptation is however always value-laden because of underlying normative judgements that are based on principles and world views. Some of the normative positions are defined at national or European level, whereas others vary considerably in time and place. Driessen & Van Rijswick (2011) put forward a list of normative principles that – in their view – should take the lead in climate change adaptation. The five principles included in the United Nations Framework Convention on Climate Change (UNFCCC) are *equity, solidarity, precaution, sustainability* and *good neighbourliness*. Other relevant principles, that do not directly follow the UNFCCC, are the *principle of proportionality*, the *principle of subsidiarity*, and the *cost-recovery principle*. The authors argue that these principles are to be explicitly discussed in climate change

adaptation policy processes. However, the way normative principles are dealt with varies across states and regions and depends on "*the main problems that have to be solved, the political preferences, historical views, the actual preferences (…), the way a state is organized, and the obligations following from (…) law*" (Driessen & Van Rijswick, 2011, pp. 563-564).

Driessen & Van Rijswick (2011) identify a number of topics related to normative principles that have been insufficiently researched. In order to arrive at legitimate measures, the question is what principles are taken into account when formulating and implementing adaptation measures, and what legal meaning has to be assigned to them (Driessen & Van Rijswick, 2011). Hence, there is a knowledge gap concerning the role of international normative principles in transboundary climate change adaptation.

1.2. Research questions

This research project aims to yield information on the role of normative principles in transboundary climate change adaptation. Besides an identification of the principles in relevant EU policies and an assessment of the reflection of the principles at other policy levels, the project aims to shed light on the factors or conditions that determine the extent of reflection of international normative principles in lower-level climate change adaptation policies.

The central research question that is addressed in this project is:

> ***Which factors explain the extent of reflection of international normative principles in catchment policies?***

This research question is divided into the following research sub-questions:

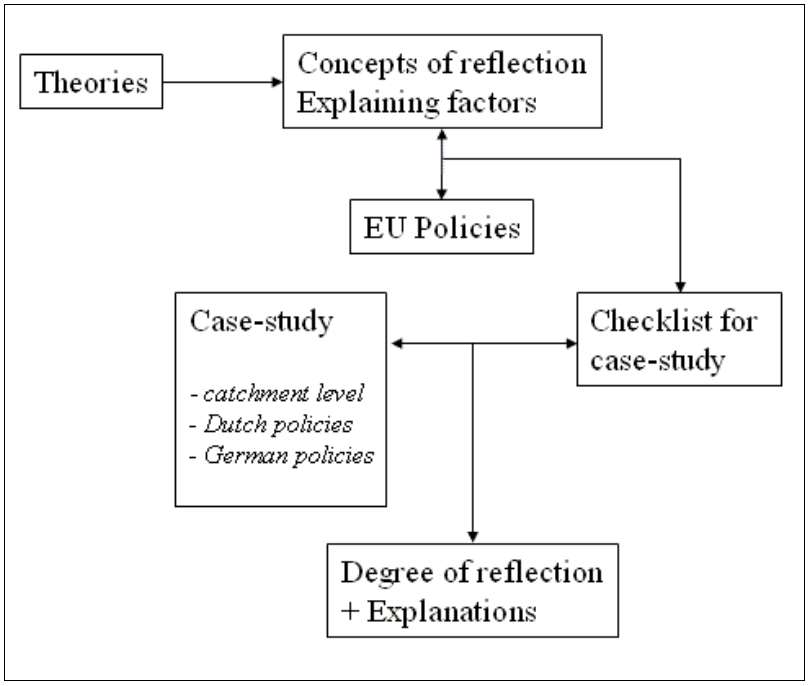
- RQ 1. *How can the concept of reflection be defined and operationalised?*
- RQ 2. *Which factors could explain the degree of reflection?*
- RQ 3. *What are the main normative principles in EU climate change adaptation policies?*
- RQ 4. *Which climate change adaptation policies in the Rhine river basin have been developed...*
  - a. *...at catchment level?*
  - b. *...in Germany?*
  - c. *...in the Netherlands?*
- RQ 5. *What are the main similarities and differences between the extent of reflection of international normative principles in EU, catchment, Dutch, and German policies?*
- RQ 6. *Which factors explain this reflection of international normative principles?*

1.3. Research design

Figure 1.1 gives an overview of the research framework. As a first step, the concept of *reflection* is defined by relating it to findings from literature on *policy performance*. After giving this definition, the method of analysis is explained. Additionally, two fields of research literature are addressed in which explaining factors for the reflection of normative principles are found: Europeanisation theory and the theory on regime effectiveness. These steps form the outline of chapter 2, thereby answering research subquestions RQ 1-2. The output of chapter 2 is a definition of reflection and a

set of effectiveness explaining factors.

Figure 1.1 Research framework



Chapter 3 gives an analysis of the normative principles that are included in the international strategic plans on catchment policies. The EU Water Framework Directive (WFD) and the EU Flood Risk Directive (FRD) are chosen as the strategic plans, as they serve as reference frameworks for their successive policies (i.e. the policies at catchment, national and regional levels). A set of 9 normative principles was identified from the EU Directives, thereby answering research subquestion RQ 3. For each of the principles a definition is given, additional literature is used. This literature research and information from one of the experts (see chapter 3) forms the basis of the assessment of the reflection of the principles. The output of chapter 3 is a set of 14 practical statements (or checklist for the case-study) that is used in the method as explained in chapter 2.

Conform the research method the next step is to confront the set of practical statements with policies at issue. This is done by means of a combination of a document analysis and interviews with experts. In the case-study, the reflection of each of the 9 normative principles is discussed for the policies at catchment, national, and regional level. The findings on each level are presented in a separate chapter: chapter 4 (catchment policies), chapter 5 (German federal level), chapter 6 (German federal state of North-Rhine Westphalia), and chapter 7 (the Netherlands). These four chapters thus answer research subquestion RQ 4.

In chapter 8, the results of the confrontation as presented in the chapters 4-7 are presented. For each practical statement, it is determined whether it is applicable to each of the levels. In this way, the presentation reveals the similarities and differences in the reflection of the normative principles at these four levels. By using insights from the theory on reflection (see chapter 2), explanations of the similarities and differences are given.

Conclusions on the reflection of the 9 normative principles from the two EU Directives in

catchment, national and regional policies are presented in chapter 9. The chapter ends with a reflection on the research project.

The Rhine at Düsseldorf, Germany

Chapter 2
Reflection: literature review and specification

2.1. Introduction

This chapter addresses the first two research subquestions:

RQ 1. *How can the concept of reflection be defined and operationalised?*
RQ 2. *Which factors could explain the degree of reflection?*

These two subquestions form the method that is applied in my research, and is explained in this chapter. The method is an adaptation of the framework of De Lange (1995), which is, in turn, based on the framework for evaluating planning procedures as proposed by Van Vught (1982 in De Lange, 1995). Central in the framework is the concept of policy *performance*. Section 2.2 addresses the concept of *performance*, and explains why *performance* is suited for measuring the reflection of normative principles from the EU Directives. Section 2.3 discusses the framework of De Lange (1995), and motivates why this framework is suited for my research on the reflection of normative principles in a catchment policiy. Section 2.4 explains the operationalisation of the research framework.

2.2. Policy performance

In general, the evaluation of policies deals with the identification and assessment of the effects associated with a policy. There are various methods of analysis. The conventional approach for example, measures the relation between the policy objectives and the resulting situation. In such an analysis, the operationalised policy targets are taken as criteria for the assessment. Also, possible effects other than these targets are disregarded. Other approaches consider all effects of a policy, for which the set of assessment criteria is extended beyond the list of policy targets. The most complex category of assessment deals with the effectiveness of a policy. In that case, the policy targets provide the criteria of assessment, however it is also determined whether the observed effects can be contributed to the policy.

Despite its usability, an approach that attaches observed changes to policy plans experience a number of problems that make the approach is insufficient to determine why policy objectives have not been met, i.e. a policy 'fails'. This insufficiency may be attributed to the fact that aspects of social interaction are disregarded in such an approach. Especially with regard to strategic or indicative policies, these aspects are important, as they deal with processes of communication between users and target groups. For this reason, elements from a social-interaction perspective are more and more incorporated in policy evaluation (Mastop & Faludi, 1993). The idea of a policy plan being followed, an idea central to measuring the *conformance* of the plan (i.e. *"the concurrence between the original plan and changes in the outside world"*, Mastop & Faludi, 1997, p. 820) is replaced by a concept that relates to the process in which the policy plan is being adopted. The main concern here is whether the plan is being 'used' in the decision situations that follow its adoptation,

and its results are less important. Mastop & Faludi (1993, 1997) explain a research design that is built on the idea that *"[w]hatever a plan states, its effectiveness is always dependent upon it being used"* (Mastop & Faludi, 1997, p. 820).

The research programme adopted by Mastop & Faludi (1993; 1997) is based on the Dutch concept of *doorwerking*. The authors note that the position of experts on strategic planning is relatively weak in comparison with experts dealing with housing, economic development or environmental protection. The crucial difference is that in the field of urban and regional planning, unlike the other fields, there are no standard procedures for measuring the effectiveness of a plan. Evaluation of effectiveness is more difficult, for example in situations in which policies are modified during implementation. To cope with this issue, the new concept *doorwerking* was introduced by Dutch national planners. Having no direct English equivalent, Mastop & Faludi (1997) state that the meaning of this *"rather vague notion of* doorwerking*"* is *"that of policies 'working through' by diffusion into the deliberations which follow their adaptation"* (Mastop & Faludi, 1997, p. 816). The authors translate the notion as *performance*, a term that is borrowed from Barret & Fudge (1981 in Mastop & Faludi, 1997).

Mastop & Faludi (1997, p. 822) define the concept of *performance* as the following condition: *"[a] strategic plan is performing well, that is, serving its function, if and only if it plays a tangible role in the choices of the actors to whom it is addressed (including the subsequent choices of the plan-maker or planmakers) and/or of other actors to whom the plan appeals, in either case irrespective of whether or not outcomes correspond with the plan"*[1].

There is however discussion about the the *performance* concept, on which De Lange (1995) elaborates. A central question in this discussion is how the concept is operationalised as a standard or norm. When it is assumed that a policy provides a certain framework, it is necessary to include an additional criterion in the evaluation that demands that elements such as problem definition, perspective and values should be similar between the initial policy and successive decisions. Indeed, when a certain policy is designed with the purpose of giving directions to successive policies, this is a meaningful criterion. When it is assumed that a policy should be useful, the initial policy should provide essential information that enhances the quality of successive policies (De Lange, 1995). In the case of EU Directives, it can be said that there is a tendency towards the initial policy giving directions. After all, both Directives do not provide essential knowledge, but rather assign this task to the Member States. Moreover, the normative principles that are identified in the Directives are directional in their very nature. De Lange (1995) however argues that both approaches do not exclude each other, as usefulness is a precondition for actual use, and use is a precondition for giving direction.

2.3. Measuring reflection

The framework that is explained by De Lange (1995) is especially applicable to strategic plans or

1 In Dutch language the concept of *doorwerking* is also defined as a condition: *"Van doorwerking van plan- of beleidsuitspraken is sprake indien dergelijke uitspraken worden gehanteerd in de nageschakelde besluitvorming, dat wil zeggen dat dergelijke uitspraken een wezenlijk onderdeel uitmaken van besluitvormingsprocessen van nageschakelde besluitvormers (inclusief het planningssubject zelf), in die zin dat de betreffende uitspraken mede de uitkomst van die besluitvorming bepalen"* (cf: Mastop, 1991, p. 69 in De Lange, 1995, p. 31).

strategies, terms that serve as counterparts to concrete decision-making. The definition of a 'strategy' is given as *"een samenhangende reeks van handelingen waarbij de eigen wensen en ambities worden gekoppeld aan de inschatting van de wensen en ambities van andere actoren"* (Klijn et al., 1993, p. 233 in De Lange, 1995, p. 42), which reads as: a coherent set of actions that relate one's initial desires and ambitions to the supposed desires and ambitions of other actors. Strategies differ from *project* plans in the sense whereas *project* plans are blueprints that provide an *"unambiguous guide to action"* and have direct effects, *strategic* plans deal with *"the coordination of a multitude of actors"* (Mastop & Faludi, 1997, p. 819).

However the two examined EU Directives comprise more than wishes and desires (e.g. also legislative directions), they can be seen as *strategic* plans. Indeed, the Water Framework Directive (WFD) and the Flood Risk Directive (FRD) affect a large number of actors in their Member States, in multiple policy fields (such as water, environment, urban planning, etc.) and at multiple levels (national, federal state, province, municipality). EU Directives are indicative; they form frames of reference for negotiations. After all, implementation of the Directives takes place at different levels, which is dependent on interpretations made in the Member States. Hence, the EU Directives can be used as input for our analysis.

A further decision is to be made about the starting point of successive decision-making, which should be defined in the context of a certain policy. In reality however, policy processes do not have a sharp starting point as sometimes is suggested; rather, they respond to policies, actions and other actors' statements. Successive decision-making is usually based on several preceding policy statements (De Lange, 1995). In this case, the analysis on the reflection of normative principles is based on the WFD and the FRD, the WFD being the first Directive to come into force, on December 22, 2000. It is however more sensible to include processes prior to the implementation to the analysis. After all, decision-making processes do not start 'out of the blue' and these preliminary processes affect actual decision-making. Actors in the decision-making process may for example share a long history that influences their attitude towards each other, and may have tried to influence each other and the policies at stake (see Bukkems, 1989 in De Lange, 1995). This indeed applies on the research on normative principles. After all, EU Directives are jointly established by the Member States, and the same is true about the normative principles that are included in these Directives. Furthermore, the Member States in this case (Germany and the Netherlands) indeed have a common history, also with regard to the management of water quantity. De Lange (1995) also broadens the scope and consider events that are not included in the process of plan preparation. Likewise, in the evaluation of normative principles relevant aspects of the planning history will be adressed.

Although the usefulness approach seems less applicable on the evaluation of normative principles, a research strategy that is directed towards usefulness can be very profitable. De Lange (1995) explains the evaluation strategy by Van Vught (1982 in De Lange, 1995), who studied the use and usefulness of 'planning conceptions' (*"planningsconcepties"*; *"uit de planningsliteratuur te distilleren opvatting[en] omtrent een wezenlijk of zinvol geacht verloop van een planningsproces"*, Van Vught, 1982, p. 79 in De Lange, 1995, p. 40). The output of this research is a set of assessments of 'usefulness'. However different, the concept of a 'planning conception' shows striking similarities with the concept of strategic plans. Firstly, both are relatively abstract and limitedly elaborated. Secondly, both lack concrete suggestions for practical use. Due to these similarities, De Lange (1995) argues that the approach as proposed by Van Vught (1982 in De Lange, 1995) is, in most cases, suited to

apply on the analysis of statements from strategic plans and policies.

Of the two Directives, the WFD is the most concrete instrument, perhaps mainly due to the development of advisory recommendations about the implementation process, that were eventually included in guidance documents (see Bloech, 2001 in Page & Kaika, 2003). However, WFD was a result of intensive lobbying and interpretation, and its final text was determined under time pressure (Page & Kaika, 2003). Therefore the WFD remains indeterminate with regard to a number of crucial aspects. The consequence for the implementation by the Member States is that the process of lobbying and interpretation extended after the Directive came into force: *"(...) the adoption of the WFD in December 2000 marked a new beginning of another round of wrangling"* (Page & Kaika, 2003, p. 340).

The FRD is an even more procedural policy document than the WFD. Indeed, the FRD to a certain extent gives direction to the water quantity management measures being adopted. However, the Directive also states that *"(...) objectives regarding the management of flood risks should be determined by the Member States themselves and should be based on local and regional circumstances"* (Consideration 10 from EC, 2007). This means that many different types of measures should be considered, but that the FRD does not prescribe any measures nor does it prioritise any of these measures. Also, the plans that are to be developed do not seem to be binding. Moreover, the organisation of public participation as well as the coordination with the WFD make the implementation of the FRD by the Member States even more complex (see also: Mostert & Junier, 2009).

2.4. Operationalisation

From the nature of the Water Framework Directive and the Flood Risk Directive as described in section 2.2, it can be learned that the similarity with the units of analysis of Van Vught (1982 in De Lange, 1995) is considerable. Hence, the method of analysis as recommended by this author can indeed be used to assess the policy statements from the WFD and the FRD. Our assessment however specifically deals with the 'use' of normative principles rather than the *performance* of the WFD and the FRD. As a consequence, it does not measure policy *performance*. For this reason, the research adopts the term *reflection* to refer to the 'use' – in a broad sense – of normative principles.

As an adaptation of the method by Van Vught (1982 in De Lange, 1995), our analysis is conducted in three steps: (1) a reformulation of strategic policies as practical statements, (2) a confrontation of the statements with practical matters, and (3) study of perceptions of usability.

2.4.1. Translation into Practical Statements

The first step concerns the translation of the (abstract) statements from plans and policies into concrete statements. This is because the statements from abstract plans and policies are usually insufficiently decisive. As a result of ambiguous and vague statements in long-term planning it is difficult to determine whether a concrete decision is at variance with the policy's content (cf. Verduijn & Puylaert, 1983 in De Lange, 1995). Therefore, interpretations of policy statements are an inevitable part of the research. De Lange (1995) notes that this is a very personal and position-bound activity; the subjectivity requires that interpretations and operationalisations should be

explicit. In the context of this research on normative principles, this first step entails the following. Firstly, the normative principles have to be identified and selected. For this purpose, a document analysis on the WFD and the FRD is conducted. With regard to their selection, the scope of the research is taken into account. Secondly, the normative principles have to be operationalised. For this purpose, a literature review on the normative principles is performed. Additionally, an expert interview is conducted in order to have guidelines for the assessment of the principles in practice. The identification and selection of relevant normative principles is explained in Chapter 3.

2.4.2. Confrontation with practical matters

The second step is to confront the operationalised statements with successive decision-making. This step comprises determining whether successive decision-making 'uses' the operationalised statements of the policy. Here, it is necessary to identify the successive decisions. De Lange (1995) distinguishes strategic policy-making and everyday decision-making. In each of these categories, a policy initiator and other, successive, actors can be distinguished, resulting in four positions in successive decision-making (see De Lange, 1995, p. 39). In the context of this research, the focus is on the two positions in *strategic* policy-making. The successive decisions can be found in policy documents. In this case, the second step requires a document analysis of strategic policy documents at four levels: at national level in Germany, at federal state level in Germany (i.e. North Rhine-Westphalia), at national level in the Netherlands, and at transboundary level (i.e. the ICPR). The document analysis is supplemented with information from interviews with experts from science and and policy at all of these levels. The output of the document analysis and the expert interviews is an identification of the reflected normative principles.

Regarding the operationalisation of the concept of *use*, De Lange (1995) argues that *use* is related to substantive motives. In other words, in order to have reflection ('doorwerking'), the process entails instrumental or conceptual use (or a combination of both), which means that successive policy directly adopts the operationalised statements or adopt the line of thought, notions and concepts without explicit reference. In this research we adopt the view of De Lange (1995), and disregard persuasive use in the assessment of the extent of reflection. In this way, the analysis is as close as possible to the content of the initial and successive policies.

2.4.3. Explaining factors of reflection

The third step is to determine why the – initial or operationalised – policy statements have been used at the relevant positions. In this third step, the method of analysis as developed by De Lange (1995) and the method used in this research diverge. This is done by using explaning factors from two fields of research: Europeanisation theory (2.3.3.1) and regime theory (2.3.3.2).

2.4.3.1. Explaining factors from Europeanisation theory

Europeanisation is defined as *"the process of influence deriving from European decisions and impacting member states' policies and political and administrative structures"* (Héritier, 2001, p. 3). Studies on Europeanisation address the gap of knowledge about the impact of European integration of EU regulatory policies at national level. The impact of integration differs between nations, and the theoretical explanations for this variation diverge. A possible explanation is the institutional

compatibility, i.e. the level of change required to adapt to European measures. Another explanation is the extent to which European policies have affected the domestic opportunity structures and interest constellations. A combination of these explanatory factors is also possible.

Knill & Lehmkuhl (2002) suggest to identify different mechanisms of Europeanisation. The authors discern three mechanisms that each focus on a different form of impact. In the first mechanism, *institutional compliance*, Member States comply to specific institutional requirements set on European level. In this form, Member States are limited in the specific arrangements to comply with European requirements. This form is particularly (but not exclusively) applicable to policies of 'positive integration', for example environmental protection. Less direct institutional compliance is also possible; in that case, European legislation alters the domestic 'rules of the game'. The second mechanism comprises *changing domestic opportunity structures*, which relies on 'negative integration'. This form is the opposite of 'positive integration', as selected options are excluded from the set of national policy choices. This form is especially seen in market-making policies. *Framing*, the third mechanism, is the most indirect form. Here, the European policies are "designed to change the domestic political climate by stimulating and strengthening the overall support for broader European reform objectives" (cf. Ingram & Schneider, 1990 in Knill & Lehmkuhl, 2002, p. 259). In this way, the beliefs and expectations of domestic actors are altered.

For the selection of explanatory factors it is relevant to determine which of the three mechanisms from Europeanisation theory best matches the procedures of the WFD and the FRD. It is clear that the second mechanism is not applicable to the WFD and the FRD. Indeed, this mechanism implies that certain options for national policy choices are excluded, which is not the case. The mechanism by which the WFD and the FRD trigger domestic adjustments is also not strictly *institutional compliance*. For example, the purpose of the WFD is that by 2015, water bodies comply to certain standards of quality and quantity. In what way conditions like a 'good chemical status', a 'good ecological potential' or a 'good ecological status' are achieved, is not prescribed. Both Directives have elements of *framing*, the third and most indirect mechanism that can be discerned. For example, the FRD does not prescribe any concrete measures for flood management. It can therefore be argued that the FRD is a relatively symbolic piece of legislation, as its implementation does not necessarily lead to the implementation of measures like the construction of dikes, water retention and expansion of floodplains. However, the FRD requires the Member States to complete preliminary flood risk assessments (by 2011, if applicable), flood hazard maps and flood risk maps (by 2013) and flood risk managements (by 2015). This may very well attach to the mechanism of *positive integration*.

It can be therefore be argued that the way of implementation of the WFD and the FRD by the Member States, i.e. the mechanism of Europeanisation, does not strictly follow a single description. This is however not a problem in the selection of an explaning factor. Indeed, Knill & Lehmkuhl (2002) emphasise the analytical nature of this distinction, stating that *"[m]any European policies might be characterized by a mixture of different mechanisms of Europeanization as the distinctive mechanisms are linked to each other in a hierarchical way with the more explicit mechanism encompassing weaker forms of Europeanization"* (Knill & Lehmkuhl, 2002, p. 257). For this reason, the analysis of explanatory factors according to the mechanism of *institutional compliance* is relevant in the case of the WFD and the FRD. Although still requiring further research, it is suggested that the *"institutional compatibility of European and domestic arrangements (i.e., the level of change required to adapt to European measures) is the most important variable in accounting for the domestic impact of*

Europe" (Knill & Lehmkuhl, 2002, 256). For this reason, *insitutional compaibility* is selected as a potential explanatory variable.

2.4.3.2. Explaining factors from regime theory

Huntjens et al. (2010) argue that the expected implications of climate change in transboundary river basins – like other threats to the earth's habitability such as deforestation, disruptions of the global hydrological cycle, or biodiversity loss – call for new or more effective systems of international environmental governance. In this project we refer to these systems as *regimes*. Krasner (1984) defined regimes as *"sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations"* (Krasner, 1984, p. 186). This definition was later reworked into *"social institutions composed of agreed-upon principles, norms, rules, and decision-making procedures that govern the interactions of actors in specific issue areas"* (Osherenko & Young, 1993, p. 1). It is regime theory, and particularly, theory on regime effectiveness that provides the additional explanatory factors.

Young's (1994; see also Osherenko & Young, 1993) model of regime effectiveness was developed as a critique on the mainstream models of institutional bargaining, and in particular to the rationalist or utilitarian models. Two weaknesses in rationalist bargaining literature were revealed. The first one is that conventional theories are too optimistic considering the ability of rational actors to cooperate: in real-world situations the prospects of successful bargaining are considerably worse than these would have been according to theory. However, a set of inadequacies of the mainstream bargaining theories explains why the formation of international regimes is often successful. The author shows that the assumptions made in mainstream theories are problematic and not descriptive for actual bargaining (Hasenclever et al., 2004).

In his alternative theory, the notion of *effectiveness* is worked out by Young (1994) as a so-called multi-dimensional rather than a single dependent variable representing the success or failure of institutional regimes. This variable is composed of: *effectiveness as problem-solving, effectiveness as goal attainment, behavio*[*u*]*ral effectiveness, procedural effectiveness, constitutive effectiveness* and *evaluative effectiveness* (cf. Young, 1994, pp. 143-152).

The most relevant part of regime theory is however the *"other side of the equation"*, as Young (1994, p. 152) puts it, that relates to the determination of the factors that account for effectiveness in all its dimensions. Young (1994) notices that, although explanations built on a single factor are appealing for a number of reasons, in the social sciences it is more common to have multiple factors that explain situations in reality. With regard to regime effectiveness, there is no reason to expect an exception. Indeed, the author proposes a set of independent variables that explain the (multi-dimensional dependent) variable of effectiveness. Its three categories are *endogenous variables*, *exogenous variables*, and *linkage variables*. Moreover, having differentiated categories of variables is helpful for case-studies (Young, 1994). In this section I explore these sets of variables, and motivate which of the factors within these categories are suited for use in my method of analysis.

Endogenous variables are factors that address the properties of the regimes themselves. The presence and performance of organisations in a regime is the first in this category that is examined. Young (1994) however notices a debate on the matter of organisation, and argues that there is no clear relationship between the presence of organisations and a regime's effectiveness. Although the

author suggests that an examination on the role of organisations is valuable, its lacking operationalisation makes this factor less applicable in our case-study. Another factor is *compliance*, i.e. how compliant behaviour is established in a system in which the regime's members control most of regime's enforcement. This is a relevant factor in my method of analysis; firstly because with regard to the implementation of EU Directives, the EU Member States indeed are largely in control of the enforcement of the regime, and secondly because this factor closely resembles Knill & Lehmkuhl's (2002) notion of *compliance.* Young (1994) furthermore argues that, in the light of a changing world and an international society in which authority is decentralised, there is a need for robustness which is operationalised as *flexibility/adaptability*. This is because, in order to establish long-term effectiveness, a regime should have *"some built-in capacity to adjust to changes in the issue area to which it pertains or the behavio*[*u*]*r it is designed to regulate"* (Young, 1994, p. 155). This factor is indeed applicable to our case-study, however, as there is a clear link with the nature of the problem, it is addressed again with regard to the linkage variables.

Exogenous variables form a wider category as these variables consider *"the full spectrum of driving forces that analysts expect to influence the course of collective outcomes in international society"* (Young, 1994, p. 156). There are *power-based* arguments, that for instance say that an effectively functioning regime requires the presence of a dominant actor. A contrasting argument is that a rough balance of power is the situation in which a regime is most effective (Young, 1994). Power-based arguments however are not suited to explain the differences in the reflection of normative principles, because the distribution of power between the EU and its Member States is assumed to be equal for each Member State. *Interest-based* arguments consider the importance of interactive decision-making and collective action, and for example focus on the configuration of interests (Young, 1994). This might prove important with regard to issues of public participation; therefore this type of argument is included in my analysis. Contrarily, *knowledge-based* arguments disregard the arguments based on power and interests, and suggest that regimes are effective when there is some common conception of the problem that is to be solved, as well as some degree of consensus about the solution (Young, 1994). Since the problem conception is addressed in my analysis of the normative principles and their implementation, this sort of arguments might also be relevant.

The third category is that of *linkage variables*. It is for example suggested that a regime's effectiveness depends on the nature of the problem. The idea here is that in resolving difficult or 'malign' problems regimes are generally less effective than in finding solutions for relatively simple or 'benign' problems. However, the degree of difficulty of the problem cannot be considered as an objective condition, as it is vulnerable for much debate. As an example, the author explicitly mentions the controversy about the difficulty of the problem of climate change (Young, 1994). Therefore, including the difficulty of the problem as an independent variable is at least problematic. Moreover, the problem for which the Member States are aiming to find solutions is the same at all levels. For these reasons, this factor is excluded from my analysis. Perhaps more useful is a focus on the fit between the character of the problem and that of the regime. This refers to the mechanisms applied to find solutions. For example, coordination regimes (that couple common rules with a decentralised administration) might be more effective than regimes based on collective decisions. Another factor that is addressed here is that of *flexibility*; this is especially relevant for regimes dealing with *"problems in which scientific understanding is changing rapidly"*, for example climate change (Young, 1994, p. 159). For this reason, this factor is included in my analysis.

2.5. Conclusion

The aim of this chapter was to arrive at a list of variables that might explain differences in the reflection of EU normative principles in national and regional policies. First, the notion of *policy performance* was worked out, and it is explained why this departure from the conventional concept of *conformance* is taken as the basis in the research method. Next, the concept of *reflection* is defined and operationalised. It was explained why an adaptation of the framework by De Lange (1995) was best suited to measure the extent of reflection in a catchment policy related to EU Directives.

Literature research on Europeanisation theory and the theory of regime effectiveness was conducted to come up with a number of factors that might explain the differences and similarities in the degree of reflection of normative principles between various policy levels. Table 2.1 presents this list of potentional explanatory factors.

Table 2.1 **Factors explaining similarities and differences in reflection**
Selection based on Knill & Lehmkuhl (2002) and Young (1994, p. 152-160)

Factors explaining similarities and differences in reflection
institutional compatibility
configuration of interests
conception of problem and solution
fit between the problem and the regime
flexibility

Chapter 3
Normative principles: identification and reflection

3.1. Introduction

European legislation on water management has a long history. Its general aims are to prevent environmental pollution at source and to lay down environmental quality standards. It can be said that legislation developed in three waves. *Directive 75/440 on water for the abstraction of drinking water* (or the 1975 Drinking Water Directive) was the start of the first wave which ended with the adoption of *Directive 80/68 on groundwater* (Groundwater Directive) in 1980. The second wave concerns the adoption of the Urban Waste Water Directive and the Nitrates Directive, both in 1990. Then the focus slightly shifted. Where in the past the focus was on environmental pollution and quality standards, in the third wave water quantity issues were taken into account. This wave started with *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*, or shortly, the Water Framework Directive. Additionally, other pieces of European legislation directly or indirectly relate to the protection of water, for example the 1985 Environmental Impact Assessment Directive and the 1992 Habitats Directive.

Current EU legislation defines a number of normative principles that can also be found in the Water Framework Directive (WFD) and the Flood Risk Directive (FRD). The purpose of this chapter is to identify these principles in EU policies on the management of water quantity. By means of introduction, section 3.2 briefly discusses the two directives from which the normative principles are derived: the Water Framework Directive and the Flood Risk Directive. After this, section 3.3 deals about the purpose of normative principles in EU law. Section 3.4 then identifies 8 normative principles in the two examined EU directives. Each identification is supplemented by one or more definitions from literature on normative principles. Section 3.5 summarises the findings from this part of the study, and presents a 'checklist' of Practical Statements that is used in chapter 8 when assessing the main similarities and differences between the extent of reflection of principles in EU policy and the policies of the case-study.

3.2. EU legislation on water quantity

3.2.1. Water Framework Directive

The most important difference between the Water Framework Directive (WFD) and older water protection legislation is that its approach is fundamentally different. A more holistic approach to water is adopted, which is reflected in two ways. Firstly, the WFD has replaced, and is replacing, a major part of first wave legislation on water protection, in this way partly compensating its fragmented nature. Conform the WFD, the *Directive 75/440 on water for the abstraction of drinking water, Decision 77/795 on the exchange of information concerning water quality,* and *Directive 79/869 on measuring and analysis of water for the abstraction of drinking water* were repealed in December 2007. Additionally, conform the requirements of Art. 17 WFD, *Directive 2006/118/EC on the protection of*

groundwater against pollution and deterioration (or 2006 Groundwater Directive) was developed. Moreover, *Directive 78/659 on freshwaters for fish, Directive 79/923 on shellfish waters, Directive 80/68 on groundwater,* and *Directive 76/464 on the pollution caused by dangerous substances* are to be repealed in December 2013.

A second way in which the holistic approach is reflected in the WFD, lies in the fact that it introduces the river basin approach. A river basin is *"the area of land from which all surface run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea at a single river mouth, estuary or delta"* (Art. 2(13) WFD). The river basin approach means that the WFD as an instrument protects all interconnected waters in a river basin. The Directive requires EU Member States to designate river basin districts and authorities for river basins. If a river basin is extended to more than one Member State, the Member State has to assign this river basin to an international river basin district. When a river basin is extended into a non-Member State, this does not mean that the Directive does not apply on this river basin, however, the duty to ensure coordination between the Member State and the non-Member State is less strict.

Art. 1 WFD states the purpose of the Directive. The focus is on pollution, which lies in the prevention of further deterioration and protection of aquatic ecosystems, terrestrial ecosystems and wetlands depending on these aquatic ecosystems, the protection and improvement of the aquatic environment, and the reduction and prevention of groundwater pollution. The subject of water quantity management is covered by the last point in this article, which states that the Directive *"contributes to mitigating the effects of floods and droughts"* (Art. 1 WFD). Also, the promotion of sustainable water use, which is also one of the Directive's purposes, is an issue that partly addresses water quantity management (Jans & Vedder, 2008).

3.2.2. Flood Risk Directive

The Water Framework Directive is complemented by *Directive 2007/60/EC on the assessment and management of flood risks*, officially abbreviated as Floods Directive. However, as the main objective is the assessment and management of risks rather than the prevention of floods, the document is here referred to by means of its unofficial, but correct, title: Flood Risk Directive (FRD). Interestingly, the FRD closely follows the river basin approach as laid down in the Water Framework Directive (Jans & Vedder, 2008). The FRD is a procedural directive. Depending on the literature that is addressed, the procedure is divided in three or four stages. Here, we refer to the FRD as a three-stage procedure (see Table 3.1). In the first stage, a preliminary flood risk assessment is prepared for each (portion of a) river basin district that is lying within their territory, conduct a preliminary flood risk assessment (Art. 4(1) FRD). For all areas that are identified in the preliminary assessment (cf. Art. 5(1) FRD) as facing potential significant flood risks, flood hazard maps and flood risk maps will be prepared by December 22, 2013 at the latest (Art. 6 FRD). This is the second stage of the procedure. The FRD however provides so-called transitional measures; Member States may decide not to conduct a preliminary flood risk assessment. This is possible either when risk assessment has already taken place by December 22, 2010 or when it is decided before December 22, 2010 that flood hazard maps and flood risk maps are prepared (Art. 13(1)(a) and Art. 13(1)(b) FRD respectively). The flood hazard maps categorise the flood hazard (low, medium, or high probability), and the flood risk maps reflect the combination of the flood risk and the potential negative effects on *"human health, the environment, cultural heritage and economic*

activity" (cf. Art. 2(2) FRD). In the third stage, which is to be finalised on December 22, 2015 at the latest, the Member States establish flood risk management plans (Jans & Vedder, 2008). These plans are to contain *"appropriate objectives"* (see Art. 7(2) FRD) for flood risk management in order to reduce the negative consequences of flood events for the aspects as laid down in Art. 2(2) FRD. In this stage the measures for achieving these objectives are determined, addressing all aspects of flood risk management. Although the FRD does not prescribe actual flood management measures, a number of suggestions is made. Art. 7(3) FRD mentions sustainable land use practices, improvement of water retention, and the controlled flooding of areas in case of flood events (see also Mostert & Junier, 2009).

Table 3.1 The implementation procedure of the Flood Risk Directive

Stages of the Flood Risk Directive	
1. preliminary flood risk assessment (if applicable)	due December 22, 2011
2. flood hazard maps & flood risk maps	due December 22, 2013
3. flood risk management plans	due December 22, 2015

3.3. The purpose of normative principles

Before explaining and identifying normative principles in the two EU Directives, we have to explain the function of normative principles in general. *Principles* are to be distinguished from *rules*. A rule refers to a norm that provides rights or imposes duties on the subjects of the law. By contrast, a principle of law represents an ideal of reason or justice. It is presumed that principles of law form the basis of the institution of law (Harbo, 2010). Principles of law differ from rules of law in that they are more explicitly stated in the premises of a court decision (Duckworth, 1977 in Harbo, 2010). As we will see in the next section, normative principles are indeed explicitly stated in the considerations of the EU directives.

Harbo (2010) discusses three main reasons why courts apply principles of law. First, principles of law are referred to in court's premisses as a rationalisation of decisions. Unlike natural sciences, law is not an absolute or objective science, however, referring to principles secure that decisions are made in an objective way, or give at least this impression. Here the assumption is that the stronger one is bound to certain principles, the less arbitrary or subjective the decision is made. The effects of these are that decision-making can be made more efficient, as the range or arguments to be considered when solving a case, is limited. This limited scope forms a basis for solving a concrete problem, since many problems that are raised by the concrete case have a solution in the principle of law. It also means a limitation of the diversity of arguments, since fewer arguments are taken into account. Secondly, more objective decision-making leads to outcomes that are easier to predict. This in fact is an important feature of the liberal concept, as it helps to secure a stable legal framework for economic operators. It could also be argued that legal predictability is also preferable from a democratic point of view. Thirdly, courts apply principles of law by reason of substantial legitimacy. In other words, principles are applied because courts believe that their substantial meaning will increase the decision's legitimacy. It can be argued that this is the most important feature of a principle of law.

3.4. Identification and definition of principles

In the previous section, the main reasons why courts apply principles of law are explained. With regard to the principles in the EU environmental documents, there is however an important difference. Although courts may use formalised normative principles in practice, in the EU legislative pieces only a limited number of normative principles in mentioned an explicit way. This, in my opinion, does however not necessarily mean that the specific principle is not included in the document. The wordings of a document may very well hint to the presence of a principle in an implicit way. Similarly, the implicit presence of normative principles is expected to be found in policies at other levels, especially since the normative principles may lose their formal appearance in their way down to national or regional legislation in the EU Member States.

For these reasons, an additional step is required for a proper identification of explicitly as well as implicitly included normative principles in the WFD and the FRD. A short literature review helped to identify the less obvious principles. Additionally, an interview with Andrea Keessen was conducted to arrive at a better understanding of the purpose of normative principles, and also to have a clear selection procedure for the normative principles used in this research. Keessen is assistant professor at the Institute of Constitutional and Administrative Law, Utrecht University, Utrecht, the Netherlands.

With regard to the selection of normative principles, the following rules applied (cf. Keessen, 2012):

1. The principle is – either explicitly or implicitly – in the Water Framework Directive (preamble included) *or* in the Flood Risk Directive (preamble included);
2. The principle is applicable to issues of water quantity.

In subsections 3.4.1—3.4.9 nine normative principles are identified in the WFD and the FRD. For each of the principles, it is mentioned in which of the two directives (or both) the principle is included (*identification*), where the principle originated from (if applicable) and how the principle is defined (*definition*), and on which aspects the assessment of the reflection of the specific principle in policies at river basin, national or regional level is focused (*assessment*). The interview with Mostert (2012) serves as a guideline for this framing issue. Table 3.2 summarises the 9 normative principles that were identified in the WFD and the FRD.

Table 3.2 The identified normative principles

Normative principles
Precautionary principle
Principle of preventive action
Solidarity
Cost-recovery principle
Source principle
Sustainable development
Subsidiarity
Proportionality
Public participation

3.4.1. Precautionary principle

3.4.1.1. Identification

For a number of principles the Water Framework Directive refers to the Treaty on the Functioning of the EU (TFEU). This is also true for the *precautionary principle*, as this is mentioned as one of the basic principles underlying the European Community policy on the environment in consideration 11 of the preamble to the WFD. Consideration 11 WFD refers to Art. 174 TFEU, which is now Art. 191 TFEU). The precautionary principle returns in consideration 44 WFD; the principle should be taken into account when identifying priority hazardous substances.

The precautionary principle is not mentioned as such in the Flood Risk Directive.

3.4.1.2. Definition

The *precautionary principle* was introduced in the Treaty on the functioning of the European Union with the 1992 Treaty of Maastricht. The origin of this principle lies in what is called *Vorsorgeprinzip* in German environmental law. However, in terms of scope of application, content, and impact on the burden of proof the interpretation of the precautionary principle differs in national, European and international law (Marr & Schweber, 2003 in Jans & Vedder, 2008). Van Rijswick & Havekes (2012) state that union policy, according to Art. 191 TFEU, is based on a number of principles including the *precautionary principle*.

The precautionary principle is able to justify action to prevent damage, even in cases in which on the basis of available scientific data no clear causal link can be established. The core of the principle is that *"if there is a strong suspicion that a certain activity may have harmful consequences, it is better to act before it is too late rather than wait until full scientific evidence is available which incontrovertiby shows the causal connection"* (Jans & Vedder, 2008, p. 37). In European environmental law the use of the principle also implies that the European Commission has the right to establish the – according to the Commission – appropriate level of protection of the environment, and of human, animal and plant health. The precautionary principle relates to risk management, as it does not require to reduce the risk to zero. Instead, it leaves the judgement of an acceptable level of risk as a political responsibility. The principle also affected the Article that states that the European Commission, in preparing environmental policy, has to take account of available scientific and technical data. After adopting the precautionary principle, not acting and waiting for an absolute proof of the causes of certain undesirable environmental effects is no longer an option.

However the precautionary principle is used to justify action in absence of appropriate scientific evidence or when scientific data are inadequate, it is not the case that this principle can be used to implement measures for hypothetical risks. This is because, prior to the adoption of protective measures, a risk assessment has to be carried out that is *"as complete as possible given the particular circumstances of the individual case"* and it is therefore secured that the implementation of the measures "*is necessary in order to ensure that there is no danger for the human health and the environment"* (Jans & Vedder, 2008, p. 39).

3.4.1.3. Assessment

The assessment will be based on the presence of the precautionary principle in legislation on water management. The assessment also deals with the question how scientific uncertainties are treated. The development of measures before absolute scientific certainty is established is an example of the reflection of the precautionary principle.

3.4.2. Principle of preventive action

3.4.2.1. Identification

Like the precautionary principle, the principle of preventive action is mentioned in consideration 11 of the preamble to the Water Framework Directive. The principle is also worked out in the articles of the Directive. As a first purpose the Directive states that it *"prevents further deterioration and protects and enhances the status of aquatic systems and* […] *terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems"* (Art. 1(a) WFD). Preventive action is also to be take into account with regard to the pollution of groundwater. It can be noted that water quantity issues might alter the consequences of the principle of preventive action. This is because specific conditions – with floods and droughts as the most notable example – are regarded as unforeseen or exceptional circumstances, and result in an exemption from the requirement of preventing further deterioration or achieving good status, *"provided that all practicable steps are taken to mitigate the adverse impact of the status of the body of water"* (consideration 33 WFD).

The presence of the principle of preventive action in the Flood Risk Directive is somewhat different. The principle of preventive action is not mentioned as such in the Directive. In fact, consideration 2 FRD states that "*floods are natural phenomena which cannot be prevented"*, although a number of human activities as well as climate change can be mentioned as factors increasing the probability of flood events and their negative impacts. Hence, the focus in the policy is not on preventing floods but rather on flood risk assessment and management. It is however not the case that the policy abandons flood prevention: consideration 14 FRD states that prevention, like protection and preparedness, is a focus of flood risk management plans.

3.4.2.2. Definition

Jans & Vedder (2008) summarise the *principle or preventive action*, which is also referred to as the *prevention principle*, by stating that prevention is better than cure. In other words, the principle *"allows action to be taken to protect the environment at an early stage"* (Jans & Vedder, 2008, p. 41). The *principle of preventive action* was included in EU policy by the Single European Act. The EU's Third Environmental Action Programme (1982-1986) strongly focused on the principle, as it had prevention as its central theme. A number of conditions enhance preventive action: the improvement and publication of knowledge and information, the formulation and introduction of procedures for early judgement in decision-making processes, and the monitoring of the implementation of adopted measures (Jans & Vedder, 2008). Like the precautionary principle, the *principle of preventive action* is one of the basic principles in EU policy on the environment (Van Rijswick & Havekes, 2012).

3.4.2.3. Assessment

The assessment of the reflection of the *principle of preventive action* is based on the question whether the policy on water management emphases purely technical flood protection (e.g. strengthening of dikes) or water retention (i.e. more space for water). The principle may be reflected when the effects of measures are judged in an early stage, for example when the aim is to implement so-called "no regret"-measures. Another point of discussion is the setting of standards for flood protection.

3.4.3. Solidarity principle

3.4.3.1. Identification

The *solidarity principle* is explained in consideration 15 of the preamble to the FRD: *"The solidarity principle is very important in the context of flood risk management. In the light of it Member States should be encouraged to seek a fair sharing of responsibilities, when measures are jointly decided for the common benefit, as regards flood risk management along water courses."* Also, solidarity within a river basin is ensured by means of Art. 7(4) FRD: *"In the interests of solidarity, flood risk management plans established in one Member State shall not include measures which, by their extent and impact, significantly increase flood risks upstream or downstream of other countries in the same river basin or sub-basin, unless these measures have been coordinated and an agreed solution has been found among the Member States concerned in the framework of Article 8"*, in which Art. 8 refers to the production of flood risk management plans.

In the WFD the *solidarity principle* is not found explicitly. However, in international river basins it is typically the case that measures implemented in upstream-lying areas have effects on downstream-lying areas. This is especially true for flood measures. As the WFD prescribes that Member States coordinate their national measures (see Jans & Vedder, 2008), it can be argued that solidarity to some extent is enhanced by the very form of coordination that is prescribed by the WFD, i.e. water management in international river basin districts.

3.4.3.2. Definition

According to Ross (2010), the idea of solidarity goes back in history as far as two centuries, as it strongly relates to the concept of *fraternité* at the time of the French Revolution. Since then, the meaning, scope and significance of the solidarity principle have been continuously contested. The author refers to the concepts of *solidarity* by Stjernø (2005 in Ross & Borgmann-Prebil, 2010). Besides the differences between the no less than 7 concepts that are to be distinguished, two shared necessary values with regard to solidarity can be identified: *"that an individual should identify with others, to some degree, and that a feeling of community should exist between the individual and (at least some) others (...)"* (Stjernø, 2005 in Ross, 2010, p. 4-5). As a conclusion it is stated that the concept of *solidarity* is *"(...) based not on personal interest, but on political altruism: it is founded on empathy and cognition, and the balance between the two may vary. Solidarity is developed through communicative action and the ability to take the role of 'the other(s)'"* (*ibid*, p. 5). Ross (2010) argue that, In their book, rather than assuming a single overarching definition of *solidarity* in the context of the EU, the author argue that *"the particularities and novelties of the EU's legal, political and social shape provide a context in*

which to interrogate and, possibly, renew solidarity" (Ross, 2010, p. 6).

3.4.3.3. Assessment

From the Directives and the definition it is clear that the *solidarity principle* refers to coordination within the river basin district. The reflection of the *solidarity principle* therefore is based on the question whether the implementation of water quantity measures are coordinated. Especially the relation between upstream-lying and downstream-lying areas is discussed.

3.4.4. Cost-recovery principle

3.4.4.1. Identification

This principle is referred to in the preamble to the Water Framework Directive as the *principle of recovery of the costs of water services*. Consideration 38 WFD states that*"*[*t*]*he principle of recovery of the costs of water services, including environmental and resource costs associated with damage or negative impact on the aquatic environment should be taken into account in accordance with, in particular, the polluter-pays principle*. Art. 9 WFD is specifically about the recovery of costs for water services. This article explains for example that Member States take account of the principle by means of an economic analysis (Annex III WFD), that water-pricing policies provide incentives for an efficient use of water resources.

In the Flood Risk Directive the cost-recovery principle and the polluter-pays principle are not mentioned. However, consideration 19 in the preamble to the FRD refers to Art. 9 WFD considering the impacts of multi-purpose use of water bodies and their environmental impacts. It states that the WFD provides for recovery of costs. Moreover, from Art. 7(3) FRD it is known that costs and benefits are one of the relevant aspects that should be taken into account in flood risk management plans. For these reasons, it is assumed that cost-recovery is also a guiding principle in flood risk management.

3.4.4.2. Definition

Whereas the *cost-recovery pronciple* is not mentioned by Jans & Vedder (2008) as a general principle of EC law in relation to environmental protection. The *polluter-pays principle* is included as a principle of European environmental policy. Also, Van Rijswick & Havekes (2012, p. 80) regard the *"principle that polluter should pay"* as one of the basic principles of union policy. The *polluter-pays principle* was set in the Communication from the Commission to the council in 1975 regarding cost allocation and action by public authorities on environmental matters. As far as the authors know, the text as laid down in the 1975 Communication is still the guiding principle. Possible measures that reflect the *polluter-pays principle* are the use of charges, laying down standards, and the creation of a system of environmental liability (Jans & Vedder, 2008, p. 44). In this way, penalties are created that aim to place the burden of the control of environmental pollution on those actors that 'abuse' the environment (Ingwani et al., 2010). Mocanu (2009) argues that the *polluter-pays principle* exceeds the framework of juridical responsibility, thus including economic aspects, as it is does not aim at simply appointing a payer for the costs of pollution.

3.4.4.3. Assessment

Although the WFD particularly mentions the *polluter-pays principle*, in the context of water quantity issues the concept is taken broader. The assessment will indeed focus on the recovery of costs of water quantity management. Attention will be paid to the financial structure that is used to provide for the protection against flood risks.

3.4.5. Source principle

3.4.5.1. Identification

In the Water Framework Directive, the source principle is mentioned in consideration 40. It states that the water policy of the European Community should be based on *"a combined approach using control of pollution at source".* Article 10 WFD elaborates on this combined approach: it distinguishes between point sources and diffuse sources.

The source principle is applied on water quality (i.e. pollution) problems, and not on issues of water quantity. It therefore is not present in the Floods Directive. However, when discussing the definition of the principle, I will argue that the source principle is particularly relevant with regard to water quantity issues.

3.4.5.2. Definition

The *source principle* states that *"damage to the environment should preferably not be prevented by using end-of-pipe technology"* (Jans & Vedder, 2008, p. 42). Whereas most legislation refers to the source principle with regard to environmental pollution, Jans & Vedder (2008) adopt a broader view and state that European environmental legislation *"shall be based on the principle that environmental damage should as a priority be rectified at its source"* (*ibid*, p. 42). In line with this, Van Rijswick & Havekes (2012, p. 80) state that union policy on the environment is based on the *"principle that environmental damage should as a priority be rectified at source (...)"*. This broadened definition makes it possible to include water quantity issues: droughts and floods may not be regarded as (water or environmental) pollution, they may in fact lead to environmental damage.

3.4.5.3. Assessment

From the interview with Mostert (2012) it is clear that several aspects related to the *principle of preventive action* can be regarded as instantiations of the *source principle*. The reflection of the source principle is based on the question the problem of environmental damage due to high or low water is rectified at source, and especially whether a preference sequence for the treatment of precipitation, floods and droughts is present in water management.

3.4.6. Sustainable development

3.4.6.1. Identification

The Water Framework Directive states that *"water is* […] *a heritage which must be protected, defended*

and treated as such". From consideration 5 of the preamble to the WFD it can be derived that *sustainability* had been an important principle during the development of the Directive, as it is stated that on 18 December 1995, the European Council adopted conclusions that required a new framework directive establishing the basic principles of [a] sustainable water policy in the European Union. It is notable that terms like *sustainable* [*water*] *management, sustainable water use*, and sustainable activities, and *sustainable development* can be found throughout the whole document.

Like the WFD, the Floods Directive refers to *sustainability* and *sustainable development*. In consideration 22 of the preamble to the FRD it is mentioned that the Directive aims to focus on policy integration in accordance with the principle of *sustainable development.* For this purpose it refers to Art. 37 of the Charter of Fundamental Rights of the European Union. Another instantiation of this principle is that of *sustainable land use practices* of which the promotion is to be included in flood risk management plans (Art. 7(3) FRD).

3.4.6.2. Definition

In the past, the principle of *sustainable development* has been defined many times. Although the concept is much older, the 1987 report of the Brundtland Commission is often seen as a starting point of policies aiming at sustainable development, as this was the first time that the concept was set on the international agenda (Driessen & Glasbergen, 2000). Since then, *sustainable development* has been popularised as a *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED, 1987 in Du Pisani, 2006, p. 83). There is a (debatable) difference between the notions of *sustainable development* and *sustainability.* This difference presumably refers to the question whether sustainable development challenges economic growth. Therefore, there is a tendency in government and private sector organisations to adopt the term *sustainable development* – here, development is seen as synonymous with growth – whereas NGOs and academic environmentalists tend to adopt the concept of *sustainability* (Robinson, 2004). The latter term is indeed defined slightly different as a *"way of thinking about how simultaneously meet the needs of people and the environment by enhancing human well-being without undermining ecological integrity"* (Mansfield, 2009, p. 37). Instead of an apolitical and closed concept, *sustainability* should be seen as the result of value- and power-laden discussions (Mansfield, 2009). Especially because the needs of future generations are uncertain, it is impossible to derive explicit directions for environmental policies (Driessen & Glasbergen, 2000). However, policies directed toward sustainable development aim to find a balance between three elements known as the economic, social, and environmental pillars.

3.4.6.3. Assessment

The assessment of the reflection of *sustainable development* focuses on the three pillars of the concept. It becomes however clear, that any of these pillars refers to other normative principles that have been worked out. Therefore, attention is also given to the value-laden discussions that are presumed to give directions for future development. Especially relevant in this context is the problem perception and the sense of urgency with regard to the effects of climate change on water quantity issues. Also, the balance between climate adaptation and mitigation is discussed.

3.4.7. Subsidiarity principle

3.4.7.1. Identification

In the Water Framework Directive, the *subsidiarity principle* is mentioned in consideration 18 of the preamble to the WFD. This consideration states that one of the purposes of the proposed framework is to further develop principles and structures for protection and sustainable use of water, which should be in accordance with the *subsidiarity principle*. This is the only instance of the principle in the WFD.

In considerations 23-24 of the preamble to the Flood Risk Directive, the *subsidiarity principle* is found. It is recognised that the establishment of a framework for measures to reduce the risks of flood damage, cannot sufficiently be achieved by the EU Member States. By reason of scale and effects of actions, these measures are better be achieved at Community level. The Directive refers to the Treaty establishing the European Community, as the adoption of measures is to be in accordance with the subsidiarity principle set out in Art. 5 of the Treaty. Like the *proportionality principle* (see 3.2.8), the *principle of subsidiarity* is seen as one that brings flexibility to the local and regional levels (consideration 24 of the preamble to the WFD).

3.4.7.2. Definition

The *subsidiarity principle* is one of the general principles of EC law that relate to environmental protection (Jans & Vedder, 2008). It plays an important role in water management (Van Rijswick & Havekes, 2012). The principle is defined in general terms in Art. 5(3) of the Treaty establishing the European Community: *"*[*i*]*n areas which do not fall within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community"* (Art. 5(3) EU after amendment by the Reform Treaty as cited by Jans & Vedder, 2008, p. 10-11). Any proposed legislation should be justified according to the *principle of subsidiarity*. This means that both a 'negative' criterion – the objective is not sufficiently achieved by the Member States – as well as a 'positive' criterion – the objective is better achieved by Community action – have to be fulfilled. In literature, the principle is sometimes differently defined. Vause (1995) for example cites the definition by the Centre for Economic Policy Research, which is *"a presumption that the European Union should do only what states cannot do well themselves"* (Vause, 1995, p 4). The requirement of the principle is that action to reach a certain objective should, ideally, *"be taken at the lowest level of government which is capable of effectively addressing the problem"* (*ibid.*, p. 2).

3.4.7.3. Assessment

In this assessment, it is assumed that the appropriate level of action (Community level or EU Member State level) is already determined with the implementation of the WFD and the FRD. Therefore, the broader sense of the principle is taken as a starting point, and the assessment focuses on the question whether water quantity measures are implemented at the appropriate level. This also means that attention is paid to the various water organisations that take a part in the implementation processes in both Germany and the Netherlands.

3.4.8. Proportionality principle

3.4.8.1. Identification

The Water Framework Directive does not explicitly refer to the *proportionality principle*. However, the principle is present in the Directive with regard to its environmental objectives. For example, the implementation of less stringent measured is justified under some conditions, including the situation in which *"the environmental and socioeconomic needs served by [such] human activity cannot be achieved by other means, which are a significantly better environmental option not entailing disproportionate costs"* (Art. 4(5)(a) WFD). Another example is that water bodies may be designated as artificual or heavily modified under a number of conditions including that *"the beneficial objectives served by the artificial or modified characteristics of the water body cannot, for reasons of technical feasibility or disproportionate costs, reasonably be achieved by other means, which are a significantly better environmental option"* (Art. 4(3)(b) WFD). Obviously, judgements of cost-effectiveness as laid down in Annex III WFD relate to the *proportionality principle*.

Consideration 23 of the preamble to the Flood Risk Directive refers to the *proportionality principle* as worked out in Art. 5 TFEU. It states that the Directive *"does not go beyond what is necessary in order to achieve that objective"* (referring to the establishment of a framework for measures to reduce the risks of flood damage). Consideration 24 FRD mentions *proportionality* as one of the principles that establishes *"considerable flexibility"* being left to the local and regional levels. Furthermore, cost-benefit analyses are prescribed by Art. 7(3) FRD.

3.4.8.2. Definition

According to Harbo (2010), the *proportionality principle* is regarded as the preferred procedure in which a conflict between either a rights provision and a state or public interest, or between a private and state or public interest. The principle can be interpreted in a number of different ways. The most explicit interpretation is *"that a means must be suitable and necessary in order to reach a given end"* (Harbo, 2010, p. 180). How strict the principle is interpreted, depends on the balance between of individual rights and public policy. On the one hand, when the principle underpins a strong position of rights, the interpretation can be strengthened to the least restrictive alternative. On the other hand, when there is room for arguments that support the public interest, the interpretation can be weakened. The gradual scale between a strong and a weak interpretation is limited on both ends. A third possibility is that the *proportionality principle* is interpreted in order to achieve a political goal, European integration in this case (Harbo, 2010).

3.4.8.3. Assessment

The assessment of the reflection of the *proportionality principle* focuses on the question whether the measures that are implemented are proportional with regard to the goal that is to be achieved. This includes a review on how cost-benefit analyses are used with regard to the measures on water quantity issues.

3.4.9. Public participation

3.4.9.1. Identification

In the Water Framework Directive, the principle of *public participation* is not explicitly mentioned. It is however referred to in the preamble: *"To ensure the participation of the general public including users of water in the establishment and updating of river basin management plans, it is necessary to provide proper information of planned measures and to report on progress with their implementation with a view to the involvement of the general public before final decisions on the necessary measures are adopted"* (consideration 46 of the preamble to the WFD).

Similarly, the Flood Risk Directive implicitly refers to the principle of *public participation* in one of the articles. The provision of information is for example ensured with regard to all products of the Directive: *"In accordance with applicable Community legislation, Member States shall make available to the public the preliminary flood risk assessment, the flood hazard maps, the flood risk maps and the flood risk management plans"* (Art. 10(1) FRD). The same article also refers to the involvement of the public: *"Member States shall encourage active involvement of interested parties in the production, review and updating of the flood risk management plans referred to in Chapter IV"* (Art. 10(2) FRD).

3.4.9.2. Definition

The principle of *public participation* is related to the access of information and the decision-making processes. With regard to EU policy, *Directive 2003/35/EC* (Public Participation Directive) exists, which implements the access to decision-making procedures, which is regarded equivalent to *public participation* by Jans & Vedder (2008). However, a number of programmes and plans, including those for which a public participation procedure is carried out under the Water Framework Directive, is excluded from application of the Public Participation Directive. Similar to other excluded programmes, the WFD has its own provisions for public participation.

3.4.9.3. Assessment

The assessment is based on the access of information. There is a focus on the question in what way water quantity management policies are communicated to the general public, and whether the public is able to influence decision-making. Furthermore, the fact that *public participation* is not explicitly defined in the WFD and the FRD is justifies an additional assessment of the active involvement of the public.

3.5. Synthesis and operationalisation

According to the method that is applied in this research, the assessment of the reflection of the normative principles uses a set of so-called Practical Statements. This set provides a checklist for assessing the degree of reflection of the normative principles. There are 14 practical statements that cover the topics discussed in the chapters 4—7. The list of practical statements returns in chapter 8.

Table 3.3 Practical Statements to identity the extent of reflection of normative principles

Precautionary principle	
(1A)	*The policy is based on assessments of the effects of climate change on water quantities in the Rhine catchment.*
(1B)	*In case of scientific uncertainties concerning climate change, the policy chooses the safest option, i.e. the worst possible scenario reasonably to expected is anticipated.*
Principle of preventive action	
(2A)	*The policy is focused on the prevention of water quantity problems rather than the management of the consequences of these problems.*
(2B)	*The policy includes 'no regret'-measures, i.e. the measures are beneficial even when the effects of climate change are less adverse than expected.*
Solidarity principle	
(3A)	*Measures taken in one nation or region should not have negative consequences for other nations or regions.*
(3B)	*When proposed measures negatively affect other regions in Germany and the Netherlands, this is only possible when it is decided cooperatively.*
Cost-recovery principle	
(4)	*There is a cost-recovery system that places the burden on the actors for which measures are implemented (regarding the management of floods) and on those actors that alter the quantitative status of water bodies (regarding the management of droughts).*
Source principle	
(5)	*There is a preference sequence built in in the management of water quantity that ensures that water quantity problems are dealt with as close as possible to where they originate.*
Sustainable development	
(6A)	*The balance between the economic, social and environmental aspects of water quantity management that is found in the policy is explicitly motivated.*
(6B)	*The policy direction of future development of climate adaptation in the Rhine catchment is open for discussion.*
Subsidiarity	
(7)	*Measures on water quantity issues are taken at the lowest possible level.*
Proportionality	
(8)	*The measures on water quantity issues are proportional with regard to the goal that is to be achieved (e.g. flood protection, reducing the effects of flooding, ensuring water availability).*
Public participation	
(9A)	*The policy on the management of water quantity is communicated to the general public, and the public is able to influence decision-making.*
(9B)	*The general public is actively involved.*

3.6. Conclusion

This chapter completed the method as set out in chapter 2, by providing an answer to the following research subquestion:

RQ 3. *What are the main normative principles in EU climate change adaptation policies?*

Two directives from the European Union were considered relevant in the case of water quantity issues: the Water Framework Directive and the Flood Risk Directive. After a short introduction on both directives, the purpose and importance of having normative principles in legislation was discussed. After having set the selection rules for the normative principles, 9 normative principles were identified, and translated in 14 Practical Statements. This set serves as a checklist in the chapters 4—7.

Chapter 4
Climate change adaptation at Rhine catchment level

4.1. Introduction

In this chapter, the following research subquestion is addressed, after which the findings are linked to the set of 9 normative principles from Table 3.3:

RQ 4. *Which climate change adaptation policies in the Rhine river basin have been developed…*
a. *…at catchment level?*

The document analysis on catchment level concerns documents from the International Commission for the Protection of the Rhine (ICPR). The basis for international cooperation for the protection of the Rhine is formed by the *Convention on the Protection of the Rhine* (ICPR, 1999), or shortly, *Convention*. The Convention was signed in Bern on April 12, 1999, by the European Community and the governments of Germany, France, Luxembourg, the Netherlands, Switzerland. These actors are referred to in the document as the *contracting parties*. The second document that is assessed here is *Rhine 2020 – Program on the sustainable development of the Rhine* (ICPR, 2001a). This program focuses on a number of issues, including flood prevention and protection. Additional information is retrieved from the Rhine Atlas (ICPR, 2001b). An overview of the documents assessed is shown in Table 4.1.

Table 4.1 Document analysis catchment level

Document	Reference
Convention on the Protection of the Rhine (translation in English)	ICPR, 1999
Rhine 2020 – Program on the sustainable development of the Rhine	ICPR, 2001a

All documents of the ICPR are originally set up in three languages (German, French and Dutch). Additionally, English translations are available on the website of the ICPR. This analysis is in principle based on the English translation of the documents; to address some details however the analysis incidentally refers to the Dutch version. The document analysis is supplemented with information from the interview with Mr. Bob Dekker (Dekker, 2012). Mr. Dekker has functions as the Head of the Dutch delegation at the ICPR since 1998. At the Dutch Ministry of Infrastructure and the Environment he is 'Adjunct Directeur Internationaal' since 2002, as well as EU Water Director since 1995. Since 1997, Mr. Dekker is Ems Commissioner in the Permant Netherlands-German Ems Commission. Since 1998, Dekker is also chairman of the Permanent Netherlands-German Borderwater Commission (PGC). He participates in the ICPR's annually PLEN-CC. As the Dutch EU Water Director, he participates in the Common Implementation Strategy (CIS) for the Water Framework Directive, also concerning flood management. The CIS meeting is held twice in a year, coinciding with the Presidency of the Council of the European Union. Similar to the ICPR, CIS has a number of Working Groups. Working Groups A (“Ecological Status”) is concerned with the implementation of the Water Framework Directive, whereas Working Group F (“Floods”) is concerned with the implementation of the Flood Risk Directive. Working Group D (“Reporting”)

takes care of all reporting issues, including the reporting within the context of the WFD and the FRD. Furthermore, the analysis is supplemented by information from the interview with Mr. Mark Wiering, senior lecturer on Geography, Spatial Planning and Environment Department at Radboud University, Nijmegen, the Netherlands. Mr. Wiering is specialised in water management, environmental law and policy, flooding, cross border co-operation in water management, shock events and institutional dynamics and policy analysis.

The ICPR is organised as follows. All decisions concerning the Rhine Convention (ICPR, 1999) are taken in the Commission's Plenary Assembly (PLEN), which is held annually together with the Coordinating Committee, which concerns the implementation of the WFD. This organisational body is called PLEN-CC. The PLEN-CC not only includes the so-called contracting parties. Liechtenstein, Austria, and Belgium (Wallonia) are also part of the PLEN-CC, because they have areas that overlap the hydrological catchment area of the Rhine, as defined in the WFD. These parties have a coordinating role with regard to the implementation of the WFD. The Strategy Group (SG) is the organisational body that prepares the PLEN-CC and coordinates the Working Groups. There are three Working Groups: Floods (H), Water Quality/Emissions (S) and Ecology (B) that have a permanent mandate. By contrast, the project groups have a fixed-term mandate.

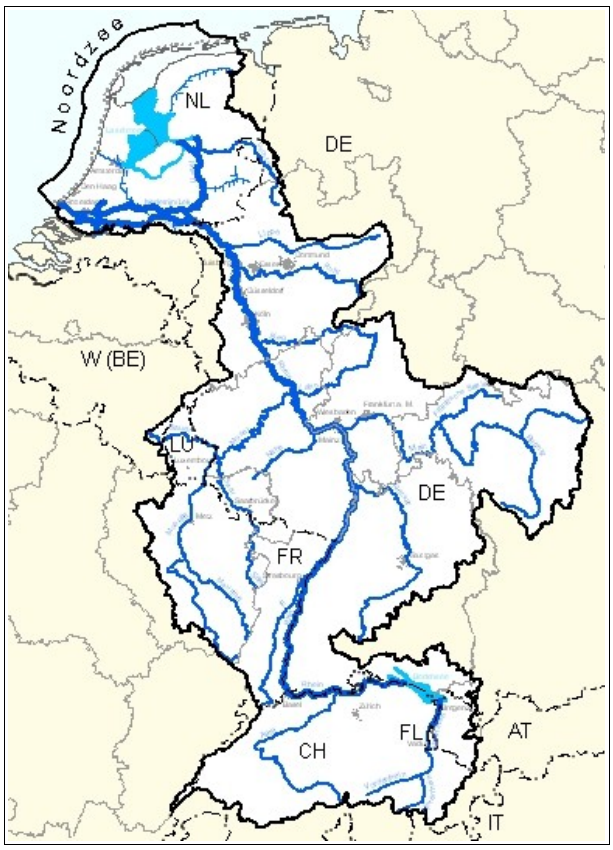
4.2. The Rhine basin

The river Rhine is about 1,320 km long and crosses Switzerland, Germany and the Netherlands. Also, parts of France, Luxembourg, Belgium, Liechtenstein, Austria and Italy are within the catchment of approximately 185,000 km^2 (IRC, 1998 in Van Ast, 2000: 291). The river is of great importance for the more than 50 million people living in the catchment. For instance, about 20 million people depend on the Rhine for their drinking water. The major part of the runoff of the Rhine river enters the North Sea through the delta area in the Netherlands (Van Ast, 2000). Of the total annual inflow of fresh water into the Netherlands, the Rhine river contributes approximately 65%. In the Netherlands, its water is used in the production of drinking water, agriculture, industry, and water management. Also, its branches are part of the transport infrastructure. Table 4.2 presents the sections of the Rhine. Figure 4.1 gives an overview of the Rhine basin.

Table 4.2 **Sections of the Rhine**
(cf. ICPR, 2001b, p. 2-3)

Sections of the Rhine		
Name	**Section**	**km**
High Rhine (*Hochrhein*, *Hoogrijn*)	Lake Constance – Basel	0 – 170
Upper Rhine (*Oberrhein*, *Bovenrijn*)	Basel – Iffezheim ('South')	170 – 334
	Iffezheim – Bingen ('North')	334 – 529
Middle Rhine (*Mittelrhein*, *Middenrijn*)	Bingen – Bonn	529 – 642
Lower Rhine (*Niederrhein*, *Nederrijn*)	Bonn – Lobith	642 – 857
Delta area	Lobith – Rotterdam (estuary)	857 – 1030

Figure 4.1 The Rhine basin



The establishment of a regime that deals with the effects of climate change in the Rhine river basin has its roots in other, human-related problems in the catchment. The extent of human influences regarding fragmentation and flow regulation is such that the Rhine river had been classified as *moderately affected* by Dynesius & Nillsson (1994 in Van Ast, 2000). There have been pollution problems, for example due to saline disposals of German and French mines in the year 1932 and severe oil discharges in 1971. Due to an accident in a Swiss chemical production plant in 1986 large amounts of chemicals were released into the river, having serious effects on aquatic life and drinking water collection. In 1950, the International Commission for the Protection of the Rhine (ICPR) was founded. Formalised in 1963, in first instance it mainly dealt with chemical pollution issues. The pollution events can be seen as crises that accelerated policy change, and indeed, today the pollution of the river Rhine is considerably lower. Nowadays, the ICPR can be seen as the actor with the greatest influence on its water management. The Commission more and more realised that problems needed to be addressed at catchment level in order to be effective. Examples are the agreements on disposals of chemicals in 1976 and the ecological plan of 1991. It is suggested (Van Ast, 2000) that a subset of these disasters in the past have been able to catalyse policy-making. The high number of events and their supposed relation with policy-making make the Rhine river a rich case to examine.

In the last decades, a change in policy focus can be seen at catchment level. The major concern of the ICPR shifted from pollution issues to issues of water safety. International water quantity was first placed on the agenda following the near-disastrous high water events in the downstream areas of the Rhine in January and February 1995 (Van Ast, 2000). In the mid-1990s, the idea was put forward to improve co-operation. This led to the establishment of the Dutch-German Working

Group on High Water in the Rhine River Basin in 1997, an initiative that investigates that are relevant for cross border policy-making, and especially focuses on co-operation in emergency situations caused by flooding (Verwijmeren & Wiering, 2007; Wiering et al., 2010).

Climate change is an important issue in the transboundary governance of the Rhine river. This is of course especially true for issues of water quantity. There is a wide scope of impacts of climate change on the Rhine river basin. For example, the effects of an increased precipitation in winter and increased temperatures lead to an increased winter runoff and a decreased summer runoff. Erosion and sediment supply rates are expected to increase and change temporal pattern due to increased rainfall and runoff. Furthermore, climate change is expected to lead to an increase of peak flows of the river near the Dutch-German border. Consecutively, increased peak flows are expected to have increased constraints to spatial planning in the lower Rhine, but offer also new opportunities for functions as nature and recreation (Asselman et al., 2000). This is especially true for the Netherlands, as this country is highly vulnerable to flooding due to the fact that large parts are lying below sea level. To protect the land from flooding, embankments along the lower branches are constructed which are based on a 'failure probability' of 1/1250 per year. Apart from flooding, drought is another climate change-induced effect that may cause problems, especially for inland navigation and agriculture (Asselman et al., 2000; Van Ast, 2000). Because of the high number of activities that have a claim on the water of the river Rhine on the one hand, and the expectation that the climate continues to change in the future on the other hand, water management should be carefully approached (Asselman et al., 2000).

4.3. Analysis

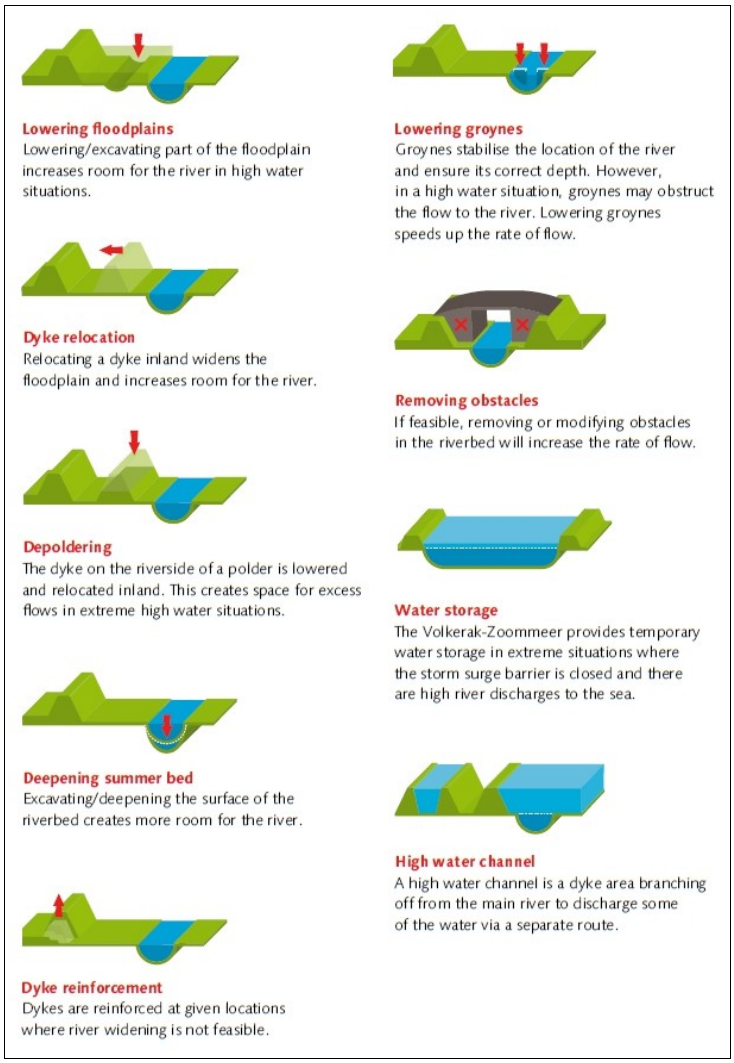
4.3.1. Precautionary principle

The precautionary principle is mentioned explicitly in Art. 4(a) of the Convention. Mr. Dekker explains that the exact wordings of the *precautionary principle* have been subject to an extensive debate. The use of the principle has a history of many decades, as it is included in the 1972 Oslo Convention on Waste Dumping at Sea and the 1974 Paris Convention on Pollution of the North Sea and Adjacent Areas from Land-Based Sources. The principle was notably present in the committee meetings of the OSPAR Convention (Oslo and Paris Conventions for the Protection of the Marine Environment of the North-East Atlantic), which came into force in 1998, thereby replacing the 1972 and 1974 Conventions. With regard to marine pollution it is very difficult to measure and prove the effects of certain chemical substances. For this reason, the precautionary principle was included. It made measures for the mitigation of hazardous substances possible, even without absolute certainty that there is a danger. Since the OSPAR Convention, the precautionary principle returned in many other documents.

The precautionary principle can be related to the (near-)floods of 1993 and 1995. By then, even without having exact information on the effects of climate change, it became clear that things needed to be done to manage floods. It was one of the underlying rationales of the 1998 Action Plan on Floods from the ICPR. As of today, the Action Plan on Floods is implemented as part of Rhine 2020. Regarding the implementation of precautionary measures, this is similar in the different nations. For example Germany started to assess measures, partly financed by the

Industrial Research Monitoring and Analysis (IRMA) project that was initiated by the European Commission. There is however a difference in the type of measures. For example, in the Netherlands more space is available for the expansion of floodplains than in Germany. The "Ruimte voor de rivier" programme indeed focuses on this type of measures. In Germany the focus is on water retention and dike relocations. In some parts, for example at Loreley, which is the narrowest part of the Rhine, no measures are possible due to the elevation (Dekker, 2012).

Figure 4.2 **"A menu of measures": possible hydro-technical measures to reduce flood risks** (source: PDRR, 2012, p. 19)



4.3.2. Principle of preventive action

The *principle of preventive action* is mentioned explicitly in Art. 4(b) of the Convention. Additionally, the Convention mentions the *principle of not increasing damage* in Art. 4(e). In the Dutch translation of the Convention this is called the *'stand-still' principle*. This may be related to the principle of preventive action, as it refers to the prevention of a decrease in environmental quality.

The *principle of preventive action* is, according to Dekker (2012) more applicable to water pollution than to issues of water quantity. As a first priority, pollution is prevented, and when the problem

occurs, pollution should be separated from the environment as much as possible. With regard to water quantity, the principle refers to the preference sequence for high water (see also subsection 4.2.5), in the sense that avoiding water discharge is the mechanism of prevention. In my framework of analysis this is however more related to the *source principle.*

4.3.3. Solidarity

This principle is not mentioned as such in the Convention. However, there is a principle called the *principle of not transferring environmental pollution from one environment to another* mentioned in Art. 4(i). This is also a form of solidarity, albeit narrower, as it is only applied to environmental pollution.

In the Rhine catchment, the solidarity principle is reflected in the relation between the Netherlands and Germany. In the future, Dutch policy aims to take account for a water discharge of 18,000 m^3s^{-1} at Lobith. At this moment, such an extreme discharge at Lobith is impossible: when the discharge approaches this amount, Germany experiences flood events, such that the discharge is considerably reduced. However, when Germany decides that will enhance all its dikes, this is a potential problem for the Netherlands. In that case, it is necessary to discuss the proposed measures. Up until now, this is not an issue, although it is very likely that a maximum discharge of 18,000 m^3s^{-1} will be the future norm due to the development of flood risk management plans in the context of the Flood Risk Directive (due 2013) and the implementation of the ICPR's High Water Action Plan. Although this issue of solidarity has not been on the agenda, this will be the case in the near future. In general, such issues are indeed addressed internationally, whereas the implementation is a responsibility of the different nations or, in case of Germany, federal states.

Wiering's (2012) impression is that both Germany and the Netherlands very seriously take care of climate change adaptation and flood management, both with regard to the generation of knowledge on these issues as well as international communication. This is reflected in the plans of the ICPR. A very proactive strategy would however be difficult implement. The underlying rationale is that when it is decided in Germany that more proactive measures are implemented, this results in a higher discharge, which has negative consequences for the Netherlands as a downstream country. Flood events in Germany on the other hand, may be profitable for the Netherlands, as they reduce discharge peaks. However, when a major flood event occurs in Germany, the Rhine water may eventually flood parts of the Netherlands. In that case however, the water comes from a different direction: the Dutch-German border instead of the dikes along the Rhine. Hence, the actual situation is complicated (Wiering, 2012).

The principle of *solidarity* is also related to the reasons for North Rhine-Westphalia and the Netherlands to cooperate. This most obviously include the downstream effects of flood measures. When flood peaks are reduced at a certain point in the river, this is in favour of downstream lying areas. This means that when North Rhine-Westphalia implements water retention areas, this is in favour of the Netherlands. Similarly, North Rhine-Westphalia depends on measures taken in upstream federal states such as Rhineland-Palatinate, Hessen and Badem-Württemberg. Less obvious are the upstream effects. Wiering (2012) explains that one of the projects in the Netherlands, in which a dike near Nijmegen is relocated, has effects up to 50 km upstream. This is because this measure improves the flow rate of the river at Nijmegen, and also upstream. A third

reason to cooperate is that the Netherlands has many expertise with regard to 'traditional' flood measures – such as dike enhancement – and measures related to giving space to the river. International cooperation is institutionalised by the ICPR and in the Dutch-German Working Group on High Water. For both sides of the border it is profitable to cooperate and to exchange knowledge. Besides knowledge on technical issues the cooperation also focuses on nature development and crisis management. For Germany, it offers a possibility to put the policy topic of flood management on the agenda. According to Wiering (2012), this is important for Germany. For example, future scenarios predict major flood events in the area of Cologne. Improving the awareness of such developments could also be a form of solidarity that taken care of by the Netherlands.

4.3.4. Cost-recovery principle

This principle is not mentioned as such in the Convention. However, the *polluter-pays principle* is mentioned in Art. 4(d), which is a principle that is closely related to the costs-recovery principle. The *polluter-pays principle* comes from the EU Treaty. In Germany and the Netherlands it is known as *Verursacherprinzip* and *de veroorzaker betaalt* respectively. The principle originated from the perspective of water pollution. The idea is that the actor that discharges chemical substances in the water, thus causing a pollution, is responsible for a resolution of the pollution problem. In the development of water management, and especially with regard to integrative water management, the scope of the principle shifted from water pollution to other aspects. It now includes all negative effects on the environment, also the effects from other sources than chemical substances.

An example of such an aspect, which is related to water quantity, is the effect of hydropower plants in the river. These power plants have turbines to generate electricity from the water stream. However, when the turbines are switched on at full power, the downstream river discharge suddenly increases. This has potential negative effects for the ecosystem, because a part of the river bed may be carried away downstream. Furthermore, physical damage may occur, including damage due to flood events. Similarly, a sudden closure of the turbines has potential negative effects for the environment. In the catchment, the ICPR recommends the hydropower plants to manage their installations in such way, that the turbines are gradually switched on an off. In that case, the ecosystem is given time to 'get used' to the increased water flow, thereby reducing the negative environmental impact. This type of management, that is called *Schwallbetrieb* in German, is more expensive for the hydropower plants. In this way, the costs for an ecosystem-friendly water management are covered, thus reflecting the *costs-recovery principle*.

4.3.5. Source principle

This principle is mentioned in Art. 4(c) as the *principle of rectification, as a priority at source*. Related to this principle is the preference sequence for high water. Dekker however questions whether this sequence works properly in practice. For example, extreme precipitation in Germany causes saturation of the soil. As a result, retention of the water at the place where it falls down, becomes a problem, as the retention capacity of the soil is very limited. Additionally, temporary water storage is possible, however only up to the capacity of the reservoirs. Hence, the first steps in the sequence are limitedly applicable, and therefore the water is discharges as quickly as possible. This of course has negative consequences for areas located downstream, such as the Netherlands. However,

extreme situations are quite likely to occur: in early spring, the combination of a frozen soil, a large snow cover in Switzerland, and relatively warm precipitation in Germany and the Switzerland forces one to discharge all water. An example of such a situation is the near-flood in 1995. The preference sequence may work in moderate, but not in extreme situations (Dekker, 2012).

Another instantiation of the source principle is the idea of emergency retention areas, or *noodoverloopgebieden* in Dutch. In case of extreme discharges, these areas, typically low-density residential areas, are flooded with the aim to avoid even larger damage elsewhere (see also Huthoff & Stijnen, 2005). Due to negative reactions from the general public, the term was abandoned in the past. However, the idea of emergency retention still persists. Dekker (2012) points to the so-called green river (Dutch: *groene rivier*) at Pannerden in the Netherlands. The idea here was to construct a side channel, through which water could flow secondary to the Pannderdensch Kanaal (one of the branches of the Rhine in the Netherlands), in case of an extreme water discharge at Lobith. The name of the channel refers to the fact that the river bed is a natural area that is only flooded in cases of high water. This is managed by spillways, that either are manually opened, or automatically when the water level reaches a certain point. There is a number of such green rivers, also in the Meuse catchment (for example near 's-Hertogenbosch, the Netherlands) (Dekker, 2012). The green river at Pannerden is part of the Rijnwaardense Uiterwaarden project. In June 2012, the definitive plan was presented. The original idea, to construct a side channel that could flow secondary to the river, proved to be infeasible due to the high costs had the plan be implemented in 2015 at the latest. Therefore, an alternative is implemented: the 1,600 metres long green river is constructed in isolation from the Pannerdensch Kanaal, thereby preserving the function as a water retention area. The area will be transformed from an agricultural to a natural and recreational area. The implementation is planned for the period 2014-2015; this part of the project will be finished in January 2016 (DLG, 2012). Agricultural areas are more likely to be designated for water retention than for example residential areas. In these cases, farmers in the areas will be compensated for the damage that occurs. In other cases, there is only grassland in the area, which suffers hardly any damage. The best alternative is to designate natural areas as water retention areas; in those cases, the area fulfils two functions. With regard to the negative public reaction, crucial here is what function is designated to these areas in times the areas are not used as emergency water retention areas (Dekker, 2012).

4.3.6. Sustainable development

The principle of *sustainable development* is central in the Convention on the Protection of the Rhine. It is mentioned in Art. 3 of the Convention as its first objective. Sustainable development here includes for example maintaining and improving the water of the Rhine and the natural function of the waters and protection and/or conservation of natural habitats, organisms and species. The principle is also mentioned in Art. 4(g). One of the Convention's objectives with regard to sustainable development – taking into account ecological requirements in the implementation of technical measures – obviously relates to the *principle of compensation in the event of major technical measures*, as laid down in Art 4(f) of the Convention. Flood protection measures are examples of such measures.

After the (near-)floods of 1993 and 1995 a shift can be seen towards policies that focus more on nature: spatial development and development of natural areas are combined. Recently, the policy

departs from this idea in the sense that hydro-technical measures are getting more important again. This is also reflected by the concept of *multilayered safety* (Dutch: *meerlaagsveiligheid*) that is very prominent in Dutch flood risk management (Wiering, 2012). The concept ensures safety on three levels (see Table 4.3).

Table 4.3 The concept of multilayered safety

Multilayered safety
1. prevention
2. sustainable spatial development
3. crisis management

The principle of sustainable development is reflected in the second layer. This means for example that Dutch local and regional policy documents incorporate aspects of water management in spatial planning, such that reservation of areas for water management is possible. However, the preventive measures are higher in hierarchy than measures related to sustainable development (see also Kolen et al., 2010).

According to Dekker (2012), the principle of *sustainable development* is reflected in the documents of the ICPR. Because of its implicit nature however, it is impossible to 'implement' the principle. The principle of *sustainable development* is for example associated with the issue of irreversible measures. In this context, the ICPR aims to avoid the implementation of measures that have irreversible negative long-term effects.

With regard to the effects of climate change on high water, the objectives of the ICPR's High Water Action Plan, now included in the plans for the year 2020, are maintained. In the Netherlands, there is a higher sense of urgency to adapt to climate change than in countries such as Germany and France. This means that the issue is more emphasised than in other countries, and higher standards may be adopted. However, the sense of urgency has not decreased in the other countries, as the implementation of flood protection measures such as retention basins still continues (Dekker, 2012).

With regard to droughts, not really much can be done to distribute the water of the Rhine. The most downstream weir is located at Iffezheim (see Table 4.1) from this location on water simply runs downstream on its way to the delta. In Germany, not the Rhine, but a number of side rivers is used as drinking water supply are. No large quantities are distracted from the Rhine in Germany and France. This means that the water quantity in case of drought is largely dependent on Lake Boden. When the discharge of the Boden Lake is low – under 1,000 m^3s^{-1} – not much water is added downstream. For this reason, the discharge at Lobith was historically low in spring 2011 (Dekker, 2012). On November 30, 2011 the water level at Lobith reached its lowest point ever[2], corresponding with a discharge of 789 m^3s^{-1} (LCW, 2011). According to Dekker (2012), such low discharges should not necessarily lead to problems for the environment, as a discharge of 600 m^3s^{-1} is still a large quantity to process. In periods of drought, there is a problem of salinisation in the

2 As a result of erosion, the river bed deepens. As a result, the water level decreases. For this reason, a lower water level does not necessarily mean that the river's discharge is lower.

western part of the Netherlands. During the most recent drought however, this did not lead to serious damage (Dekker, 2012).

4.3.7. Subsidiarity principle

This principle is not mentioned as such in the Convention. However, two articles in the document relate to the issue of subsidiarity, as these refer to the role of the Commission. Art. 6(3) for example prescribes that questions of labour legislation as well as social matters will be governed by the law of the country in which the Commission has its seat (Germany, France, Luxembourg, the Netherlands and Switzerland, alternately). Art. 8 describes the tasks of the Commission in order to fulfil the objectives as set out in Art. 3. This includes tasks of preparation (international measuring programmes, ecosystem studies), development of proposals (for individual measures and action programmes), and coordination (of warning and alert plans). The implementation side is laid down in Art. 11 that states that the decisions on the measures are communicated in the form of *recommendations*. The Commission has the opportunity to determine a timetable for the implementation (Art. 11(2)(a)). Also, the commission may determine that the decisions shall be implemented by the contracting members in a coordinated manner (Art. 11(2)(b)). In the Dutch version, this article is somewhat different ("[*De Commissie kan bepalen dat deze besluiten …*] *volgens een gecoördineerde procedure moeten worden uitgevoerd.*", Art. 11(2)(b)), which suggests a certain procedure according to which the implementation takes place. Art. 5(5) prescribes that each of the contracting parties implements the required measures conform Art. 11.

An issue associated with the *principle of subsidiarity* is the development of norms. If the subsidiarity principle had not been applied on the flood standards, a possibility would have been to develop a uniform standard for flood protection throughout the entire European Union. In that case, the standard would be too low for many areas. Similarly, the Dutch standard of 1:10,000 years in high-density urban areas, would protect many European too well, which is not conform the *proportionality principle*. For this reason, it was important that no concrete norms on flood protection were established in the Flood Risk Directive. Flood norms should better be determined at a lower level: at the level of the EU Member States, or as a joint development at catchment level. In this way, a more appropriate level of protection is established. According to Dekker (2012), the catchment level is best suited for the designation of flood norms, although differentiation should be taken into account. For the Rhine, the level of flood protection in the Alps should differ from the levels in the lower Rhine or the delta area.

Another issue regarding subsidiarity is the way in which water management is organised. In the Netherlands, water management is taken care of by three organisations in principle: the national government, the provinces, and the water authorities. This is different in Germany. For this reason, it is sometimes difficult for Dutch experts to assess which of the German authorities (e.g. *Bezirksregierungen, Wasserbehörden, Wasserverbände, Deichverbände, Stadkreise*) is resposible for a certain issue. Also, the way of organisation is different in each of Germany's federal states. The fact that the Netherlands deals with two German federal states (Lower Saxony and North Rhine-Westphalia) complicates the situation. Moreover, reorganisations within German water management make the situation even more complex. For example, in North Rhine-Westphalia the idea was to discontinue the *Bezirksregierungen*. Ultimately, this reorganisation was only partly implemented. Apart from this reduced transparency, which is assumed to be less problematic for

German experts, dealing with two federal states and the federal government can lead to problems. For example, when there is an agreement between the Netherlands and the German federal government, it is not necessarily the case that the German federal states obey to this agreement. Another difficulty is to achieve a common solution in the ICPR in the case the federal states have different viewpoints. This problem occurred several times in the past (Dekker, 2012).

4.3.8. Proportionality principle

This principle is not mentioned in the Convention. It is however recognised that the *proportionality principle* prescribes that the proposed measures are such, that they do not exceed what is necessary to achieve the objective. According to Dekker (2012), different viewpoints are possible on the question whether flood protection measures are proportional. The Delta Works (Dutch: *Deltawerken*), the large constructions to protect the delta area from the sea, for example, are associated with high costs. Whereas the idea in the Netherlands is that a high safety level is necessary, from the perspective of other nations the Delta Works may be far too expensive. Similarly, the construction of dikes with a flood standard of 1:10,000 years may be disproportional from such a viewpoint.

Also, there are different insights on monetising damage. For example, when the Netherlands decides that it will enhance its coastal flood protection from 1:10,000 years to 1:100,000 years, the potential costs associated with the damage resulting from a flood are determined as objectively as possible. In this way, the high costs of a proposed measure preventing such damage can be justified. Dekker (2012) argues that the Netherlands is quite 'ahead' with these ideas; in other countries (especially the United Kingdom) protection against flood events occurring every 100 years is a common standard.

4.3.9. Public participation

Although the principle of public participation is not mentioned in the Convention, the ICPR as well as the Dutch-German Working Group on High Water are involved in the generation of knowledge. The website of the ICPR is a rich source of information. The public is for example informed by means of flood risk maps. Also, the ICPR actively informs the public on hearings staged in the Rhine river basin, in which inhabitants of the basin may participate.

4.4. Conclusion

This chapter was the first in a series of 4 chapters addressing the use of the 9 normative principles on different levels. This specific chapter was about the working field of the two institutions of international cooperation: the International Commission for the Protection of the Rhine and the Dutch-German Working Group on High Water. In chapter 8, the findings from this chapter are confronted with the checklist of Practical Statements, and the extent of reflection of the normative principles is compared to the other levels.

Chapter 5
Climate change adaptation in Germany – federal level

5.1. Introduction

In the chapters 5—6, the answer to the following research subquestion is linked to the 9 normative principles as stated in Table 3.1:

RQ 4. *Which climate change adaptation policies in the Rhine river basin have been developed...*
b. *...in Germany?*

In this specific chapter, the findings at federal level are presented.

Water management in Germany is mainly based on three legislative pieces. Two of these are European Directives: the EU Water Framework Directive and the EU Marine Strategy Framework Directive. The third legislative piece is the German Federal Water Act (German: *Wasserhaushaltsgesetz* or *WHG*). The WHG was last updated in 2009; the revised version entered into force on March 1, 2010.

Table 5.1. Document analysis Germany – federal level

Document	Reference
Water Resource Management in Germany – Part 1 Fundamentals	UBA, 2010b
Water Resource Management in Germany – Part 2 Water Quality	UBA, 2010a
Water Framework Directive – The way towards healthy waters; Results of the German river basin management plans 2009	BMU, 2010
Water – Prosperity – Change – Protecting our water resources creates a secure foundation for life, biodiversity and sustainability	BMU, 2011b

In the document *"Water Resource Management in Germany – Part 1 Fundamentals"* (UBA, 2010b) the implementation of the two Directives and the WHG in Germany is explained. This document serves as the leading source of information from which the normative principles are identified. Other documents that have been explored are "*Water Resources Management in Germany – Part 2 Water Quality*" (UBA, 2010a), *Water Framework Directive – The way towards healthy waters; Results of the German river basin management plans 2009* (BMU, 2010) and *Water – Prosperity – Change – Protecting our water resources creates a secure foundation for life, biodiversity and sustainability* (BMU, 2011b). The document analysis is supplemented with findings from an interview with Ms. Heide Jekel from the Department of Water Management, Waste Management and Soil Protection of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Additionally, information retrieved from the interview with Mr. Gert Becker was used in the analysis. Becker is researcher at the Institute for Environmental Studies of the VU University Amsterdam, the Netherlands, department of spatial analysis and decision support. His expertises are adaptive management and governance, integrated water management and strategies including cultural aspects, change management, and integrated assessment and decision support.

5.2. Analysis

In the introduction of *"Water Resource Management in Germany – Part 1 Fundamentals"* the emphasis of German water resources policy is explained. The focus is on a continuous improvement of water quality and the structure of Germany's waters. Water pollution had been a serious problem in the past, since water conservation Germany was unable to cope with rapid industrial development. This problem was addressed relatively early, already in the 1960s and 1970s. Since the reunification of Germany on October 3, 1990, a major task is also to ensure the same level of environmental protection (including water conservation) in the entire country, since this level was considarbly lower in those five 'new' federal states (German: *Länder*) of former East Germany compared to the those of former West Germany. The result was a substantial improvement over the last 20 years.

However, water conservation, as it is stated, is an *"ongoing task"* (UBA, 2010b, p. 7). Moreover, water quantity issues are explicitly mentioned in the goals of Germany's water resources management, which can be summarizes as follows. The management of water resources is such that, in the long term, 1) the ecological balance of waterbodies is ensured, 2) reliable water supplies in terms of quantity and quality are guaranteed, and 3) that all other water uses that serve public welfare are possible (cf. UBA, 2010b, p. 7-8).

5.2.1. Precautionary principle

According to Jekel (2012), the *precautionary principle* is one of the inherent principles in German water management. In the main legislative piece, the Federal Water Act (*Wasserhaushaltsgesetz*) contains a number of regulations that either completely comply, or take into account this principle. Similarly, the principle is reflected in all 16 State Water Acts. The precautionary principle therefore is a guiding principle for all environmental legislation.

The precautionary principle is explicitly applied on groundwater management: the *groundwater precautionary principle*. This is because pollution has a delayed effect on groundwater, and so every action on water that is relevant for groundwater has to be evaluated in advance. If there is any indication that this action will negatively affect the groundwater, giving a permit for the action is not allowed. As it is stated in the WHG, the groundwater precautionary principle only relates to water quality. However, because the precautionary principle is important in the German environmental policy, the principle can constrain permits for actions that negatively affect water quantity. The water authorities closely monitor the groundwater levels and have the ability to restrict the permits for water abstraction. The actual situation in Germany is however such that drought is not an issue. At the moment, the country is provided with a sufficient quantity of water. Only in very extreme situations droughts occurred. Compared to the western part of Germany, the eastern part of the country is more likely to suffer from droughts due to less precipitation and a water-permeable soil, but it rarely comes to the point where there are for example limitations of abstractions (Jekel, 2012).

Also from the document analysis it follows that water quantity problems are not the focus of German water resources policy: *"Thanks to its favourable climatic situation, water quantity problems are uncommon in Germany"* (UBA, 2010b, p. 7). Interestingly, even in the light of climate change, no

fundamental problems with regard to Germany's drinking water supply are expected in the future, because the groundwater recharge rate continues to exceed the abstracted water quantity (UBA, 2010b). This corresponds to a 'good quantitative status of groundwater' in which the status *"is considered to be good if the available groundwater resource is not exceeded by the long-term annual average rate of extraction"* (UBA, 2010a, p. 15). An evaluation in 2009 showed that on a total of 1,000 groundwater bodies in Germany, 38 bodies (only 4%) failed good groundwater status, including groundwater bodies in the Rhine basin. Also, relatively few bodies were assessed as being overused (UBA, 2010a). However, it is not the case that no problems in the future are expected: *"the possibility of regional problems cannot be excluded, particularly during longer periods of drought"* (UBA, 2010b, p. 22). Moreover, it is noted that in practice, groundwater level or its development is insufficient to assess the quantitative status of groundwater with adequate reliability (UBA, 2010a, p. 15). In general of course, Germany is bound to the Water Framework Directive and the Flood Risk Directive, such that policies for water quantity problems should be established (UBA, 2010b).

The *precautionary principle* is reflected in the documents, although it is not listed as one of the fundamental principles. The sentence *"*[*a*] *sustainable water conservation policy should not only prevent imminent threats and restore any damage already caused, but should primarily protect and conserve natural resources in a precautionary way"* (UBA, 2010b, p.8) clearly reflects the importance of the principle. As we will see in 5.1.6 however, the documents adopt aspects of Agenda 21, including the identification and assessment of scientific uncertainties, which refers to the *precautionary principle*. With regard to water quantity issues, this is especially relevant for groundwater management, whereas in the assessment of surface water bodies (including rivers), water quantity *"plays a supporting role"* (UBA, 2010b, p. 9). It is furthermore stated that the uncertainties in regional changes with regard to rainfall distribution *"remain considerable"* (UBA, 2010b, p. 10). Regional effects are being studied in a number of projects including KliWa (German: *Klimaveränderung und Konsequenzen für die Wasserwirtschaft*, Climate change impact on water resources management), which is an inter-regional cooperation (i.e. a cooperation between a multiple federal states) (UBA, 2010b). The Adaptation Action Plan (German: *Aktionsplan Anpassung*) was also a result of cooperative work, and was agreed on by the federal government in August 2011 (BMU, 2011b). Also with regard to flood risk management problems are assessed inter-regionally (BMU, 2010).

The document furthermore states that *"it is vital to develop measures now so that water resources management may be adapted in line with changing conditions"* (UBA, 2010b, p. 10) for which Germany is developing a national adaptation strategy. The *precautionary principle* is very well reflected in the way Germany addresses climate change issues. In the document, it is explained that it is difficult to assess the effectiveness of climate adaptation measures due to the scientific uncertainties about climate change and its local effects, but that nevertheless, the general belief in the scientific community is that *"steps need to be taken now in order to adapt to climate change"* (UBA, 2010b, p. 22). To cope with these scientific uncertainties, the proposed adaptation measures should be flexible, robust, and effective, and preferably are win-win solutions. 'Flexible' means that the option of readjusting or supplementing an already implemented measure is left open. 'Robust' means that the measure should have effect, even in the case the effects of climate change differ from what is expected. In other words, it should be a 'no-regret' measure. An 'effective' measure is explained as the measure being as effective and direct as possible given the negative consequences of climate change. Additionally, 'win-win' solutions are the aim of the implementation, which means that a measure preferably should address multiple objectives, including for example nature conservation and also water resources management. This set of considerations forms the basis of the German

Strategy for Adaptation to Climate Change. This strategy was adopted by the German federal government in December 2008 and contains 14 so-called 'priority action areas' including water resources management and cross-sectional areas such as civil protection and disaster control (UBA, 2010b). Precautionary measures are questioned, as it is difficult to prepare for consequences that are unclear, since even experienced climate scientists describe these consequences in general terms. It is stated that *"many people wonder why we have to take action now if the effects will not be apparent for decades"* (BMU, 2011, p. 63). Despite this, it is made clear in the document that *"we will no longer be able to organise our everyday activities on the basis of a stable environmental situation, as we have until now"* (BMU, 2011, p. 63). This is a very clear reflection of the principle.

The 2010 BMU document includes a list of measures related to flood risk management that are available in Germany: land precautions, natural water retention, technical flood prevention, construction precautions, risk precautions, supply of information, behavioural precautions, and preparation for risk aversion in disaster plans (BMU, 2010b). The possible measures relate to a wide range of normative principles. Most obvious is the reflection of the *precautionary principle.* Land precautions include for example the restriction of the construction of buildings in floodplains, by which the negative consequences of flooding are reduced, regardless of uncertainties in the rate of flooding (BMU, 2010b). This can best achieved by not building at all in flood-prone zones, but this is not always possible to avoid. It is however possible to take flood events into account already in the construction. Examples are building houses on stilts, water-resistant building materials on walls and floors, movable walls for the prevention of water penetration, and the heating system being installed on the top floor rather than in the cellar (UBA, 2010b; BMU, 2011b). The *precautionary principle* is also reflected with regard to the financial side of risks, for example in insurance policies that belong to the 'risk precaution' measures.

5.2.2. Principle of preventive action

With regard to preventive action against flood events, Germany gives more space to its rivers as far as possible. For example on the Elbe river, there are projects that involve river restoration and relocation of dikes. In these areas, there is room for such projects. The 2002 flood disaster on the Elbe river resulted in the abolishment of new building plans: investments in some of these areas were compensated, and the locations were assigned as water retention areas. On the Mosel, which is a tributary to the Rhine, prevention is such that the people expect to be flooded once or twice a year.

The possibilities to give more room to the river alongside the Rhine are limited. In the Middle Rhine, the Rhine is located in a deep valley, such that there are no possibilities for measures such as retention. In the Upper Rhine, the situation is similar to the Netherlands. The Rhine has always been heavily used, and people have lived on the banks for thousands of years. Also, a lot of industries have settled alongside the Rhine. Therefore, more room for the river is a problem in these areas, which means that the measures are limited to protection by dikes and protection walls. In the Upper Rhine, many areas are protected by dikes, but because of a slightly different geographical situation, there are possibilities for artificial retention areas called *Polders*. Also, natural retention areas are created, for example nature parks that could be flooded (Jekel, 2012).

In one of the documents that has been assessed, a number of "fundamental principles" for water

resources management in Germany is listed: 1) the priority of prevention, 2) cooperation between all parties concerned, and 3) allocation of costs on the basis of the polluter-pays principle and full recovery of costs (cf. UBA, 2010b, p. 8). Obviously, the first principle is fairly similar to the *prevention principle*.

A number of legislative pieces form the basis of flood risk management on Germany's federal level. In August 2002, a major flood occurred in two of Germany's rivers: the Danube and the Elbe, causing 21 deaths and a damage in Germany worth more than € 10 billion. This disaster made clear that further specification of the national regulations was necessary. For this purpose, the Act to Improve Preventive Flood Alleviation (German: *Hochwasserschutzgesetz*) was developed, which came into force on May 10, 2005. This also points to the presence of the *principle of preventive action*. Important to notice here is that the improvements in flood risk management are reflected in the revised Federal Water Act, which for this purpose is coupled with the Flood Risk Directive. It is also mentioned that the tasks of converting the already existing flood action plans into flood risk management plans and coordinating transboundary flood risk management have been assigned to the ICPR (BMU, 2010b).

A flooded residential area (source: BMU, 2011, p. 60)

With regard to the measures, the category of 'technical flood prevention' that is mentioned in the 2010 BMU document clearly reflects the *principle of preventive action*, as it includes measures that aim to prevent flood events from happening, such as dikes, dams, and retention basins, but also the technical protection of properties and oil tanks. The measures that address the 'preparation for risk aversion in disaster plans' are difficult to link to one of the normative principles. However, as this category includes for example alarm and deployment plans and the training of rescue teams, it can be said that it is a form of preventive action to avoid further damage. It is however noted that technical measures have their limits. The measures only work up to certain water levels. A protected area is safe as long as the flood levels do not exceed the flood levels on which the technical measures are based. When the flood levels are exceeded, these protected areas become areas of high risks.

5.2.3. Solidarity

Jekel (2012) thinks that the FRD will help to improve cooperation, coordination and mutual understanding between the federal states and between Germany and other countries. This is because the implementation of the FRD forces to discuss the issue of solidarity between upstream and downstream located areas. Compared to other catchments, the discussion about solidarity in the Rhine catchment was alive even before the introduction of the FRD, because of the existence of the Action Plan on floods. In this agreement, a number of targets and objectives have been determined. However, due to improved technical knowledge, it is clear to all parties that these targets that have been set about 15 or 20 years ago are too ambitions. Therefore, not all conditions will be met.

Now that the action plan is merged in the implementation of the FRD, the discussion about the targets and objectives of flood protection is reinforced. This is a difficult discussion, especially with regard to the solidarity between Germany and the Netherlands. Germany is aware of the 'special' Dutch situation: as the most downstream country, the Netherlands experiences dangers from both sea and land side. In a worst case scenario, about half of the country will be flooded. This problem is understood in Germany. For Germany however it is also important to increase understanding from the Dutch side. Germany is interested in flood prevention and flood protection, but there is a number of geographical limitations on what measures could be taken.

The existence of international commissions such as the ICPR improves solidarity, as it makes it possible to discuss the issue of solidarity intensely. Although there is no “space for wonders”, it improves cooperation and mutual understanding. Because cooperation is taking place for many decades, there is a good basis of trust. The people in the commissions know each other, the experts know each other, so that in case of problems (with regard to floods as well as other issues), people communicate by telephone or organise meetings. Such a basis of trust is helpful in a reinforced discussion on solidarity (Jekel, 2012).

5.2.4. Cost-recovery principle

The cost-recovery principle is represented by a principle similar to the polluter-pays principle, which is fixed in German water legislation. This is mostly called *Verursacherprinzip*, and sometimes [*der*] *Verschmutzer bezahlt.* The *Verursacherprinzip* is for example one of the guiding principles in the German federal act on waste water discharges, according to which inhabitants pay a fee to the municipalities or water authorities for the treatment of waste water, and the waste water treatment plants pay a fee to the water authorities for discharging water into the river. This is a clear example of the principle.

With regard to water quantity, the polluter-pays principle is applied in regional water abstraction fee acts that exist in a most (but not all) of the federal states. This means that every water user has to pay a certain fee for a certain amount of water that is extracted. In this way, the income from the water water discharge goes into the budget of the federal states and can be used for water management, such as updating waste water plants or restoring rivers. Another reason for the specific federal states to develop such water abstraction fee acts was to cope with environmental problems. It depends on the specific federal state whether the polluter-pays principle is applied on

surface water only or on both surface water and groundwater. Depending on the types of industry in a specific federal state, the fee different across the federal states. For example, big mining sites in North Rhine-Westphalia pay for the abstraction of groundwater, however for to economic reasons the fee is reduced. Hence, the federal states have different regulations, and that there is no coherency on this issue. When it comes to surface water the principle is applied on power plants that need large amounts of (river) water for their cooling systems. Jekel (2012) sees a possibility that in the longer term a uniform, federal act will be developed on the cost-recovery of water abstraction.

With regard to flood protection, the German system of cost-recovery is different when compared to the Dutch system. The payment for water protection measures is officially laid down as a task of the municipalities and the water authorities. Of course, tax income is used, for example for the construction of dikes. Hence, indirectly everyone pays for these dikes. As far as Jekel (2012) knows however, no specific fee for water protection measures is applied. In fact, there is no legal basis for such a fee.

Like the *prevention principle*, the *cost-recovery principle* is identified from the list of fundamental principles for German water resources management. The principle is also addressed in the document assessing the results of the river basin management plans. It is stated that the polluter-pays principle has been *"implemented in Germany via statutes and regulations that relate to products, manufacturing processes and methods that promulgate requirements"* (BMU, 2010, p. 70). Indeed, this principle was fairly present even before the Water Framework Directive was adopted. According to the document, the principle means that *"waters must assume the cost of mitigating or eliminating the ecological damage engendered by their water use"* (BMU, 2010, p. 70), also promoting cost transparency. In the future, the *cost recovery principle* will be even more firmly present, as it is prescribed in state law in all federal states. Examples of the implementation are water abstraction fees in 11 federal states, and sewage fees in all federal states. The principle is also documented in most river basin management plans. An evaluation in 2005 showed that the level of cost recovery was close to 100% (BMU, 2010).

5.2.5. Source principle

The *source principle* is especially reflected in legislation on waste water treatment. It is indeed recognised that end-of-pipe solutions have their limits. For example, it is infeasible to improve waste water treatment plants such that they clear waste water from all hazardous substances, as from a certain point, this improvement gets disproportionally expensive. Rather, the problem should be rectified at its source, for example by provisions that prevent the use of certain chemical substances. Interestingly, the idea of the source principle is relatively new. This is because the detection systems have considerably improved, such that even low concentrations of chemical substances can be traced back. Also because it is unclear what the effects of some of the substances are, the resolution of the problem should start at another level. Although not everything with regard to prevention at source is possible, and some attempts are unsuccessful, the source principle is becoming more important in the prevention of (water) pollution (Jekel, 2012).

An example of the source principle which is more related to water quantity, is that the existence of water abstraction fees makes it quite expensive for some power plant enterprises to use large

amounts of cooling water. This can be an incentive for these enterprises to change their cooling systems. The power plants search for technical devices that reduce the amounts of cooling water, for example by means of a circulation system in which water vapour is cooled down and re-used. In this way, the amount of water that is extracted from a river is considerably reduced. Other examples are industrial enterprises that aim to re-use or internally clean water, even up to the point where no polluted water is discharged at the industrial site.

The source principle is furthermore reflected by the concept of (local) *Versicherung* of precipitation. This means that water from precipitation is not transported elsewhere before it seeps through the soil. The concept is set in the Federal Water Act, and is especially applied in new settlements to establish a situation that resembles the natural treatment of precipitation. For example, small strips of grassland are constructed between buildings, such that the soil absorbs the precipitation. Of course, not everywhere this approach is possible, for example along motorways, such that the construction of for instance retention areas is still necessary. However, a priority is assigned to this approach: if anyhow possible, the water is temporarily captured locally (Jekel, 2012). The concept of *Versichering* is probably what is meant by the category of measures that is called 'natural water retention'. This section of the UBA document explains the special attention that is given to the management of rainwater. Th aim of this management is indeed to return the water *"to the natural cycle as close as possible to the site where it falls"* (UBA, 2010b, p. 78). This means a departure from conventional sewerage in developed areas, as sewer systems usually prevent most of the water from taking the natural route; the systems transport the water to a different place instead. This requires adjustment of rainwater treatment plants and the construction of stormwater overflows and retention facilities, reservoir sewers and rainwater purification basins, which are built in Germany at high investments and maintenance costs. For this purpose, a separate discharge of rainwater and waste water (separate system) is preferred over a sewerage system that combines the two discharges (mixed system). The idea behind this preferred rainwater treatment is stated as the *"principle of discharging rainflows as quickly and comprehensively as possible via the sewer system, coupled with a high standard of disposal reliability and drainage convenience"* (UBA, 2010b, p. 77). On the one hand, this separation of rainwater discharges enhances water treatment. This is because water treatment plants have lower amounts of relatively clean rainwater to manage and it reduces quality problems in surface water due to overflows of mixed sewerage systems. On the other hand, this so-called 'semi-natural stormwater management' has a link with flood events, especially since this form of management also aims to minimise sealing and stabilising land. Soil which is not sealed or stabilised is more water-permeable, such that rainwater runoff, including runoff to a river, is reduced. As such, semi-natural stormwater management relates to the *source principle*, as the water is treated preferably at the place of origin.

The construction of retention areas can also be regarded as an instantiation of the source principle. Retention is for example applied with regard to drinking water, which is beneficial in times of drought. The dimension of this issue is however considerably different when compared to the Netherlands. This is because in principle, there is a sufficient amount of water available in Germany. Furthermore, retention of water from precipitation water is sometimes used to reduce the risk of flooding. For example, there is a preference for separate canalisation systems, such that rainwater and waste water are collected separately. In this way, the rainwater can be directly discharged to the river, which benefits waste water treatment plants, or it can be used for different purposes (Jekel, 2012).

Another example of the source principle is the use of *emergency* retention areas. These are called *Hochwasserpolders* or simply *Polders* in German. The emergency retention areas are normally meadows or pieces of agricultural land. In case of high water, the areas are intentionally flooded in order to reduce the flood peak on the river. Examples of such emergency retention areas on the Rhine can be found in the federal states of Baden-Württemberg, Rhineland-Palatinate as well as North Rhine-Westphalia. Especially on the Upper Rhine there a several of such emergency retention areas. When agricultural land is flooded, the farmers are typically compensated for the damage. The implementation of such areas is however not an easy issue. Obviously, in many cases the owners of the land that is to be included in emergency retention areas are against this transformation. For example in Baden-Württemberg the implementation of emergency retention areas is experiencing many protests, conflicts and court cases. As a result, the so-called Integrated Rhine Programme in this federal state, that was planned to be completed by now, is delayed considerably. So, even for Germany, in which the problem has a smaller dimension than in the Netherlands, the construction of emergency retention areas is problematic (Jekel, 2012).

5.2.6. Sustainable development

The principle of *sustainable development* is an overarching principle. It is difficult to say whether this principle is used as a fundamental or guiding principle. It is for example not mentioned explicitly mentioned in the German Federal Water Act, however one of the articles acknowledges the responsibility for future generations with regard to the protection of the environment. The pillars of sustainable development are indeed reflected in some way. For example, it is clear that water resources should not be over-used, and that there should be a balance between water uses and water protection. There are economic and environmental protection issues that have to be combined. Because of a guaranteed access to water and sanitation in Germany, social issues are less of a problem. In general, the principle of *sustainable development* is mostly covered by the other principles. Moreover, Germany has a very detailed environmental law in all sectors, in which the idea of sustainable development is reflected. Also, there is sufficient conscience that there is a need for a careful treatment of the environment and its resources. Hence, although the exact concept is not included in the federal legislation, it can be said that the state is responsible for sustainable development (Jekel, 2012).

With regard to the documents, one of the texts mentions Agenda 21, which was adopted at the 1992 United Nationals Conference on Environment and Development in Rio de Janeiro. Two of its chapters, Chapter 17 and 18, are seen as particularly relevant for water resources management. Of these chapters, a number of programmes (or programme areas) are relevant in the case of water quantity issues related to climate change. This includes the problem of *"serious uncertainties with regard to climate change and the management of marine environmental resources"* (UBA, 2010b, p. 8) from Chapter 17, and from Chapter 18 the assessment of the quantity of water resources and the impacts of climate change. It is clear that the inclusion of Agenda 21 refers to the principle of *sustainable development,* and hints to the *precautionary principle*.

Another instantiation of the principle of *sustainable development* can be seen in the documents. It is mentioned that the obstructions along waterways are barriers in the migration routes for many fish species, but also have negative influences on the water flow. In particular, the flow times of flood waves is shortened by straightening and regulation of rivers. As a result, steeper and higher tidal

waves occur, increasing the risk of flooding. Moreover, without floodplains and backwaters, rivers are insufficiently able to cope with heavy rain and meltwater due to missing natural overflow areas. One of the solutions is to transform riverside land to a more natural state, for example in the project on the Rhine led by the Nature and Biodiversity Conservation Union of Germany (NABU; German: *Naturschutzbund*). Although the *"opportunities for the environment and the natural world are limited on heavily navigated waterways"* [such as the Rhine] (BMU, 2011b, p. 42), it is necessary to exploit these possibilities. Also for the German federal government, the aim is to combine the interests of nature and inland shipping in its water protection policies (BMU, 2011). This reconciliation of competing interests reflects the principle of *sustainable development.*

The sharp distinction between climate change mitigation and adaptation is very similar in Germany when compared to the Dutch situation. Water issues typically fall under climate change adaptation, whereas mitigation is restricted to energy issues. The general feeling in Germany is that water is not sufficiently acknowledged with regard to the mitigation problem (Jekel, 2012).

5.2.7. Subsidiarity

The *subsidiarity principle* as laid down in EU environmental legislation is reflected by the general feeling Germany that the powers of the European Commission are too widespread. The idea here is that the European Commission tends to regulate things that are better be regulated at national level. Jekel (2012) supposes that this feeling is similar in the Netherlands.

In Germany there is the ongoing issue of what tasks are performed at the federal level, and what tasks are performed at the level of the states. It could be argued that for some issues, decisions are made by the federal states, as this level is closer to the problems than the federal level. Normally this is not a problematic issue, as the German constitution makes clear which tasks are assigned to which level. However, in some cases this distinction is less clear, there is some sort of mixture. Water management is a good example of this, because of the existence of water acts on both levels: the WHG at federal level and a LWG for each of the federal states.

The current distribution of tasks in Germany is as follows. At the federal level there are no implementation authorities on water management, except with regard to water ways (i.e. water transport) that is regulated by the Federal Ministry on Transport and Urban Development (German: *Bundesministerium für Verkehr, Bau und Stadtentwicklung*). All other water management (regarding pollution, floods, the implementation of the WFD, etc.) is performed by the federal states. Each federal state has an environmental Ministry, that usually combines environmental issues with for instance agriculture and spatial planning. The federal states have their regional acts and also perform policy orientation. The actual work on water management is done at two or three different levels, depending on the size of the federal state and the way of internal organisation. Normally, the district level (*Bezirksregierung*) concerns middle-level authorities that are responsible for big licensing issues, e.g. large water abstraction and water protection zones. The less important permits are covered by the municipalities (Jekel, 2012).

5.2.8. Proportionality

The *proportionality principle* is inherent in the general procedural administrative law in Germany.

This means that only measures that are proportional with regard to their purpose are taken. For example, water abstraction comes with a number of obligations for the users of the water, however these obligations have to form some sort of balance. Interestingly, German courts normally reject claims of disproportionate measures because of the importance of environmental protection (including flood protection) in Germany. The principle is especially applied as a proportionality of financing, which is relevant for a large number of issues.

With regard to flood risk management, the proportionality principle is reflected by the conduction of cost-benefit analyses. These analyses are used to outweigh technical measures against each other. In most cases, it is possible to create a 'win-win-win' situation, which favours nature conservation, water management and flood protection. In other cases, for example when a possible 'cost' is that half of the city of Cologne will flooded, which is infeasible, finding the best solution is less easy (Jekel, 2012).

5.2.9. Public participation

In the documents it is stated that the next step for implementing the so-called German Strategy for Adaptation to Climate Change is to develop an action plan, which was planned for the first half of 2011. Indeed, the Action Plan for Adaptation was adopted by the German federal government on August 31, 2011. Activities in four areas are addressed. One of these areas is the area on *"communicating knowledge, informing and enabling [that] draws together the German government's initiatives on communicating information, expanding research and information infrastructures and supporting dialogue, participation and networking"* (BMU, 2011a). This already shows that *public participation* is seen as an an important principle in the strategy. It is planned that an evaluation of both the adaptation strategy and the action plan takes place at the end of 2014, after which the documents will be updated (BMU, 2011a).

With regard to flood risk management, it is stated that early adaptation measures are needed. Also, the measures and strategies that are already adopted or developed, i.e. those of the German Federal Water Act and the EU Flood Risk Directive, *"need to be implemented without delay"* (UBA, 2010b, p. 22). It is stated that the impacts of climate change should be considered in special technical flood control measures in the future. However, the progress of this consideration could at least be questioned. The document mentions the incorporation of a 'climate factor' as an example of how to cope with the potential impact of climate change. Moreover, it is stated that a social debate is needed to decide which flood risks are tolerated, and which are not. A possibility is that this ends in an agreement on differentiated levels of protection and the exploration of *"further options for a flood risk management policy that has been adapted to climate change"* (BMU, 2010b, p. 22). Whatever the outcome, the fact that it is stated that a social debate is needed, points to the reflection of the *principle of public participation*.

Considering the actual measures, the category of 'behavioural precautions' can be placed under the *principle of public participation*, as these measures include *"public education and preparation for flooding with specific recommended actions for the general public"* (UBA, 2010b, p. 106). In the document, the involvement of the general public is mentioned together with the cooperation beyond administrative boundaries as demanded by the Flood Risk Directive. Also, in the light of *public participation*, Germany's citizens are given a number of practical advises. This also enhances the

active involvement of the public. Citizens are advised to minimise the creation of water water, to clean their cars at a carwash instead of on unsealed soil, to avoid the use of salt in winter (to avoid chemical substances or salt seeping into the groundwater), to use water-permeable soil surface materials or avoid sealing, and to use the best technology in decentralised rainwater management (cf. UBA, 2010b, pp. 139-142: *"What can each and every one of us do to help? – Tips on Water Conservation"*).

5.3. Conclusion

This chapter addressed the use of the 9 normative principles from the WFD and the FRD on federal level in Germany. In chapter 8, the findings from this chapter are confronted with the checklist of Practical Statements. Also, the extent of reflection of the normative principles is compared to the other levels. In the next chapter, the answer to RQ 4b is completed with an analysis at the level of one of Germany's federal states.

Chapter 6
Climate change adaptation in North-Rhine Westphalia

6.1. Introduction

The German federal system requires that the EU Directives at issue, the Water Framework Directive and the Flood Risk Directive, have their implementation at regional level. This means that all measures are taken at the level of the federal states. In this chapter, climate adaptation in one of these federal states, North-Rhine Westphalia (NRW), is studied, NRW is the last German state the Rhine crosses before entering the territory of the Netherlands (see Figure 6.1). Together with chapter 5, this chapter provides the answer to the following research subquestion and its linkage to the 9 normative principles as stated in Table 3.1:

RQ 4. *Which climate change adaptation policies in the Rhine river basin have been developed...*
b. *...in Germany?*

Figure 6.1 **Federal States in Germany**
(source: UBA, 2010b, p. 25)

Two brochures are investigated (see Table 6.1), which are directed at the actors involved in the implementation of the WFD and the FRD in North Rhine-Westphalia. These actors are the municipalities (German: *Kommunen*), the water authorities (German: *Wasserverbände*) and the individual residents. However, the main targeted actors are the municipalities and the water authorities. The findings from the document analysis are supplemented with information from the interview with Mr. Erik Buschhüter from the Ministry for Climate Protection, Environment,

Agriculture, Nature Conservation and Consumer Protection (Buschhüter, 2012).

Table 6.1 Document analysis North-Rhine Westphalia

Document	Reference
Mit dem Wasser leben – Hochwasserschutz in NRW	MKULNV, 2011a
Hochwasserrisken gemeinsam meistern – Die europäische Richtlinie zum Hochwasserrisko-management in Nordrhein-Westfalen	MKULNV, 2011b

6.2. Analysis

Buschhüter (2012) confirms that the translation of the European Directives to the relevant governments in Germany is stipulated by the Federal Water Act, the *Wasserhaushaltgesetz* (WHG). With regard to legislation, North Rhine-Westphalia is bound to the federal government, which develops the relevant legislation. In other words. This means that the implementation of the Directives is in principle a task of the federal government. In Germany this is done as follows. The federal government (German: *Bund*) develops a sort of framework which is to be processed by the federal states (German: *Länder*). Like all federal states, North Rhine-Westphalia has a State Water Act, the *Landeswassergesetz* (LWG). However, the LWG only contains legislation that is not already in the WHG. In other words, this is additional legislation. The LWG is decisive with regard to flood management.

6.2.1. Precautionary principle

To Mr. Buschhüter, the *precautionary principle* (*Vorsorge* in German) and the *principle of preventive action* (*Vorbeugung* in German) are highly related. The principle is very much reflected in the action plans that were developed after the high water events in the Rhine in 1993 and 1995. There actually have been flood action plans for all rivers in North Rhine-Westphalia, including the Rhine, Sieg, Erft, Ruhr, Emscher and Lippe, even before the Flood Risk Directive or even the Water Framework Directive had been published. The flood action plans reflect the *precautionary principle*. From a substantive point of view, these plans already contained all that is currently required by the EU Directives. In this sense, the new legislative pieces were not substantially different. A disadvantage thus far had been that the federal state had not been responsible for flood protection, but instead each actor that is affected by the protection measures. In practice, this does not mean that every individual citizen is responsible. Rather, authorities such as the water authorities and the dike associations are responsible. In areas where there are no water authorities or dike associations present, the municipalities take over this role. The situation is different from other federal states, as for example Baden-Württemberg in which the federal state is responsible for flood protection measures. In general and especially along the Rhine in North Rhine-Westphalia however, the task is assigned to the dike associations and the water authorities, a situation which is to some extent similar to the organisation in the Netherlands. This also means that the approach in North Rhine-Westphalia is more democratic than in for example Baden-Württemberg, where the state government can make decisions more on its own. The fact that the implementation can only be performed in cooperation with the relevant actors such as the dike associations and the municipalities, is that there is more direct communication with the actors affected, which

potentially leads to an easier acceptance of the measures (Buschhüter, 2012).

With regard to scientific uncertainties, Mr. Buschhüter assumes that North Rhine-Westphalia's flood protection measures are prepared for extreme events. The *Bemessungshochwasser* in North Rhine-Westphalia are comparable to the flood protection levels in the Netherlands. This means for example that the dikes are able to cope with high water levels except in very extreme situations. This has been the case in all High Water Action Plans on the Rhine that were developed after 1995. A principle in North Rhine-Westphalia is however that dikes are not necessarily raised for such extreme events. In other words, the principle implies that flood protection can be realised, but up to a certain level. It is possible to build even higher dikes, but there is always the (uncertain) possibility that even more water is discharged. In 2004 a flood study was performed together with the Dutch-German Working Group on High Water, to determine the worst-case scenario, i.e. the highest possible river discharge, also with regard to climate change. The study (DGWGHW, 2004) proved that it is impossible to protect the area of Bonn and Cologne against flooding, as the river discharge in the scenario was very high. This is because the dikes are too low. Also, it is proven technically impossible to raise these dikes, due to the compactness of the urban area. Moreover, building walls to protect the city centre of Cologne would result in a soil pressure that negatively affects the foundation of the historic buildings – putting safety at risk. The high density of the urban areas along the Rhine in North Rhine-Westphalia also implicates that there is no space available for large retention areas. For this federal state the consequence is that there is no possibility or preference to easily raise its dikes.

Although the normative discharges and their respective levels of protection differ between North Rhine-Westphalia and the Netherlands (see Table 6.2), the dikes near the Dutch-German border are equal in height. This is because in Germany a margin of 1 metre is incorporated in the design of the dike (Buschhüter, 2012). According to the 2004 study, this is done in order to cope with higher water levels, for example caused by the wind or obstacles in the water. Hence, in practice the dikes along the Rhine are coping with even higher water levels than the normative discharges on which their design is based (DGWGHW, 2004). This also means that the actual protection levels are higher than the official numbers. Determining an actual number is difficult, but experts say that it approaches a probability of 1 : 1,000 years. In the worst-case scenario, flood events occur at the Rhine from Bonn/Cologne to Düsseldorf (Buschhüter, 2012). The *precautionary principle* is reflected by the statement that along the *Niederrhein* part of the Rhine, the protection level is sufficient to cope with very rare situations of high water. This has been realised by technical measures.

Also the 'room for the river' concept is used in North Rhine-Westphalia. It is stated that in order to cope with more extreme discharge peaks, the river has to be given more space. When this is the case, the water extends in horizontal direction, such that the peak levels are reduced. The reactivation of meadows (German: *Auen*) is measure in the light of giving space to the river. Although the primary aim of this measure is to enhance water quality rather than reduce the risk of flooding, it is emphasised since the implementation of the Flood Risk Directive is explicitly coordinated with the implementation of the Water Framework Directive (MKULNV, 2011b, 25). The reactivation of meadows reflects the *principle of preventive action*.

The study mentions an additional expected flood event between Düsseldorf/Dormangen to the mouth of the Ruhr river. Since in case of a flood at the southern and middle parts of the Niederrhein there is already a large amount of water outside the river banks, no additional flood

events occur at a discharge of 14,000 m^3s^{-1}, except at Emmerich – at least as long as the improvement of a protection wall has not been finished (DGWGHW, 2004). Because this is a worst-case scenario, the recommendation for North Rhine-Westphalia was not to raise their dikes for this extreme event. After all, according to Mr. Buschhüter North Rhine-Westphalia and the Netherlands are best protected against flooding compared to the Rhine or any other river in all other German states. For example, the protection levels at the Oder, Danube or Elbe in the other states are 1 : 200 years. North Rhine-Westphalia therefore decided to design protection measures up to a certain level which is considered a high standard (Buschhüter, 2012). When the levels are exceeded, crisis management takes over.

Table 6.2 Normative discharges and levels of protection along the Rhine

Normative discharges and levels of protection along the Rhine (cf. DGWGHW, 2004, p. 10)		
Part of the Rhine	**Normative discharge**	**Level of protection**
Germany, Oberrhein	5,500—7,300 m^3s^{-1}	1 : 110—1 : 1,000 years
Germany, Niederrhein	12,900—14,800 m^3s^{-1}	1 : 500—1 : 200 years
The Netherlands, Rijn	16,000 m^3s^{-1}	1 : 1,250 years

The attitude of the Germany towards protection against flooding differs from that of Netherlands. In the Netherlands, a large part of the country is below sea level, and therefore vulnerable to flooding. Because of a different situation, this attitude is far less present in Germany. This is also related to the Germany's attitude towards effects of climate change. Concrete (structural) defence against high water will only be considered when it is clear what the effects of climate change in Germany are. At the moment, the ICPR considers in what way the possible effects of climate change should be managed with regard to the Rhine. The problem here is the high bandwith of uncertainty across the calculations. The outcomes vary from 0% (no effect) to 20% higher water levels; it is even possible that some parts of the Rhine experience a decrease in water levels. Since 0% and 20% are equally probable, simply taking the average value is insufficient. As long as these uncertainties exist, the the concrete set of measures as implemented today will not change. Instead, the focus of flood preparation is on risk and crisis management (Buschhüter, 2012).

Also important are the instruments for flood predictions. For the Rhine in North Rhine-Westphalia and Rhineland-Palatinate these predictions are made at a central point, namely at the Flood Warning Center in Mainz (*Hochwassermeldezentrum Mainz*), the capital of Rhineland-Palatinate. This center provides all 5 monitoring stations at the Niederrhein in North Rhine-Westphalia (i.e. Düsseldorf, Ruhrort, Wesel, Rees and Emmerich) with reliable predictions up to 24 hours (MKULNV, 2011a). Predictions of floods relate to the *precautionary principle.*

North Rhine-Westphalia's environmental Ministry also published a second brochure, which is named *"Hochwasser gemeinsam meistern – Die europäische Richtlinie zum Hochwasser-risiko-Management in Nordrhein-Westfalen"* (MKULNV, 2011b). This can be translated as "a common approach to floods – the European Flood Risk Directive in North Rhine-Westphalia". The brochure states in the introduction that precautionary flood management (*"Hochwasservorsorge"*, MKULNV, 2011b, p. 6), in the form of high water action plans, technical measures and security measures, is

anchored in the plans of the federal state and the regions. The fact that the *precautionary principle* is mentioned this explicit, reflects the idea that this principle is deeply rooted in German laws. The brochure also mentions new provisions from the WHG that reaffirm the prohibition to construct new buildings in floodplains; only under restrictions new developments and expansion of buildings is possible. For example, municipalities can set up adapted building contracts in order to create new areas for water retention. In this way it is also possible to keep certain areas free, in other words, these are reserved for future water retention. These decisions are made at the basis of flood risk maps (MKULNV, 2011b). This also reflects the *precautionary principle.*

A dike has collapsed (source: MKULNV, 2011b, p. 14)

6.2.2. Principle of preventive action

The *"Mit dem Wasser leben"* brochure mentions 7 locations where dikes are relocated in order to give the Rhine more space and 4 controlled water retention areas that serve as a water buffer in flood situations (MKULNV, 2011b). An additional project, a retention area located at Itter-Himmelgeist (between Monheim and Mündelheim) is mentioned in a 2004 study (DGWGHW, 2004, p. 21), however this project is not included in the brochure. A dike relocation has less impact than a retention area, since it only increases the diameter of the river through which the water is discharged – of the Rhine in North Westphalia results in a retention such that the speed of a flood wave is reduced (Buschhüter, 2012). According to Buschhüter (2012), a set of 11 large projects has been planned (see Table 6.3), and 6 of these are already implemented. The other projects are either under construction – the municipalities currently deal with their authorisation – or being planned. The implementation has been very expensive and will also be expensive in the future. Certain is however, that the 11 projects will be finished. The set of measures is being implemented further, and its finalisation is planned for the year 2020. However, its realisation depends on the availability of financial resources. Moreover, it is subject to public objection.

The technical measures include the construction of dikes, relocation of dikes, the construction of water reservoirs (German: *Rückhaltebecken*), the control of retention areas (German:

Rückhalteräume), and the development (German: *Gewässerentwicklung*) and restoration (German: *Renaturierung*) of water bodies. The technical measures account for an additional retention surface of circa 3,325 ha, which accounts for about 140 million m³ of water[3]. The target of these facilities is to reduce the recorded water level at the monitoring station of Lobith (the Netherlands) by more than 10 cm, and to cause a delay of the peak discharge by 12 hours (BWK, 2010; MKULNV, 2011a, p. 11). This is especially caused by the project Orsoy-Land (Buschhüter, 2012). It can be said that these technical measures relate to the *principle of preventive action*. A quantification of the exact effects of the construction of retention areas is however difficult to make, since the effects depend on the measures taken downstream (i.e. in the Netherlands) (Buschhüter, 2012).

Table 6.3 Technical flood management measures in North Rhine-Westphalia

Technical flood management measures in North Rhine-Westphalia (source: BWK, 2010; Buschhüter, 2012; DGWGHW, 2004, p. 21)				
Name	**Category**	**Area**	**Capacity**	**Status**
Deichrückverlegung Niederkassel	dike relocation	10 ha	0,2 million m³	realised
Rückhalteraum (Köln-)Langel	water retention area	500 ha	6 million m³	under construction
Rückhalteraum Worringer Bruch	water retention area	600 ha	29 million m³	planned
Deichrückverlegung Monheimer Rheinbogen	dike relocation	200 ha	8 million m³	realised
Ilvericher Bruch	area protection	400 ha	15 million m³	cancelled
Deichrückverlegung Mündelheim	dike relocation	100 ha	5 million m³	planned
Rückhalteraum Orsoy-Land	water retention area	220 ha	10 million m³	planned
Deichrückverlegung Orsoy	dike relocation			realised
Deichrückverlegung Bislicher Insel	dike relocation	1,100 ha	50 million m³	realised
Deichrückverlegung Lohrwardt	dike relocation	275 ha	15 million m³	under construction
Bylerward	area protection	500—700 ha	20—30 million m³	cancelled

The *"Mit dem Wasser leben"* brochure states that it is essential for a densely populated and industrialised federal state to have some form of flood protection. Since North Rhine-Westphalia is such a state, many things have been performed with regard to the issue of flood protection. Very central to the implementation of flood protection measures is individual responsibility. The brochure refers to §5(2) of the Federal Water Act, in which reads as follows: *"Jede Person, die durch Hochwasser betroffen sein kann, ist im Rahmen des ihr Möglichen und Zumutbaren verpflichtet, geeignete Vorsorgemaßnahmen zum Schutz vor nachteiligen Hochwasserfolgen und zur Schadensminderung zu treffen (…)"* (WHG, §5(2)). This can be translated as the obligation for every person that is possibly affected by high water to take preventive measures against possible negative consequences of flooding insofar he is reasonably able to. This relates to the *principle of preventive action*, a principle that is deeply rooted in North Rhine-Westphalia's legislation on flood protection.

3 The numbers may be inaccurate due to the use of sources from different points in time.

Important in flood protection in North Rhine-Westphalia is the concept of *Bemessungsabfluss* or *Bemessungshochwasser* is developed for the design of dikes. It is the normative discharge that serves the design of dikes and is defined as the statistical probability of occurrence of a certain amount of water per second (*"Das ist die Wassermenge pro Sekunde, die laut Statistischen Berechnungen eine bestimmte Auftretenswahrscheinlichkeit hat"*, DGWGHW, 2004, p. 10). The normative discharge is related to the level of protection (presented as a probability), as it is assumed that the river is able to cope with the normative discharge without flooding. Levels of protection differ across the Rhine (see Table 6.2).

6.2.3. Solidarity

The *"Mit dem Wasser leben"* brochure states that flood control in the Rhine is successful only, when there is coordination between NRW and its neighbouring countries and federal states: *"Am Rhein gelingt der Hochwasserschutz nur, wenn er zwischen den anliegenden Staaten (…) und innerhalb (…) abgestimmt ist"* (MKULNV, 2011a, p. 9). In other words, there should be some form of alignment between NRW and the federal states of Baden-Württemberg, Hesse (*Hessen*), Rhineland-Palatinate (*Rheinland-Pfalz*), and between Germany, the Netherlands and Switzerland. This points to the presence of the *solidarity principle*. Although the implementation of measures is a task of the local municipalities and dike associations, the state government of North Rhine-Westphalia determines the so-called *Bemessungshochwasser*, discharge levels that serve the design of flood defences. Transboundary governance is covered by NRW's participation in the International Commission for the Protection of the Rhine and the Dutch-German Working Group on High Water (German: *Deutsch-Niederländischen Arbeitsgruppe Hochwasser*).

A relevant paragraph in the brochure is about the nature of technical measures that aim to reduce peak discharges. A possible policy target is the construction of new facilities, for which it is noted that their construction affects the height and duration of peak discharges in other places. The brochure states: *"Deshalb müssen die Maßnahmen entlang der Flüsse sorgfältig aufeinander abgestimmt werden"* (MKULNV, 2011b, p. 20), which means that measures along the rivers should carefully be matched with each other. This refers to the *solidarity principle.*

According to Mr. Buschhüter, there indeed is solidarity between the federal states as well as between the nations. The principle *Oberlieger schützt Unterlieger* ('upstream protects downstream') is important in NRW. Indeed, this concept is also elaborated in the documentation: *"Bei diesen Maßnahmen schützt der 'Oberlieger' weiter oben am Flusslauf naturgemaß den 'Unterlieger' an einer tieferen Stelle des Flusses"* (MKULNV, 2011a. p. 11), which means that the upstream-lying residents protect the downstream-lying residents in a natural manner. This is relevant for the relation with the Netherlands. Measures for retention (German: *Rückhaltemaßnahmen*) are designed in cooperation with colleagues from the Netherlands, so that these measures are not only profitable for NRW, but also for the Netherlands. Likewise, measures in the Netherlands are also profitable for NRW. When the river is widened downstream, the area in which the water is discharged increases, such that the water upstream can be discharged faster. According to Mr. Buschhüter, there is an effect up to 30 km upstream. In general, there is a close communication between NRW and the Netherlands, and NRW only implements flood protection measures which do not have negative effects for the Netherlands. For example, every modification to the riverbed should absolutely not lead to increased water levels or higher discharges to the Netherlands.

The coordination between the federal states is similar to the coordination with the Netherlands. However, the fact that there are many different preferences from each of the other federal states, complicates the problem. This is especially true for Hessen, which is able to build a water retention area that is profitable for the downstream lying states (Rhineland-Palatinate, North Rhine-Westphalia), but prefers to avoid this, as it wishes not to implement measures against the will of its citizens. North Rhine-Westphalia offered Hessen financial resources to implement such a measure, however in this case the wish of the citizens prevailed. The coordination between the federal states is very close, and North Rhine-Westphalia aims to secure the principle of solidarity. This is especially done internationally, through its participation in the ICBR.

North Rhine-Westphalia participates in the Dutch-German Working Group on High Water, which was established after the high water event of 1995. During the critical event, inhabitants of the area along the Rhine in the Netherlands were evacuated. By contrast, just over the border in Germany, no evacuation took place. In other words, evacuation stopped right at the national border. In fact, the Dutch evacuation was at that time unknown for the people in Germany, even at for example the water authority where Mr. Buschhüter was active. Hence, it was determined that the regional coordination did not work properly. After the event, parties at both sides of the border decided that cooperation was necessary and to be institutionalised. The first Joint Statement (German: *Gemeinsame Erklarüng*) was the first result in 1997. In this statement, three parties in the borderland jointly agreed on Dutch-German cooperation with regard to high water levels in the Rhine. An additional aim was to reach joint agreement on technical issues such as dike constructions, discharge models and normative discharge levels (Buschhüter, 2012). These intentions are similar to the aims of the Working Group included in its latest Joint Statement covering the time period of 2007-2012, which includes developing a joint strategy for the management of high water levels with regard to the identification of appropriate solutions, cooperating the implementation of measures, educating the general public, and conducting research to determine the effects of flood reduction measures and future developments (for example with regard to climate change) (DWGHW, 2007).

6.2.4. Cost-recovery principle

According to Mr. Buschhüter, the recovery of costs of water services, in this case for flood management, is approached somewhat differently in Germany compared to the Netherlands. Firstly high water levels are in principle caused by precipitation. Secondly, through the centuries humans have developed areas alongside the rivers, and as a result people are living in areas that are vulnerable to flooding. However, High water protection along the Rhine in North Rhine-Westphalia is explicitly and primarily paid by those whose ground is in the protected area. This is (to some extent) comparable to the role of the water authorities (Dutch: *waterschappen*) in the Netherlands. The basis of cost-recovery in North Rhine-Westphalia is that every land owner is a member of the dike association or water authority, and has to pay an annual tariff. In the cities this is paid by the city at the costs of its citizens. In addition, the federal state financially supports the measures. This contribution is between 40% and 80% of the total costs and depends on the financial strength. A contribution of 80% is common, which means that land owners pay for the remaining 20% (Buschhüter, 2012).

6.2.5. Source principle

In contrast with the Netherlands, North Rhine-Westphalia never had the aim to construct emergency retention areas (German: *Noträume*; Dutch: *noodoverloopgebieden*). According to Mr. Buschhüter, the discussion about emergency retention areas in the Netherlands indeed reached Germany. This is a difficult issue. No suggestions (for example from politics) were made for such measures, because it would never be accepted by the general public. The implementation of such measures has therefore never been considered in North Rhine-Westphalia. With regard to the *source principle* however, measures are implemented such that the discharge of rivers that mouth into the Rhine is delayed. This is also the case in other federal states, although the approach in North Rhine-Westphalia is of a more reserved nature. The effects however are quite limited; the peak discharge is delayed, but it does not decrease the river's water level.

The *"Hochwasserrisiken gemeinsam meistern"* brochure also refers to the definition of floods in the Flood Risk Directive: *"Hochwasser sinds Naturphänomene (…). Damit müssen wir umgehen"* (MKULNV, 2011b, p. 7) and *"Absoluten Schutz können sie (…) nicht gewährleisten"* (MKULNV, 2011b, p. 20). In other words, flood events cannot be prevented and thus have to be managed. This represents the shift from flood protection to flood management also present in the Flood Risk Directive.

The municipalities have a central role in flood management. This especially relevant with regard to decisions on urban planning: *"Die Kommunen sinds aus dem Bau- und Wasserrecht verpflichtet, ihre planungsrechtlichen Festsetzungsmöglichkeiten auch im Interesse des vorbeugenden Hochwasserschutzes umfänglich auszunutzen"* (MKULNV, p. 8). In other words, German legislation requires the municipalities to incorporate the interests of preventive measures as much as possible. Examples are that the municipalities ensure that rainwater is being handled as close as possible to the place where it falls down, and the reduction or avoidance of soil coverage (MKULNV, 2011b, p. 8). This reflects the *source principle.*

6.2.6. Sustainable development

In Germany there is a plan comparable to the Dutch "Ruimte voor de rivier" project. In North Rhine-Westphalia, a study was conducted to investigate how the structure of the rivers – river courses, side channels, etc. – could be qualitatively enhanced in the context of the Water Framework Directive. The working group that guided the research were experts from both Germany and the Netherlands. They developed a total of 40 measures, both qualitative as well as quantitative. An example of a quantitative measure is altering the distance between discharge hindrances, which locally decreases water levels. Together, these measures would significantly decrease the water level during high water. Implementing all 40 measures is however impossible for a number of reasons. For example, it would be necessary to remove 7,2 millions m^3 of soil. At this moment, this is impossible, as there are nature conservations in the Rhine area in which it is prohibited to remove the soil. Instead, three pilot projects have been started, that favour ecology, flood protection and inland navigation; a 'win-win-win' situation. The projects are in a very early stage; only recently is was decided that the projects took off, currently other stakeholders such as nature conservation organisations are consulted to assess the feasibility of the projects. Although the purpose of the projects is to enhance the quality, the "more room for the river" principle is a

driving force for North Rhine-Westphalia. Moreover, it is experienced as good example on how the implementation of the Water Framework Directive and the implementation of the Flood Risk Directive are tailored.

With regard to climate change adaptation, all High Water Action Plans that are developed since 1995 include an extreme scenario for discharge levels. North Rhine-Westphalia already requested the municipalities and dike associations to incorporate such extreme scenarios, but until now, this had not been done to the satisfaction of the federal state. However, this is improving due to the EU Directives coming into force. Especially the Flood Risk Directive is very helpful in this case, as this Directive integrates all operations with regard to risk management. Examples are forms of urban planning that consider avoiding building in flood-prone areas and constructing buildings that can resist being flooded. The fact that these questions are addressed in the implementation of the Flood Risk Directive is very helpful in climate change adaptation. The sense of urgency about flood risks among the citizens is very low; until now, citizens are only involved at the times flood events actually occur. The further implementation of the Directives, and especially the publication of flood risk maps may however improve the general public's engagement, and may consequently have a reaction towards politics (Buschhüter, 2012).

6.2.7. Subsidiarity

According to Mr. Buschhüter, the current division of tasks and responsibilities is appropriate. North Rhine-Westphalia is forced to work closely with the local organisations, as the federal state is not authorised to implement measures on its own. The process therefore includes other parties (Buschhüter, 2012). It can also be mentioned that the leading actor in the development of flood risk management plans are the District Governments (German: *Bezirksregierungen*), that coordinate working groups with relevant stakeholders and formulate plans for the participation of professionals as well as the public (MKULNV, 2011b).

With regard to the division of tasks, it is clearly stated that, although the federal states and the municipalities (German: *Kommunen*) are performing many tasks, flood protection relies on individual responsibility. Obviously, it generally is unable for individual citizens and companies to implement flood protection measures. Therefore, these actors are joined in dike associations, the so-called *Deichverbänden*. Other actors that are informed are the water associations, the *Wasserverbände.* The water associations, dike associations and the municipalities are supported by the government of North Rhine-Westphalia, which shares the costs of flood prevention measures and other, specific measures. This clearly reflects the principle of *subsidiarity*, the tasks and responsibilities are laid down to the lowest possible level, i.e. the individuals. To guide this lower-level responsibility, North Rhine-Westphalia developed the Flood Protection Plan (German: *Hochwasserschutzkonzept*), which exists since the mid-1990s and has been revised ever since.

6.2.8. Proportionality

In one of the brochures (MKULNV, 2011b), the progress of the implementation of the Flood Risk Directive is explained. The first and second step, involving the preliminary flood risk assessment (due December 22, 2011) and the flood hazard maps (due December 22, 2013) are already published for North Rhine-Westphalia. At this moment, the flood risk management plans (due

December 22, 2015) are being developed. In the development of these plans, it is important to determine the priorities that are assigned to the actions: *"Nächster Schritt ist die Festlegung einer Rangfolge"* (MKULNV, 2011b, p. 17). For this purpose, the urgency of each measure should be developed, and and what cost the measure can be realised. This indicates the presence of the *proportionality principle*.

North Rhine-Westphalia is bound to EU legislation with regard to the proportionality principle. Cost-benefit analyses are performed as a way to assess the proportionality of individual measures. When it concerns technical measures and there are multiple alternatives, conducting a cost-benefit analysis is relevant to examine what is the best option. According to Mr. Buschhüter however, not all measures that are developed in the context of the Flood Risk Directive can be assessed properly in a cost-benefit analysis. Some aspects of risk management, for example the cooperation between the fire brigade and water authorities, cannot be quantified. A cost-benefit analysis would not be suitable in that case. Hence, cost-benefit analysis are nit generically conducted (Buschhüter, 2012).

6.2.9. Public participation

Objection to large projects is not unknown, and generally delays the implementation process. In some cases, i.e. the Ilvericher Bruch and Bylerward projects (see Table 6.3), the citizens objected the respective measures. Also, it was unable to implement the projects regardless of the citizens' objection. This is is a consequence of the Flood Protection Plan, which states that no expropriations should be performed in order to implement flood protection measures. The only possibilities to reserve areas for (emergency) water retention are to buy the areas from the owners or to compensate the owners for the damage. This requires that the local people agree with the implementation of a measure. Voluntariness, social acceptance and tolerance are important in the Flood Protection Plan.

The Flood Protection Plan includes technical measures on flood prevention, water retention, precautionary measures, and participation of the general public (MKULNV, 2011a). This last aspect hints to the reflection of principle of *public participation* in the policies existing in North Rhine-Westphalia.

A possible measure with regard to *public participation* is education (or *Aufklärung* in German). It can be used to enhance the protection of individual properties and buildings, which is evaluated as insufficient. Education can also favour flood management in custom building. Examples are information programmes for individuals, owners, administrative employees and architects (MKULNV, 2011b). Education, especially targeted at the general public, can be mentioned as an example of the *principle of public participation*. Linked to this is the list of suggestions for the inhabitants to cope with the risk of stormwater flooding that is included in the *"Mit dem Wasser leben"* brochure (MKULNV, 2011a). For the most part, this list includes measures of precautionary and preventive nature. Examples are the installation of electricity, gas and heating systems at a place other than the cellar, the construction of elevations (as water barriers) at doors and cellar windows, not to leave valuable possessions in a cellar, and to keep inlets for local water channels free from dirt. It can even be negotiated whether a cellar is necessary at all, which can be relevant in the case of the construction of new houses (MKULNV, 2011a). By providing practical advices to its inhabitants, the federal state of North Rhine-Westphalia puts emphasis on the individual's

responsibility to take action. Other relevant measures are the provision of information in flood situations and the local publication of flood risk maps (MKULNV, 2011b).

6.3. Conclusion

This chapter addressed the use of the 9 normative principles from the WFD and the FRD in one of Germany's federal state: North Rhine-Westphalia. In chapter 8, the findings from this chapter are confronted with the list of Practical Statements, after which the extent of reflection of the normative principles is compared other levels.

Chapter 7
Climate change adaptation in the Netherlands

7.1. Introduction

This chapter is the last in a series of 4 chapters on the role of normative principles at different policy levels. It addresses the following research subquestion and its relation to the use of normative principles:

RQ 4. *Which climate change adaptation policies in the Rhine river basin have been developed...*
c. in the Netherlands?

The document analysis for the Dutch part of the case-study addresses two programmes: the "Ruimte voor de rivier" (translated as *Room for the river*) project and the "Deltaprogramma 2012" programme (translated as *Delta Programme* or *DP2012*). Table 7.1 shows an overview of the assessed documents.

Table 7.1 Document analysis: the Netherlands

Document	Reference
Brochure Room for the River	PDRR, 2012
Approved decision Room for the River	PDRR, 2006
Werk aan de delta – Maatregelen van nu, voorbereiding voor morgen	DP2012, 2011
Nationaal Bestuursakkoord Water	NBW, 2011

The Room for the river project is a Planning Key Decision (Dutch: *Planologische Kernbeslissing* or *PKB*). This was a procedure that, according to the Dutch government, suited the supra-regional decision-making best. The PKB, as it is stated in the document, is not providing firm policy decisions. Measures will be worked out in more detail after the procedure has been completed. This is done on the level of the provincial and municipal authorities, with the national government assessing the lower-level plans.

The Room for the river programme has a main objective and a secondary objective. The main objective is to ensure that the branches of the Dutch part of the Rhine can cope discharge volumes up to 16,000 m^3s^{-1} (discharge at Lobith, close to the point where the Rhine enters the Netherlands) without the risk of flooding. The measures for this purpose have to be completed by the year 2015. The measures include "lowering floodplains, relocating dykes further inland, lowering river groynes, and deepening summer beds" (PDRR, 2012, p. 5). Other measures are removing obstacles (if feasible), water storage in case of high river discharges, and high water channels that discharge a part of the discharge via a different route. The secondary objective is that the measures that enhance safety should also improve the economic and environmental quality in the river region. When read in more detail, the project also mentions a third objective. The third objective is focused on the time period after 2015. It is predicted that, due to climate changes, additional space for

coping with higher discharges is needed. The third objective is therefore to ensure that this space is permanently available (PDRR, 2012).

The Delta Programme (*Deltaprogramma*) is a programme concerning the protection of the Netherlands against high water and the maintenance of the freshwater supply. The performance of the principles in the second report on the *Deltaprogramma* (the DP2012) is especially relevant to assess. This is because where the first report focused on the question how work is being done in the period until 2015, this report focuses on water safety and the freshwater supply itself (DP2012, p. 7). It can therefore be said that the focus of the second report is more *substantive* when compared to the more *procedural* first report.

7.2. Analysis

The DP2012 report serves as a guideline for the assessment of the reflection of the principles. In the Netherlands, multiple programmes on water management exist. A number of them are part of the Delta programme, while maintaining their own administration, organisation, and financing. Additional information was retrieved from the interview with Dr. Erik Mostert, lecturer within the Water Resources Management Group at TU Delft University, Delft, the Netherlands. Mr. Mostert has conduced mcuh comparative research on water policy and law, collaboration processes, the role of expertise, and the role of concepts. He also specifically studied the implementation of the Water Framework Directive and the Flood Risk Directive.

7.2.1. Precautionary principle

According to Mostert (2012), the Netherlands adopts a precautionary approach, i.e. when there are scientific uncertainties it chooses the safe option. Mostert has the impression that the Netherlands' approach to the effects of climate change is more precautionary than the German approach.

The Royal Netherlands Meteorological Institute (Dutch: *KNMI*) has developed 4 scenarios of climate development: moderate and extreme increase of temperature either combined or not combined with a change in (dominant) wind directions (G, W, G+, W+). With regard to its measures (for example flood defences), the Netherlands does not always anticipate the worst possible scenario, as this is too expensive, at least in most cases and at short term. Rather, it anticipates the worst possible scenario that can reasonably be expected. This is more in line with Mostert's understanding of the precautionary principle: the existence of uncertainties is not a reason to do nothing. However, there are cases in which the Netherlands actually considers an extreme situation. A good example is the catastrophic scenario on which the suggestions from the Delta Commission, published in their 2008 report, were based (Mostert, 2012). In the development of the extreme scenario the Delta Commission decided – after conducting additional research on all elements of the original IPCC scenarios – to adjust the assumptions. The resulting scenarios were more extreme than the original IPCC scenarios (Delta Commission, 2008). For example, the peak discharge of the Rhine at Lobith was estimated at 16,500—19,000 m^3s^{-1} in 2050 and 17,000—22,000 m^3s^{-1} in 2100, with a reference discharge of 16,000 m^3s^{-1} and disregarding uncertainties in hydraulic models and hydrolic effects, for example floods in Germany (Delta Commission, 2008, p. 117) It can therefore be said that the Delta Commission had a 'very precautionary' approach;

Mostert (2012) however notes that the scenarios were only part of an advice (and not of a policy), and that the application of the principle in this way can at least be questioned.

These scenarios are indeed addressed in the Room for the river brochures. There is a strategic policy choice concerning uncertainties about future climate trends. However the policy goal is to cope with discharges up to 16,000 m^3s^{-1} (determined in 2001), due to climate change a rise can be expected up to about 18,000 m^3s^{-1} (discharge at Lobith) at the end of the 21st century. Also, climate change affects the sea level; this change is included in the policy since the Room for the river project takes a sea level rise of about 60 cm into account. Unknown responses of other countries to future climate changes make it even more difficult to make accurate predictions about the measures after the year 2015.

The new discharge volume of 16,000 m^3s^{-1} that was determined in 2001 does not affect the distribution percentages that were calculated for the 15,000 m^3s^{-1} discharge. In the case that the discharge exceeds 16,000 m^3s^{-1}, the additional volume will be distributed between the Waal and IJssel branches.

The extreme situations in the year 2011, as the DP2012 states, show that it is necessary to respond to climate changes that can already be measured, such as soil subsidence and sea level rise, and measured and projected changes concerning peaks and falls in precipitation and river discharges, dryer summers, and spatial and economic developments. The report explicitly mentions climate change effects which are uncertain and difficult to predict for the next 100 years or even for the next decades. Also, spatial and economic developments cannot be predicted. The programme copes with these uncertain developments in a sober and realistic way (*"Daar moeten we nuchter en realistisch mee omgaan"*, DP2012, p. 8). In practice this means that the strategy that is adopted maintains the possibility to switch to a different strategy or to implement measures in such a way that adjustments of these measures is still possible in the future (so-called 'no-regret' measures). An other implication is that the option to implement measures that are not necessary as of yet has been left open. In other words, the Deltaprogramme 2012 concerns a strategy to cope with uncertainty on the effects of climate change and of other developments, thus reflecting the *precautionary principle*.

The *precautionary principle* is also very well reflected in the Room for the river project's strategic policy choice that states that at some locations, measures are implemented that result in higher safety standards than currently necessary. This is done to prevent certain future developments, such as building houses or other spatial developments, which would otherwise form considerable obstacles for the needed safety measures. A secondary reason for this strategy is that it is prevented that multiple sets of measures are implemented at the same location.

With regard to drought management, the precautionary principle is especially applied to groundwater management. According to Mostert, athough there are still deficiencies in our knowledge about groundwater, the understanding is sufficient to predict possible shortages. This is related to the release permits of groundwater extraction, which can be restrained in for example dry summers (Mostert, 2012).

7.2.2. Principle of preventive action

In the Netherlands, there is a policy of implementing 'no-regret' measures. An example is the current preparation of the so-called Delta Decisions (Dutch: *Deltabeslissingen*), which will be made in 2014. These include decisions on the reservation of space for measures, for example for retention areas. In the Room for the river brochure it is indeed stated that *"future spatial developments must not form an obstacle in taking the necessary measures"* (PDRR, 2006, p. 9). In other words, the measures that will be taken up until 2015 must be useful in the longer term; they *"*[*must*] *not thwart measures which might be needed later"* (PDRR, 2006, p. 10). This is a form of implementing no-regret measures.

Another example are the emergency retention areas (Dutch: *noodoverloopgebieden*), however the idea of implementing such measures has been abandoned: the Room for the river projects excludes these measures to be taken in the short term, however, their implementation will be 'necessary' in the future. It is "*regarded as a last resort"* (PDRR, 2006, p. 10) in the case discharge volumes rise up to 18,000 m^3s^{-1}.

Currently the basis of preventive measures against flood events are the exceedance probabilities (Dutch: *overschrijdingskansen*), which are defined as *"gemiddelde overschrijdingskans per jaar van de hoogste waterstand waarop de tot directe kering van het buitenwater bestemde primaire waterkering moet zijn berekend, mede gelet op overige het waterkerend vermogen bepalende factoren"*, Art. 2.3 Waterwet; the average annual probability that the highest water level a flood defence structure can resist is exceeded, also taking into account other factors determining the flood defence capacity. These norms differ across the country. For example, in the west of the Netherlands, it is allowed that water flows over a dike once in every 10,000 years.

Exceedence probabilities in the Netherlands are however different from flood norms (Dutch: *overstromingsnormen*). Already in the 1996 Act on Water Defence (*Wet op de waterkering*) – a piece of legislation that was later merged with 7 other acts into the Water Act (*Waterwet*) – the option to take flood norms was mentioned. Indeed, the current plan is to shift from exceedance probabilities to flood norms. There are various reasons why flood norms are preferred. For example, when some water flows over a dike, it is not necessarily causing any damage – as long as the dike does not collapse. Also, as these current norms go back to reports from the 1960s and were calculated quite roughly, they are based on obsolete knowledge. They are also based on an outdated spatial situation; economic activity as well as the size of the population behind the flood defences have considerably increased. Furthermore, the current norms are to low; some areas may deserve higher norms, which potentially is a financial problem. On the other hand, the norms of some locations may be reduced. This is also a problem, as reducing the norms will probably not be accepted by society.

The latter problem is 'solved' by means of preventive action, as it is determined that the current level of protection will – at least – be maintained. It is however impossible to increase flood protection levels of dike rings in isolation: as all dike rings are connected to each other, altering the standards of flood protection in one part of the system will most probably affect the actual level of protection of other parts of the system. In other words, there will be 'winners' and 'losers'.

With regard to *preventive action*, establishing new standards for flood protection belongs to the

determination of *"appropriate objectives for the management of flood risks"* as part of the development of Flood Risk Management Plans (due December 22, 2015) as stated in Art. 7(2) of the Flood Risk Directive. In the Netherlands, the planning was that new norms had been introduced in 2011, however, this has been postponed (Mostert, 2012).

The DP2012 report states that the Delta Programme is successful to the extent that a part of the work is done. However, the conclusions of the third report on water safety will show that more work needs to be done. This especially concerns the actualisation of the norms on water safety, which is done in order to create a protection level that – if necessary – differs from the present level. In this way, the norms better suit the growth of the population affected by high water issues and also the increase of economic value of the land behind water defences.

A number of action points of the Dutch implementation of the Flood Risk Directive are more concerning. The first point refers to the definition of floods. In the Flood Risk Directive, a flood is defined as *"(...) the temporary covering by water of land not normally covered by water. This shall include floods from rivers, mountain torrents, Mediterranean ephemeral watercourses, and floods from the sea in coastal areas, and may exclude floods from sewerage systems"* (Art. 2(1) FRD). According to this definition, incidental coverage by water of areas outside dike rings are regarded as floods. For example a number areas in Scheveningen, parts of Katwijk and Dordrecht, and entire harbour of Rotterdam regularly experience coverage by water. However, the policy for areas outside the dike rings is based on individual responsibility and maintaining the current safety standards. No concrete flood norms have been established. This because these events are not regarded as floods in Dutch policy. This might be a problem with regard to the Flood Risk Directive, as the flood risks in these areas have to be assessed and plans have to be made. It should be noted however that the Directive itself is unclear about what the plans should comprise.

A second and related example is grassland which is incidentally covered by water from ditches. These events can lead to significant damage and thus are regarded as floods. Hence, the Flood Risk Directive demands plans for the management of these events. Thus far no decisions for this type of floods, however, it seems that the Netherlands will decide that this type of floods is excluded from their plans. If this indeed is the case, having no standards for these type of floods may not be conform the Directive.

A third example is that the Flood Risk Directive states that risks should be managed. The current Dutch policy on risk management is insufficient, as it only takes possible casualties and economic damage into account. Environmental damage and damage to cultural heritage are not part of the risk assessment, although this is demanded by the Flood Risk Directive (and partly by Art. 4 Water Framework Directive).

'Solving' these deficiencies in the implementation of the Flood Risk Directive does not necessarily lead to different (preventive) measures in the Netherlands. However, this Directive is a highly procedural instrument. Therefore, the Netherlands can take the finest measures, but if it doesn't follow the procedures, it fails to implement the Flood Risk Directive (Mostert, 2012).

In the introduction to the brochure *"Room for the river – Safety for four million people in the Dutch delta"*, the main problem of the Room for the river project is stated as forwarding *"measures to ensure improved flood protection for the river region"* (PDRR, 2012, p. 4). This seems to reflect the

principle of preventive action, however it is not in line with consideration 2 from the preamble to the Flood Risk Directive, which stated that, in principle, *"floods are natural phenomena which cannot be prevented"*. This is explained by the low level of priority that is given to dike reinforcement: the reinforcement of dikes is only an option when other options are 'unaffordable' (too costly) or 'inappropriate' (below optimal requirements) (PDRR, 2006; 2012). Instead, the programme is described as an integral programme that not only ensures safety, but also creates more space for new economic and leisure activities, and for nature.

7.2.3. Solidarity

Currently, the regional water authorities in the Netherlands (Dutch: *waterschappen*) are responsible for dikes, whereas the Directorate-General of Public Works and Water Management (Dutch: *Rijkswaterstaat*) is primarily responsible for the main water system. Currently, the National Government is for 100% responsible for the reinforcement of the primary water defence, i.e. all dikes and dunes that enclose one of the 53 dike rings or dikes located in front of dike rings (as for example the Afsluitdijk). The water authorities are not responsible for the reinforcement of water defence structures, but have the responsibility for their management, except in a few cases (including the Afsluitdijk). An important development in water management however is that the water authorities will become more financially responsible for the reinforcement of the primary water defence. In the future only 50% of the costs for reinforcement will be paid by the National Government. The other 50% will be collectively paid by the water authorities: 10% comes from the responsible water authority, and 40% comes from a fund to which all water authorities contribute. For example, when a dike in the Rivierengebied area needs to be reinforced, 10% is paid by *Waterschap Rivierenland*, 40% by the fund of water authorities, en 50% by public resources. This also means that this is relatively expensive for areas such as Zeeland, which is sparsely populated but has many dike rings. On the other hand, it is profitable for water authorities in areas without many primary water defences, such as *Regge en Dinkel* and *Reest en Wieden* in the provinces of Drenthe and Overijssel (Mostert, 2012). The development is explained in the Bestuursakkoord Water, that states that *"Uitgangspunt hierbij is dat er geen onevenwichtige verschuiving van de lokale lasten optreedt, met name in gebieden met veel primaire waterkeringen en relatief weinig inwoners"* (Bestuursakkoord Water, 2011, p. 22), i.e. the principle is that there will be no uneven distribution of the local burden, especially in areas with many primary water defences and a relatively small population. The shift from collective to more individual responsibility relates to the *solidarity principle*. A shift to even more individual responsibility can be seen in the discussion about insurance from a risk management perspective in order to cope with the damage of extreme events such as floods (see also Aerts, 2009; NOS, 2012).

The DP2012 report contains a section about the transboundary aspect of water safety and water supply issues. Due to the fact that river basin management takes place, which is of course relevant for the implementation of the Flood Risk Directive and the Water Framework Directive, the Dutch Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs, Agriculture and Innovation have their contacts with neighbouring countries. This includes the river commissions such as the International Commission for the Protection of the Rhine (ICPR). International cooperation, as the report states, even stresses the importance of joint action: *"Gezamenlijk optreden is hierbij van groot belang"* (DP2012, p. 54). The Dutch contribution is to emphasise the need for more attention to drought problems. In the development of measures that

are the result of the Flood Risk Directive, the effects of these measures in situations of drought have to be evaluated. This means that the measures have to be robust not only in high water situations, but also in drought situations. A principle that is explicitly mentioned in this context is the Dutch *niet-afwentelen* principle, which is closely linked to the *solidarity principle*. The advice is to put the coherence between flood and drought measures on the agenda of the river basin commission: however the link between water safety and freshwater supply is on the agenda, there are still possibilities to improve this. The negative impacts of long-lasting droughts on society should therefore receive more political attention in the river basin commissions.

7.2.4. Cost-recovery principle

The *cost-recovery principle* is not present in flood management, however, the related principle that states that the actor causing an event (Dutch: *de veroorzaker betaalt*) is financially responsible, is relevant. This is also included in the Nationaal Bestuursakkoord Water as the *kostenveroorzakingsbeginsel* (Art. 10 NBW). The principle is expressed in relation to the norms for the various land use types. Inundation from surface water is allowed to occur once in 10 years for grassland, once in 25 years for agricultural land, once in 50 years for high quality agricultural and horticultural land, and once in 100 years for developed areas. An implication of the principle is that when a certain area is re-developed from grassland to a residential neighbourhood, the norm should be enhanced from once in 10 years to once in 100 years, which involves costs (NBW, 2003, p. 21). The water authorities are responsible for this costs, however, the costs are obviously passed on to the residents, the company developing the area, or the municipality (Mostert, 2012).

The Freshwater partial programme of the Delta Programme examines long-term measures that are able to cope with structural water shortages. One of the questions that is addressed is how much freshwater is supplied and and what price. Another question is about the responsibility of the user. These two questions attach to the *cost-recovery principle*. In the programme's search for strategies and measures increase in the water supply is an issue, but emphasis is also put upon the restriction of water use.

The DP2012 report contains a chapter on the financial resources for the programme, which is of course linked to the *cost-recovery principle*. Two aspects are important: the Delta fund *(Deltafonds)* and the changing role of the water authorities. The Delta fund is the main financial resource for the Delta programme; up and including the year 2028 the fund will be fed with a stable and substantial amount of money. From the year 2020 on this will be € 1 billion (DP2012, p. 58). With the purpose to use the financial resources in an efficient and effective way and to use private money for the programme, research is being done on the use of alternative strategies of financing. This will be one of the subject for the next report on the Delta programme, DP2013.

The other aspect is that the budget for the period 2011-2020, which is € 1.2 billion, is partially taken care of by the water authorities. This is a departure from the present financing construction; a change that is regarded as necessary to secure the financing for the already running High Water Protection Programme, HWBP2.

7.2.5. Source principle

The *Nationaal Bestuursakkoord Water* document mentions a concept that is central to Dutch policy on water quantity management after the (near-)floods in the 1990s. This is known as the *preference sequence* (Dutch: *voorkeursvolgorde*) for water: *"(...) eerst vasthouden, dan bergen en in laatste instantie afvoeren van overtollig water of aanvoeren in ingeval van watertekort"* (NBW, 2003, p. 19), or shortly, *vasthouden – bergen – afvoeren*. The concept refers to the management of floods as well as droughts. To prevent floods and droughts, the first option is to have water retention at the place the rainwater falls down. If this is impossible, a second option is temporary storage of water. The option with the lowest preference is to discharge the water, which usually includes raising dikes (Mostert, 2012). Because this concept prefers to manage the problem right at its source, it can be said that it resembles the *source principle.*

According to Mostert (2012), it comprises difficult assessments to evaluate whether the *preference sequence* is represented by current policies. It is however suggested that there have been effects of this policy concept. Recently, more attention has been paid to the construction of water retention facilities, whereas before the focus was more on water discharge (i.e. increasing the capacities of pumping stations and drainage channels). In the Delfland area for example, the project *ABC Delfland* was executed, which resulted in a number of water retention areas. These are small meadows to which water can be discharged. As a result, horticultural areas do not experience floods, such that damage to greenhouses is prevented (Mostert, 2012).

A recent development reflecting the *source principle* is the focus on water retention in urban areas. Extreme rainfall can result in the temporary coverage by water of roads and pavements. Stichting Rioned (2012) recently explained that this form of water retention is (partially) intentional. It states: *"Tijdelijke opvang van het resterende water op straten en pleinen is veel goedkoper"; "Het benutten van wegen en groen om water korte tijd op te slaan is een handigere en beter betaalbare maatregel"* (Rioned, 2012): as prevention of water coverage is impossible, retaining the water on streets and in urban vegetation zones is a more practical and less expensive measure than discharging the water through the sewer system. It is also stated that damage to buildings due to floods is unacceptable, but that municipalities and owners are responsible for reducing the damage: *"Eigenaren en gemeenten moeten (…) maatregelen nemen om de schade te beperken"* (Rioned, 2012).

With regard to management of droughts, the *verdringingsreeks* sequence is very important. The highest priority is safety. This is because situations of drought can lead to floods. The major threat is dehydration of dikes (Mostert, 2012). An example of such a danger is *piping*, a situation in which soil particles at the water side of the dike are released, such that a seepage flow through the dike core is established. This 'pipe' destabilises the dike and may eventually cause the dike to collapse (see also Vorogushyn et al., 2011). The danger of dike dehydration is illustrated by dike collapses in Wilnis and Rotterdam(-Terbregge), both in August 2003. These kind of events were new to the Netherlands and can be attributed to the very dry summer of 2003.

The preference sequence can also be useful in times of drought, as water can be stored prior to these periods. Mostert however questions whether the sequence is actually relevant with regard to drought management. Water surplus is to be stored in the winter season, when there is increased precipitation and reduced evaporation. Generally, the shortage of precipitation in the summer

season is in the order of 100—300 mm. It is practically impossible to store as much water as the precipitation shortage: even when a water basin is constructed that occupies 1% of the total area, preparing for a shortage of 100 mm means that it should be 10 metres deep. Moreover, when the water surplus is used in for example April or May, the basin will be exhausted when the area experiences additional dry periods in July or August. Hence, water basins that serve drought management in the context of the preference sequence are very limited in their use.

Other measures related to droughts are for example related to water consumption. Water can become scarce in dry periods, especially as a result of the combination of precipitation shortage and water consumption. In contrast with other nations such as Great Britain, the Netherlands cannot force a hose ban in such situations. For this purpose there have been national campaigns that encouraged the general public to limit its water consumption, for example by avoiding irrigation of gardens. Severe problems however did not occur for many decades; the most recent severe drought was experienced in 1976 (Mostert, 2012). Ironically, in the summer of 2012, a Dutch water supplier encouraged people that return from their holiday's to flush all water taps, toilets and showers during 1 minute, in order to have fresh water (i.e. water free from metal particles such as copper, led and nickel). The company states that these metal particles are not harmful, but rather unwanted (*"Dit heeft geen gevolgen voor de gezondheid, maar wenselijk is het niet"*; Oasen, 2012), which justifies flushing the water supply. Obviously, this measure does not reduce water consumption in summer periods.

7.2.6. Sustainable development

It is recognised that the principle of *sustainable development* is built up from environmental, economic, and social aspects.

It could be argued that the Netherlands should focus more on environmental sustainability. Environmental aspects are currently covered by the Birds and Habitats Directives and addressed by Environmental Impact Assessments. Also, compensation takes place, albeit to a certain extent. A part of the policy is to reserve areas for future measures such as water retention. According to Mostert (2012), it is not clear how strong these reservations are, which may a problem for environmental sustainability. Another limitation is the fact that current risk assessment does not take environmental damage into account. This should not necessarily imply different flood norms, but the fact that the environment is not considered explicitly in setting the standards for flood protection might be a problem with regard to the demands of the EU Directives. With regards to droughts, dehydration of nature due to water shortages has been acknowledged since the 1980s in the Netherlands.

Economic aspects are taken into account in Dutch flood risk management for many decades. A recent development is to take the combination of casualties and economic damage into account. However, what the precise calculation should comprise is unclear. The current trend is that there should be a distinction between *individual* and *collective risk*. This is illustrated by the example of two areas between dike rings. Assume that both dike rings may experience a flood once in every 1,000 years, but that in area 1 the population is 100 times greater than in area 2. By definition, the *individual risk* in both areas is equal, as this is only related to the probability of flooding. However, the *collective risk* is 100 times higher in area 1, as it is also related to the size of the area's population.

The question here is which risk is decisive for flood norms, and in what way. A possible solution is to determine a basic level, an individual probability of death due to a flood event. This probability is an *individual risk* and could for example be 1/100,000, as found in the management of external safety. The base level would then be decisive for the level of flood protection, the flood norms. Additionally, for areas in which there is a considerable *collective risk*, the level of protection should be increased. The current situation in the Netherlands, as assessed by Mostert (2012), is such that the basic level of 1/100,000 is already established in most of the country, except for areas such as the *Rivierengebied* and the *Flevopolder*, especially the city of Almere.

The social (human) component of sustainability is addressed in many considerations and articles of the Flood Risk Directive. It could however be questioned whether this is reflected in Dutch flood management policy. For example, the conservation of landscapes and cultural heritage are related to human welfare, however these aspects fall outside the Dutch risk assessment. Also, the equality concept, important with regard to sustainable development, is related to the decisions in risk assessment.

Since future changes in river discharge are taken into account in the Room for the river project, it can be said that the programme's three objectives in principle reflect all three pillars of the *sustainable development principle.* The Room for the river brochure (PDRR, 2012) claims that the Netherlands is unique in the sense that it has a vision on water safety issues for up to 100-years.

The *sustainable development* principle, and especially the environmental and economic pillars of the concept, are for example reflected in the description of the Hondsbroekse Pleij project. In this project the river will be widened and the distribution of water between the lower Rhine and the IJssel branches is controlled. For this purpose a dike has to be moved 250 metres inland, and a high water channel has to be positioned; this requires redevelopment of the area. At the same time, a water garden is constructed, which serves as a groundwater surplus consumer. Additionally, recreational facilities are built. In this way the focus is on nature and recreational facilities, together with water safety reflecting the three pillars of sustainability.

The principle of *sustainable development* is furthermore addressed by the policy choice concerning the conservation of the *"area of considerable scenic, cultural and ecological importance"* (PDRR, 2006, p. 10) that is formed by the rivers and floodplains. As it is calculated that of the additional 3,000 m^3s^{-1} discharge expected at the end of the 21st century, only 1,400 m^3s^{-1} can be discharged between the dikes, this justifies dike reinforcement. The principle is however reflected in the sense that in each of the situations – either river relief or dike reinforcement – the "core qualities" should be conserved. Also, new "qualities" are created. In this way, the strategy not only results in achieving the safety level, but also promotes nature conservation and activities such as recreation, mineral extraction and urban developments.

The *sustainable development* principle is reflected specifically by the statement that the Room for the river project is linked to the improvement of habitats. This in particular concerns threatened species as the project's efforts aim to improve habitats in the Natura 2000 ecological network. Also, compensatory measures are relevant to examine. The development of compensatory measures is necessary in the situation where alternatives are inconsistent with the PKB's objectives. Compensatory measures can be implemented either along the same river branch (as a priority) or at another location in the riverine area. According to the document, compensatiry measures are

guaranteed, *"preferably by bringing the relevant areas within the scope of the Nature Conservation Act 1998"* (PDRR, 2006, p. 15).

The Delta Programme also has a couple of partial programmes which are specific for a certain region. The programme on the region of Rijnmond-Drechtsteden is one that is relevant for the Rhine delta and examines strategies that couple the short- and medium-term demands for spatial development and water safety issues on the one hand, and the long-term strategy on safety and freshwater supply on the other. More specifically, the two demands should not be in conflict with each other (DP2012, p. 37). Although this partial programme is still in its research stage and no concrete measures have been developed, the aim of balancing short- and long-term demands attaches to the principle of *sustainable development.*

The partial programme on rivers (*Deelprogramma Rivieren*) of the Delta Programme includes the river-specific projects *Ruimte voor de rivier* and *Maaswerken* are included. An important issue in the high water problem is the distribution of river discharges. At the moment this distribution is relatively rigid, and it is examined whether the distribution can be made more flexible. The inflexibility of the system can also cause problems related to droughts. Like the Rijnmond-Drechtsteden partial programme, the partial programme on rivers is in its research stage; the outcomes are expected in 2014.

7.2.7. Subsidiarity

At the moment, there is a discussion about the water authorities; these authorities may in the future not be continued to exist. On the one hand, the water authorities refer to the principle of subsidiarity to argue that they should not be dissolved. After all, because they are smaller organisations, they are closer to the citizens than the provinces. On the other hand, the enhancement of the primary water defence had in the past always been a financial responsibility of the National Government. Although the water authorities hire contractors and are responsible for the implementation of the measures, the planning and financial resources are arranged at the national level. This could be regarded as low subsidiarity. The shift of financial responsibilities is mainly a shift in tax burden; it is a saving for the National Government and does not alter the extent of subsidiarity.

Furthermore, because the dike rings are connected to each other, water authorities never have 100% freedom of action at the level of the dike rings. Hence, no absolute centralisation or decentralisation is possible. When subsidiarity is indeed interpreted as the aim to establish as much decentralisation as possible, it could be said that subsidiarity in this case is limited (Mostert, 2012).

At last, it could be argued that the extent of subsidiarity of the Dutch water authorities is decreasing because of the trend to increase in scale. The number of water authorities in the Netherlands has tremendously decreased from approximately 3000 in 1950 to today's 26 organisations (and will decrease even further). This means that the water authorities are fairly large organisations, in some cases covering an area of approximately an entire province. The main advantage of the increase in scale is that it favours expert knowledge (a larger authority has more financial resources for the employment of experts). This is demanded by the increased tasks on

water quality, for example for (waste)water treatment, and also on water safety. It can however be argued that the scale that fits the management water quality best differs from the scale that is best suited for managing water quantity (Mostert, 2012).

7.2.8. Proportionality

The *proportionality principle* can be understood here as the measures being in proportion to their purpose. The principle is reflected in the current norms for the primary flood defence; the costs and benefits are weighed against each other. This is proportional by definition. The same is applied to local flood norms. It should however be noted that this is done quite roughly. For the categories of land use (grassland, agriculture, horticulture, etc.; see *kostenveroorzakingsbeginsel*) average values have been taken as uniform (optimum) levels. For example, where the flood norm for grassland is 1 : 10 years, the actual optimum for an individual area of grassland may be for example 1 : 5 years or 1 : 20 years. In practice, this means that roughly half of the grasslands is insufficiently protected, whereas the protection of the other half is too high. It also means that when improvement of flood protection is necessary, the costs to establish the uniform levels may vary according to the actual levels of protection of the individual locations. Hence, the implementation of the proportionality principle is not perfect (Mostert, 2012).

The Delta Programme builds upon the concept of the so-called 'adaptive delta management' strategy (*"adaptief deltamanagement"*, DP2012, p. 8) that concerns doing what is necessary at the moment – not more and not less – without excluding future possibilities. This reflects the *proportionality principle*.

With regards to the Room for the river project, the *proportionality principle* is reflected in the way alternative measures are assessed. These are measures that can replace one measure or a set of measures in the basic package. However, this is bound to rules. The document states that *"[a]n alternative measure can only replace a measure or group of measures in the basic package if it makes a sufficient contribution to reducing the design high water level by 2015 at the latest and if costs fall within the state budget or, in the opinion of the government, there are adequate guarantees that extra funding can be secured"* (PDRR, 2006, p. 13). The principle is for example applied on two alternatives for the IJssel branch of the Rhine river: at Kampen and Zutphen, flood bypass channels are proposed. These bypass channels suit the project's goals better, as they for example could cope with the expected future higher river discharges and could greatly enhance spatial quality. However, the alternatives are more costly and more complex than the measures in the basic package of measures.

7.2.9. Public participation

In the Room for the river project, there is a continual and close cooperation with the people that are affected by the implementation of the Room for the river measures, i.e. the 150 homes and 40 businesses that have to give way to the measures. As an example, the river widening project at Overdiep (Dutch: *Overdiepse polder*) is mentioned. At this location, land reclamation is to be reversed. In this case the current dike will be lowered, and a new dike is built on a different place. The result is that water from the river will flow into the polder every 25 years on average. Most of the existing farms however will be rebuilt on raised areas ('terps') along the new dike. Interesting

here is that the final solution was provided by the local inhabitants and farmers, and that already early in the planning process, information could be accessed. This reflects the principle of *public participation*. However the Overdiep polder is located alongside the river Meuse, it is very likely that early access to information and public participation are also playing an important role in the Room for the river solutions associated with the river Rhine.

Dike relocation (artist's impression) along the Waal branch at Lent, the Netherlands

Public participation also plays a substantial role in the dike relocation project along the Waal river (a branch of the Rhine) at Lent, a village close to the city of Nijmegen. The relocation of the dike is necessary to solve the bottleneck in the river: whereas the Waal river is about 1000 metres wide elsewhere, at Lent it is only 450 metres wide (PDRR, 2012, p. 16). During the high water situations in 1993 and 1995 this proved to be a major flood risk. In the dike relocation project, the municipality of Nijmegen is allocated the task of informing its citizens by means of information meetings, a newsletter, a website, and also by cooperation with an organisation called Platform Waalsprong that represents inhabitants and entrepreneurs from Nijmegen (Gemeente Nijmegen, 2012)

7.3. Conclusion

In this chapter, the use of 9 normative principles in the Netherlands was investigated. Relevant policy documents that were assessed were about the Delta Programme and the Room for the river project. Now that all practical matters are addressed, the next step in my research is to investigate the similarities and differences between the various policy levels. This is the aim of the next chapter.

Chapter 8
Explanations of the reflection of normative principles

8.1. Introduction

In the previous chapters, the extent to which 9 normative principles are reflected in German and Dutch policies on water quantity management in the Rhine basin was assessed. This is done by means of in-person interviews with experts and analysis of policy (strategy) documents. The next step in my research is to make an inventory of the similarities and differences between the extent of reflection on the various levels. This was done by examining the similarities and differences between the confrontation of the policy with practical statements.

In the chapters 4—6 the reflection of the normative principles at each level (Rhine catchment, federal level in Germany, the state of North Rhine-Westphalia, and the Netherlands) was investigated. The subsections 8.2—8.10 describe and the similarities and differences between the reflection at these levels. This was done in two steps. For each principle, it was determined:

1. whether the principle is explicitly mentioned in (strategic) policy documents or legislations at the particular level;
2. whether the policies at the particular level are in accordance with one or more practical statements as developed for the particular normative principle.

This chapters provides answers to the last two research subquestions:

RQ 5. *What are the main similarities and differences between the extent of reflection of international normative principles in EU, catchment, Dutch, and German policies?*
RQ 6. *Which factors explain this reflection of international normative principles?*

For each principle's explicit reflection and Practical Statement(s), the scores on all policy levels are presented in tables (Table 8.1—8.9). The symbol ✓ means that the principle is mentioned, or that the policy is conform the respective Practical Statement; the symbol ○ means that no evidence for this sort of reflection (or evidence against its reflection) is found. In this way, an overview of differences and similarities between the various levels is constructed. These scores are then justified using the information from the earlier chapters. After this, the explaining factors from Table 2.1 are addressed to hint to explanations for the differences and similarities between the levels. These explanations are supported by additional literature and information from the interviews.

8.2. Precautionary principle

The reflection of the *precautionary principle* deals with the way climate change effects on which the policy is based are studied (Practical Statement 1A), and the way worst-case scenarios with regard to water quantity are anticipated (Practical Statement 1B).

Table 8.1 Reflection of the *precautionary principle*

Precautionary principle		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		✓	✓	✓	○
(1A)	*The policy is based on assessments of the effects of climate change on water quantities in the Rhine catchment.*	✓	✓	✓	✓
(1B)	*In case of scientific uncertainties concerning climate change, the policy chooses the safest option, i.e. the worst possible scenario reasonably to expected is anticipated.*	✓	○	✓	✓

8.2.1. Explicit reflection

The principle is explicitly mentioned in the Convention on the Protection of the Rhine (ICPR, 1999); the Rhine2020 programme refers to the *precautionary principle* as stated in the Convention. Likewise, the principle is explicitly stated and complied to in the German Federal Water Act, and very important in groundwater management. It is also present in all State Water Acts (including North Rhine-Westphalia's). In the Netherlands, the *precautionary principle* is not explicitly mentioned in water legislation, but its conceptual use is indeed recognised.

8.2.2. Reflection of practical statements

At catchment level, the principle was followed especially in the management of the near-floods of 1993 and 1995, and was the underlying rationale of the 1998 Action Plan on Floods, which is now incorporated in the Rhine2020 project. At German federal level, scientific uncertainties are identified and assessed, especially in the KliWa project and in the context of the Adaptation Action Plan, thereby reflecting Practical Statement 1A. It is not feasible to anticipate on the worst possible scenario, such that Practical Statement 1B is not reflected. For NRW specifically, the effects of climate change on flood risks were studied together with the Dutch-German Working Group on High Water, also reflecting Practical Statement 1A. In the Netherlands, the assessment of climate change effects on water quantity management is taken very seriously. It can be said that the Delta Commission had a very precautionary approach in assessing the impacts, since it was based on adjusted climate scenarios that are more extreme than the default IPCC scenarios. Therefore, both Practical Statements are reflected at the level of the Netherlands. In Germany the *Bemessungshochwasser* ensures a safety margin that is capable for extreme events. North Rhine-Westphalia therefore is confident that it has a very precautionary approach to flood issues, thus reflecting Practical Statement 1B. The way flood norms are calculated however differs throughout the country, such that this is not proven for all federal states.

8.2.3. Explanations

A first remark refers to the explicit reflection of normative principles. Most principles, including the *precautionary principle*, are not reflected in the Dutch policy documents. It was believed that

there was no need to incorporate principles at any rate in the Water Act, as this would be only symbolic. Also, inclusion of principles was expected to influence decision-making, as individuals could rely on these principles (Van Rijswick & Havekes, 2012). Therefore, although they have in the past played a role, no normative principles are included in the most important legislative piece on water law in the Netherlands, the Dutch Water Act. This exclusion of principles is criticised, especially since normative principles *"can play an important guiding role" "in a situation where it is necessary to deal with uncertainties"* (Van Rijswick & Havekes, 2012, pp. 82-83).

A second relevant variable that may explain the differences with regard Practical Statement 1B is the *conception of problem and solution*. The conception of the effects of climate change in the river basin may differ between the Netherlands and Germany, probably because the effects that are reasonably can be expected differ between the countries and regions. Therefore, Germany generally might accept a higher uncertainty with regard to flood events when compared to the Netherlands. Furthermore, in NRW the standards are high when compared to the other federal states; therefore it might also accept a higher uncertainty (Becker, 2012).

8.3. Principle of preventive action

The *principle of preventive action* refers to the focus of the policy on water quantity issues. A preventive policy focuses on preventive measures rather than risk management, i.e. a focus on the management of the consequences of water quantity problems. Also included here is the 'no-regret' aspect of the measures, which means that measures have positive effects, even if it is the case that the effects of climate change are less severe than predicted.

Table 8.2 Reflection of the *principle of preventive action*

Principle of preventive action		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		✓	✓	✓	✓
(2A)	*The policy is focused on the prevention of water quantity problems rather than the management of the consequences of these problems.*	✓	○	✓	✓
(2B)	*The policy includes 'no regret'-measures, i.e. the measures are beneficial even when the effects of climate change are less adverse than expected.*	○	✓	✓	✓

8.3.1. Explicit reflection

In the Convention on the Protection of the Rhine (ICPR, 1999), the *principle of preventive action* is explicitly mentioned. At German federal level, the priority of prevention is recognised as a fundamental principle, which is also reflected by the presence of the principle in the revised Federal Water Act. In NRW, the principle of *preventive flood management* is mentioned in the documents at NRW level. Like all normative principles, the *principle of preventive action* is not

explicitly included in the Dutch Water Act. However, the principle is explicitly reflected in other important documents. Most notably, the DP2012 document explicitly states that *prevention* of floods is the primary aim of the programme on the primary flood defence.

8.3.2. Reflection of practical statements

The principle is also very well reflected in the Rhine2020 programme. Most of the measures with regard to water quantity that are included in this programme focus on flood prediction and prevention. This is conform Practical Statement 2A. Although it may be the case that measures concerning water quantity proposed issues at catchment level are beneficial regardless of the effects of climate change, this 'no-regret' aspect is not addressed in the documents at Rhine catchment level, which is not conform Practical Statement 2B.

At German federal level, Practical Statement 2A is not reflected, in the sense that it is explicitly mentioned in the documents at federal level (BMU, 2010b) that national attention is increasingly being centred to the management of flood risks rather than prevention. At this level, it is recognised that measures related to climate change need to be robust; in fact, the principle that measures should take effect regardless of the effects of climate change is explicitly included in the BMU documents, thus reflecting Practical Statement 2B.

The 11 technical measures for flood management in NRW focus on flood prevention, as they aim to reduce water levels and delay the peak discharge. Although management of flood risks and flood prediction are also important parts, flood prevention is the focus of the policy that is mainly rooted in the action plans developed after the 1993 and 1995 high water events. Therefore, Practical Statement 2A is reflected. Also, the aim is to have 'win-win' situations when measures are implemented, which ensure positive benefits of the measures regardless of the effects of climate change, which is conform Practical Statement 2B.

Indeed, although alternative ('natural') measures are implemented in the case that they are possible, feasible and cost-effective, flood prevention is the main focus of the policy. Practical Statement 2A is thus reflected. Also, the issue of 'no-regret' measures is explicitly mentioned, thus reflecting Practical Statement 2B.

8.3.3. Explanations

Differences in the *fit between the problem and the regime* might explain the differences in policy's focus (Practical Statement 2A). This may be related to the shift from the prevention of floods to risk management that is seen in water quantity policy in Germany and the Netherlands. Whereas a 'safety-first' policy focuses on preventive measures and reflects the idea of 'resistance' (see: De Bruijn, 2004 in: Steenhuisen et al., 2007), a 'trade-off' policy focuses on 'resilience', a term also derived from De Bruijn (*ibid.*). There is evidence that the shift from 'resistance' towards 'resilience' has started at different points in time in both countries. In Germany, there is a strong focus on 'resilience' (Steenhuisen et al., 2007). In NRW, already by 1980 there were suggestions for *"renaturalisation and use of retention areas to avoid protective construction"* (Becker, 2009, p. 333). In the Netherlands however, this movement is seen later; although in the 1970s water management took up tasks of water quality, the 'ecological turn' was reached in the 1980s and 1990s. In this period of

time alternative ways of managing water were considered (Wiering & Crabbé, 2006), which is somewhat later than in Germany. In the Netherlands, 'resilience' is used, for example in the "Ruimte voor de rivier" programme. Here however, the related measures are used to provide additional 'resistance' The Dutch policy discourse was therefore up until very recently focused on a 'battle against the water', and thus on preventive measures (Wiering & Arts, 2006). This changed slightly, however, the policy is still designed to *"prioriti*[*s*]*e safety"* (Steenhuisen et al., 2007, p. 385).

As an additional variable it can be mentioned that 'no-regret' measures are not included at catchment level, most likely because the implementation takes place at different levels.

8.4. Solidarity

With regard to water quantity issues, this principle referred to solidarity between areas located upstream and areas located downstream (Practical Statement 3A). Only in case of cooperative decision it is possible that these effects exist (Practical Statement 3B).

Table 8.3 Reflection of the *solidarity principle*

Solidarity principle		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		○	○	✓	○
(3A)	*Measures taken in one nation or region should not have negative consequences for other nations or regions.*	○	○	○	○
(3B)	*When proposed measures negatively affect other regions in Germany and the Netherlands, this is only possible when it is decided cooperatively.*	✓	○	✓	○

8.4.1. Explicit reflection

The *solidarity* issue is not explicitly addressed in most of the documents, however, in the case of North Rhine-Westphalia, the issue is explicitly mentioned.

8.4.2. Reflection of practical statements

A narrower form of the *solidarity principle* is included in the ICPR's Convention on the Protection of the Rhine, which relates to environmental pollution. Solidarity between nations or regions with regard to water quantity issues – floods, in this case – is however also a vivid element of transboundary cooperation in the catchment. Indeed, issues of solidarity are internationally addressed. It is expected that these issues will be more prominent in the future, especially if the flood norms in the Netherlands are adjusted to an increased maximum discharge of 18,000 m^3s^{-1}.

Although solidarity is not a topic that is included specifically in the documents on German federal

level that were analysed, there certainly is awareness of the upstream-downstream relationship between Germany and the Netherlands at this level. The other way around, Germany demands the Netherlands to have solidarity with Germany, as Germany is limited in the measures that it is able to take. There is however a considerable basis for trust, which potentially enhances German solidarity with the Netherlands.

In North Rhine-Westphalia, the solidarity issue is covered by the important *Oberlieger schützt Unterlieger* principle. Also, retention measures can be designed by experts from both sides of the national border, with a win-win situation (a measure that is profitable for NRW as well as for the Netherlands) as the optimal outcome. Solidarity with regard to flood measures remains a point of concern when it comes to the relations with other federal states due to the large variety in preferences, these issues are however taken up in close coordination between the federal states.

In the Netherlands, the solidarity issue also relates to the very recently determined shift in responsibility. In the near future, there is a shift toward a higher (financial) responsibility for the Dutch water authorities. However, the *solidarity principle* is not included in the Dutch Waterwet.

With regard to the practical statements, the following differences can thus be seen. It is not ensured that measures in one nation or region do not have negative consequences for other nations or regions (Practical Statement 3A). Instrumental use of the *solidarity principle* as translated into statement (3B) can however be seen in North Rhine-Westphalia and at catchment level, but not at German federal level and in the Netherlands. At these levels, there is rather a conceptual use of the statement.

8.4.3. Explanations

The differences in reflection of the *solidarity principle* may be explained by differences in the *configuration of interests*. It is known that NRW, as the lowest-lying German state in the Rhine basin, has much to win with regard to solidarity from the upstream states: *"the federal state Nordrhein-Westfalen cares about solidarity, as they depend on the flood policy of the other federal states upstream"* (Steenhuisen et al., 2007, p. 383). This might also explain its consciousness about the issue in the Netherlands, and thus its solidarity towards the downstream-lying areas (Wiering, 2012).

A second factor is that of *flexibility*, which might explain why the principle of *solidarity* and its accompanying Practical Statements are not reflected in the Netherlands. Although international cooperation takes place, solidarity is not absolutely necessary for the Netherlands, as its policy is *"able to secure safety levels independent of German flood policy"* (Steenhuisen et al., 2007, p. 383).

As an additional factor, it can be noted that the *solidarity principle* is relatively new principle, as it was introduced in the Flood Risk Directive in 2007. This might explain why the principle is not explicitly mentioned at any of the policy levels.

8.5. Cost-recovery principle

At many levels, cost recovery of water services and flood protection is related to the *polluter-pays*

principle. Therefore, an occurrence of either the *cost-recovery* or the *polluter-pays principle* in legislation is regarded as sufficient to coincide with the instrumental use of Practical Statement 4. The Practical Statement also refers to way the costs for water quantity measures are distributed among the actors.

Table 8.4 Reflection of the *cost-recovery principle*

Cost-recovery principle		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		✓	✓	○	✓
(4)	*There is a cost-recovery system that places the burden on the actors for which measures are implemented (regarding the management of floods) and on those actors that alter the quantitative status of water bodies (regarding the management of droughts).*	○	✓	✓	○

8.5.1. Explicit reflection

In the documents that were addressed, a form of the *cost-recovery principle* or the *polluter-pays principle* was present, except in the case of North Rhine-Westphalia.

8.5.2. Reflection of practical statements

At Rhine catchment level, the *polluter-pays principle* is present in the Convention on the Protection of the Rhine. Moreover, it is noted that its scope is broadened to other environmental effects than pollution, for example the effects of hydropower plants along the Rhine, which is related to water quantity issues.

At German federal level, the German *Verursacherprinzip* is similar to the *polluter-pays principle*. At this level, the principle is related to cost-recovery, most notable with regard to the groundwater subtraction. In addition, the *cost-recovery principle* is a fundamental principle at this level. In the future, cost-recovery will be even more important due to its forthcoming inclusion in state law.

In the Netherlands, cost-recovery of flood protection is institutionalised as the *kostenveroorzakingsbeginsel* in the NBW. The main difference between Germany and the Netherlands is that in the Netherlands, flood protection is principally a responsibility of the national government, whereas in Germany, this is a task of the municipalities and the water authorities. In NRW, flood protection is explicitly and primarily financed by those whose ground is in the protected area, with support by the federal state of NRW. In the Netherlands, cost-recovery is performed at collective rather than individual basis. In conclusion, it can be said that Practical Statement 4 is more applicable to the German situation, at least in North Rhine-Westphalia, than on the Dutch situation, although it should be noted that a shift toward (more) individual responsibility in the Netherlands is expected.

8.5.3. Explanations

Institutional compatibility might explain the differences in the reflection of Practical Statement 4 between the German and the Dutch policy. It is known that in Germany, all plans on water quantity have to be balanced with other rules and procedures. As a result, there is no legal basis for a safety level at state level. The German *"government does not principally safeguard private buildings and pieces land from flood damage"* (Steenhuisen et al., 2007, p. 385), such that individuals need to take their own measures. This is a reflection of Practical Statement 4, as the burden is placed on actors for which measures are implemented. A different trade-off takes place in the Netherlands, which, by contrast, reserves financial resources for flood protection (Mostert, 2012). Protection there is in principle a government task.

Like in the case of 'no-regret' measures (see 8.3.3), the cost-recovery system is not implemented at catchment level; this may be the reason Practical Statement 4 is not reflected at this level.

8.6. Source principle

In most cases, instantiations of the *source principle* at the various policy levels refer to origins of chemical pollution. Practical Statement 5 broadens the scope to water quantity issues. The principle is used when there is a preference sequence developed in water management ensuring that water quantity problems are abated as close as possible to the place where they originate. With regard to its practical use, the principle is linked to the management of precipitation and to (emergency) retention areas.

Table 8.5 Reflection of the *source principle*

Source principle		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		✓	✓	✓	✓
(5)	*There is a preference sequence built in in the management of water quantity that ensures that water quantity problems are dealt with as close as possible to where they originate.*	✓	✓	✓	✓

8.6.1. Explicit reflection

The idea of a preference sequence is explicitly mentioned in most of the policy documents, and in some cases even rooted in legislation (such as the Dutch Nationaal Bestuursakkoord Water).

8.6.2. Reflection of practical statements

At catchment level, the *source principle*, related to chemical pollution, is included in the Convention on the Protection of the Rhine. In Germany, the concept *Versicherung* is referred to at federal level as well as in North Rhine-Westphalia, where it encompasses a preference sequence such that

precipitation is treated preferably at the place where it comes down. A similar sequence can be seen in the Netherlands (*vasthouden – bergen – afvoeren*).

In Germany, retention areas are used as freshwater supply in times of increased drought risks, and also as measures that reduce peaks in river discharge. Likewise, in the Netherlands temporary capturing water is a potential measure to abate drought risks, although the effect of this measure is limited. In Germany, emergency retentions are in general used to reduce flood peaks in the river. However, the implementation of emergency retention areas comes with large resistance from the general public. This was also the most important reason to abandon the idea of emergency retention areas in North Rhine-Westphalia. In NRW, retention areas are used to *delay* flood peaks, although the effects are limited. The Netherlands also abandoned the use of emergency retention areas because of this reason, however emergency retention by means of so-called green rivers is still possible.

In conclusion, the idea of having a preference sequence for water quantity management conform Practical Statement 5 is present at all levels. The use of emergency retention areas is however more emphasized in Germany – albeit not in NRW – than in the Netherlands, although the implementation suffers from negative reactions from the general public.

8.6.3. Explanations

Evidence of the existence of a preference sequence conform Practical Statement 5 has been found at all levels. The relationship between the levels with regard to the *source principle* (as applied to issues of water quantity) is not known. This is interesting, especially since the principle in the WFD and the FRD principally applies to pollution.

8.7. Sustainable development

The reflection of the *sustainable development* principle refers to the balancing between the three pillars of sustainability (economic, social, and environmental aspects of the concept). This is addressed in Practical Statement 6A. Also, it is important that future development is not fixed; sustainable development should be open for discussion (Practical Statement 6B).

Table 8.6 Reflection of the principle of *sustainable development*

Sustainable development		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		✓	✓	✓	✓
(6A)	*The balance between the economic, social and environmental aspects of water quantity management that is found in the policy is explicitly motivated.*	✓	✓	✓	✓
(6B)	*The policy direction of future development of climate adaptation in the Rhine catchment is open for discussion.*	✓	✓	○	○

8.7.1. Explicit reflection

At Rhine catchment level, the principle of *sustainable development* is explicitly present in the Convention on the Protection of the Rhine. At the other levels, some notion of *sustainable development* or the concept of *sustainability* is given in the policy documents or the legislation.

8.7.2. Reflection of practical statements

Of all the principles, *sustainable development* is perhaps the most difficult principle to use or implement at any level. It can be noted that at catchment level, the principle is very vivid due to the implementation of the Rhine2020 programme. Indeed, this programme explicitly balances economic, social, and environmental aspects of water quantity measures (Practical Statement 6A). Due to the importance of (stakeholder) involvement in discussions, it can be said that the outcomes of the process are not determined beforehand (conform Practical Statement 6B). Also, there are no reasons to assume that the sense of urgency for the effects of climate change has decreased in the ICPR's member countries.

At German federal level, although not explicitly present in the Federal Water Act, *sustainable development* is seen as an overarching principle. In North Rhine-Westphalia, the aim is to balance the three pillars of sustainability in flood protection. Three pilot projects were started with the aim to create 'win-win-win' situations for ecology, flood protection, and inland navigation, which requires some balancing of the aspects of the principle. Due to its federal structure however, it can be said that the framing of this particular principle is done at federal level. Therefore, there is evidence for Practical Statement 6A at federal and state level, whereas the evidence for Practical Statement 6B at state level, at least in NRW, is lacking. For the Netherlands, *sustainable development* is important and a balancing between all aspects of the principle is motivated (conform Practical Statement 6A), however, with regards to the social component there are difficulties, since aspects such as equality and the conservation of landscapes and cultural heritage do not fall within the nation's risk assessment. The principle is mostly reflected in the Room for the river programme. For this project however, the outcome is fixed. This argues against Practical Statement 6B.

8.7.3. Explanations

Like with regard to the *principle of preventive action*, the differences may be explained by differences in the *conception of problem and solution*. In the Netherlands, the problem of protecting human structures and activities is framed differently than in Germany, reflected by the 'safety first' approach. Compared to other federal states, NRW framed the problem from a more socio-economic viewpoint, namely as a task of risk management that integrates flood prevention, navigation and ecological measures (Becker, 2009). Already in 1990/1991 NRW proposals to *"create more space for the river"* are seen (Becker, 2009, p. 333). Besides the Netherlands' focus on 'resistance' rather than 'resilience', there is a difference with regard to the risk assessment. Another promising factor explaining the differences in the reflection of Practical Statement 6A is the *configuration of interests*. In the Netherlands, the risk assessment excludes a number of aspects, such as landscapes and cultural heritage (Mostert, 2012). In Germany these aspects are indeed taken more into

account, which may point to an additional, *cultural* variable. Also, it is suggested that the transition towards new approaches to river management (diverging from the 'safety first' policy) experienced resistance. Even the (near-)floods of 1993 and 1995 in the Netherlands did not provide a window of opportunity for change, but rather for the supporters of traditional river management. The old approach to river management was firmly rooted in for example legislation and organisations, such that *"advocates of the* [novel, 'transformative'] *concepts have had to work hard to achieve acceptance"* (Huitema & Meijerink, 2009, p. 360). The role of policy entrepreneurs advocating some interest might be greater in Germany than in the Netherlands (Becker, 2009).

The lack of reflection of Practical Statement 6B at NRW level may be related to the *institutional compatibility*: as the boundaries of the policy with regard to climate adaptation in NRW is established at federal level, less discussion on the policy's direction is possible at NRW level.

8.8. Subsidiarity

Practical Statement 7 explains that the *subsidiarity principle* is reflected when measures on water quantity issues are taken at the lowest possible level. Originally, this principle was meant to divide the tasks between the EU and its Member States, but in my research the principle was also applied on subsequent levels. The focus therefore is on how the implementation of flood and drought measures is distributed along the relevant actors.

Table 8.7 Reflection of the principle of *subsidiarity*

Subsidiarity		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		○	○	○	○
(7)	*Measures on water quantity issues are taken at the lowest possible level.*	✓	○	✓	✓

8.8.1. Explicit reflection

In the ICPR's Convention on the Protection of the Rhine, the *subsidiarity principle* is not explicitly mentioned, however, a number of articles refers to the distribution of tasks. In Germany, subsidiarity is also not explicitly mentioned in legislation, although the constitution determines the division of tasks between the national government and the federal states' governments. The *subsidiarity principle* is not found in documents from NRW or the Netherlands.

8.8.2. Reflection of practical statements

With regard to high water management, the catchment level is best suited to develop flood norms. This would then be the lowest possible level (conform Practical Statement 7). There are large differences between Germany and the Netherlands in the way water management is organised. Whereas throughout the country, the same sorts of actors deal with water management in the

Netherlands, in Germany the situation is less transparent. The number of actors associated with water quantity management in Germany is considerably higher, and the way of organisation differs through its federal states. Another major difference is that there is a continuous discussion in Germany about what tasks should be taken up by the federal government, and what tasks by the governments of the federal states. Due to less transparency, it is not proved that issues in Germany are dealt with at the lowest possible level, arguing against Practical Statement 7. In North Rhine-Westphalia however, the idea is that the implementation of measures is taken up at the appropriate level, as NRW is forced to work together with the local organisations. This is conform Practical Statement 7. In the Netherlands, there is a recent discussion about which tasks are taken up by the water authorities. It is argued that the level of subsidiarity is decreasing due to the increase in scale of these authorities. The water authorities are however still the organisations that implement flood and drought measures; this would be the lowest possible level, conform Practical Statement 7.

8.8.3. Explanations

The continuous discussion about what tasks are taken up by the German federal government and what tasks by the state governments is related to the *institutional compatibility*. It is suggested that the level on which the measures are implemented in NRW is appropriate (Buschhüter, 2012). The fact that a planning approval decision can be challenged at court, thus *"providing a strong power base for lower water authorities and municipalities"* (Becker, 2009, p. 329), supports this suggestion.

8.9. Proportionality

The *proportionality principle* refers to measures on water quantity issues being proportional with regard to the goal that is to be achieved. The main instrument to measure proportionality is a cost-benefit analysis.

Table 8.8 Reflection of the *proportionality principle*

Proportionality		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		○	✓	✓	○
(8)	*The measures on water quantity issues are proportional with regard to the goal that is to be achieved (e.g. flood protection, reducing the effects of flooding, ensuring water availability).*	✓	✓	✓	○

8.9.1. Explicit reflection

The *proportionality principle* is not mentioned in the Convention on the Protection of the Rhine (ICPR, 1999) or in the Rhine2020 document. At German federal level, the *proportionality principle* is rooted in German general procedural administrative law. At NRW level, the *proportionality principle*

is important, as NRW is bound to EU legislation. The principle (known in Germany as *Verhältnismäßigkeit*) is also present in the state water act. In the Dutch water act, the *proportionality principle* is not explicitly mentioned.

8.9.2. Reflection of practical statements

It is recognised at catchment level that the costs of the proposed measures have to be justified. Although the responsibility of the implementation of the measures is at the national level, it is stated in the Rhine2020 document that measures should be appropriate and cost-effective, thereby reflecting Practical Statement 8. Federal legislation in Germany ensures that disproportionate measures are normally rejected. Cost-benefit analyses are applied in flood risk management. This is conform Practical Statement 8. To ensure the proportionality of measures in NRW, cost-benefit analyses are conducted. It is recognised however that not all aspects of flood management can be assessed in cost-benefit analyses. In the Netherlands, the costs and benefits of the primary flood defence are weighed against each other. However, as this is done roughly, it is not ensured that the costs outweigh the benefits of the measures. This is not conform Practical Statement 8.

8.9.3. Explanations

The lack of reflection of the *proportionality* principle in the Netherlands might be explained by the *configuration of interests*. In the Netherlands, this configuration ensures that financial resources remain accessible for water quantity management during longer periods than in Germany. As a result, it is possible to have higher investments in for example flood measures, which might not be proportional with regard to the goal that is achieved. According to Becker (2012), may different viewpoints with regard to the proportionality of measures exist.

8.10. Public participation

The Policy Statements on *public participation* demand that, in order to achieve reflection of this principle, water quantity policies have to communicated to the general public, which is also able to influence decision-making (Practical Statement 9A). Furthermore, active involvement of the general public (Practical Statement 9B) is an indicator for *public participation*.

Table 8.9 Reflection of the principle of *public participation*

Public participation		*Catchment*	*Germany (federal level)*	*NRW*	*The Netherlands*
Explicit reflection		○	○	○	○
(9A)	*The policy on the management of water quantity is communicated to the general public, and the public is able to influence decision-making.*	✓	✓	✓	✓
(9B)	*The general public is actively involved.*	✓	✓	✓	✓

8.10.1. Explicit reflection

Although public participation is an element of decision-making procedures at all levels, in none of the documents that were assessed, *public participation* is stated as a principle.

8.10.2. Reflection of practical statements

However, in many cases there is a focus on (elements of) public participation. At catchment level, one of the focus points of the ICPR is the active involvement of the public (conform Practical Statement 9B). This also includes communication toward this public (conform Practical Statement 9A), although the ICPR is supposedly not able to guide the general public's influence in decision-making, as rules for this influences are fixed in national and regional legislation. In Germany, *public participation* is important in various ways. The documents from the federal level therefore reflect both Practical Statements 9A and 9B. In NRW, citizens are able to influence decision-making, a considerably important issue in the implementation of emergency retention areas, which is at voluntary basis. Moreover, the public is actively involved in flood protection measures at individual level. Therefore, it is determined that Practical Statements 9A and 9B are reflected at NRW level. In the Netherlands, *public participation* is vividly present in the partial projects of the Room for the river programme, reflecting both communication, influence (Practical Statement 9A) and active involvement (9B) of the (general) public at this level.

8.10.3. Explanations

Most notable are the similarities in the reflection of the principle and Practical Statement 9A. It seems that there is a high degree of *institutional compliance*, that explains that *public participation*, a prominent concept in the Flood Risk Directive, finds its way to the various policies. It is noted however that, although the issue of public participation is addressed at catchment level, still more can be done (Becker, 2012). Also in Germany, implementing a 'risk culture' can be regarded as a process in which more weight is assigned to participatory procedures (cf. Garrelts & De Lange, 2011). As for the Netherlands, the opportunities for public participation, the provision of information are considered good and also the degree of openness in public administration is high (Van Rijswick & Havekes, 2012), which might be due to a high degree of *institutional compliance*.

8.11. Conclusion

This chapter elaborated on the confrontation of practical matters at four policy levels with the 'checklist' (Table 3.3) that consisted of Practical Statements. Differences and similarities were revealed on the reflection of the 9 normative principles. By using information from additional (case-study) literature and the interviews, the research subquestions RQ 5—6 were answered. The next chapter discusses these findings and provides suggestions for further research.

Chapter 9
Conclusions and discussion

9.1. Conclusions

The aim of this research was provide an answer to the following research question:

> ***Which factors explain the extent of reflection of international normative principles in catchment policies?***

In order to arrive at an answer to this question, a comprehensive method was developed. As a first step, the concept of *reflection* was defined and operationalised. Because the conventional concept of policy *conformance* proved to be unsuitable for the assessment of the extent of reflection of normative principles, policy *performance* was taken as the basis for the definition of *reflection* (RQ 1 in chapter 2). Next, the method that was used in this research was explained. This method is an adaptation of the framework by De Lange (1995).

Three additional steps were required to complete the method. The first one was to arrive at a set of factors that might explain similarities and differences between the extent of reflection of normative principles at the various policy levels. This step, that answered research subquestion RQ 2, included a literature study on Europeanisation theory and the theory of regime effectiveness, and was explained in chapter 2. The second step was explained in chapter 3. It answered research subquestion RQ 3, and resulted in a list of 9 normative principles identified in the Water Framework Directive and the Flood Risk Directive. A 'translation' of this set of principles into and a checklist of 14 so-called Practical Statements to assess findings from practice was the third step, and completed the research method.

In the chapters 4—7, the checklist of Practical Statements was confronted with the findings from the case-study on the Rhine catchment. Policies at four levels – Rhine catchment level, German federal level, state level (NRW), the Netherlands – were investigated. This resulted in answers to research subquestion 4 and their relationships with the 9 normative principles.

Chapter 8 elaborated on the similarities and differences between the extent of reflection across the various policy levels (conform research subquestion RQ 5). The last step (conform research subquestion RQ 6) was to arrive at a set of factors that might explain the extent of reflection of the 9 normative principles in catchment policies. It turned out that, concerning the Rhine case-study, a number of factors from Europeanisation and regime theory may explain similarities and differences. However, a number of additional factors was retrieved from the interviews and additional literature. Table 9.1 gives an overview of the factors that might explain the differences and similarities is given per principle, and includes the distinction between principles that are derived from Europeanisation theory and regime theory (second column, conform Table 2.1) and additional factors (third column).

Table 9.1 Factors that might explain the differences between the extent of reflection of the principles

Normative principle	Explanatory factor(s)	
	From Europeanisation/regime theory	Additional factors
1. Precautionary principle	- conception of problem/solution	- exclusion of principles in Dutch Water Act
2. Principle of preventive action	- fit between the problem and the regime	- level of implementation
3. Solidarity	- configuration of interests - flexibility	- recent principle
4. Cost-recovery principle	- institutional compatibility	
5. Source principle		
6. Sustainable development	- configuration of interests - conception of problem/solution	- cultural differences
7. Subsidiarity	- institutional compatibility	- scope of the principle
8. Proportionality	- configuration of interests	
9. Public participation	- institutional compatibility	

With regard to the Rhine case-study, the *precautionary principle*, the *principle of preventive action*, the *source principle,* the principle of *sustainable development*, and the principle of *public participation* are well reflected at most levels. The factors that might explain the differences between the levels are the *conception of problem and solution* and the *fit between the problem and the regime*. A general remark is that in the Netherlands, no principles are included in the most important legislative piece on water quantity issues, the new Water Act. Additionally, there were striking similarities in the reflection of the *source principle* that cannot be explained with the results from this research. The factors *configuration of interests* and the *conception of the problem and solution* are likely to account for the differences with regard to the principle of *sustainable development*. Striking similarities with regard to the principle of *public participation* were revealed, probably due to a high degree of *institutional compatibility*.

Moderately reflected are the *cost-recovery principle* and the *proportionality* principle. Factors that possibly contribute to the differences are *institutional compatibility* and the *configuration of interests*.

The low extent of reflection of the *solidarity* principle might well be explained by the fact that this principle is relatively recently included in EU legislation compared to the other principles. The *configuration of interests* might explain the differences between the degree of reflection. With regard to the Netherlands, a lack of *flexibility* of the policy might explain why solidarity is not a necessary component of the programmes. As with the *subsidarity* principle, most obvious is the discussion about the federal system in Germany, which is related to the factor of *institutional compatibility*.

As a conclusion, all factors that were derived from Europeanisation theory and the theory on regime effectiveness (Table 2.1) may account for the differences and similarities that were found. Two factors are however the most explanatory: *institutional compatibility* and the *configuration of interests*.

9.2. Discussion

This research revealed a number of factors that might explain the differences in the extent of reflection of normative principles in the Rhine catchment. The Rhine catchment proved to be a rich case, and may very well be representative for other catchments. After all, many principles were related to the relation between upstream- and downstream-lying areas, a relation that is inherently present in all transboundary river basins because of their geographical setting. Since *institutional compatibility* proved to be a very relevant explanatory factor, the case-study might be more relevant for river basins within the European Union than for other river basins.

A lesson that can be learned from the case-study is that the set of factors from Europeanisation theory and the theory on regime effectivess might explain similarities and differences, the set of factors is not exhaustive. A suggestion for further research would therefore be to shift the focus towards the set of additional factors and measure the extent to which they account for the similarities and differences in the extent of reflection of the normative principles.

In the case-study, a difficult element was the federal system in Germany. An implication is that the findings from the state of North Rhine-Westphalia might not be representative for all German states. NRW is in general more involved with the assessment of the risk of flooding than some other states, which influences the reflection of the *precautionary principle*. Also, NRW has more to win or lose with regard to *solidarity*, which makes it less representative. Furthermore, the problem is differently framed than in for example Baden-Württemberg or Bavaria, which affects the reflection of the *sustainable development*.

Also, the method as applied in this research has a number of deficiencies. The most striking deficiency is that it contains two relatively subjective elements. The first element is the selection of the normative principles from the EU Directives. Definitions of the principles may differ across the nations, which potentially causes differences in interpretation. Moreover, it resulted in an aribitrary set of normative principles.

The second and most striking subjective element is however the translation of the principles into Practical Statements. To have very clear Practical Statements is crucial; the clearer, the less room for variations in their interpretation, especially because the chosen method requires a two-point scale of Practical Statement reflection (either reflected or not). A suggestion for further research is to sharpen the assessment in the Practical Statements. Another suggestion would be adapt the method and to apply a different scale of reflection (3-point or 5-point, for example).

Moreover, three principles (*source principle*, *subsidiarity* and *proportionality*) were taken into a broader perspective than their original meanings retrieved from the EU Directives. Whether the reflection of these principles is properly assessed, can therefore be questioned. Also, the method required to pay equal attention to all principles. As it turned out, more information on the *precautionary principle* and the *principle of preventive action* was available than on the other principles, which may have caused in a focus shift in the research. The *solidarity* principle, very relevant because of the transboundary nature of the research, might therefore remain underexposed. A suggestion for further research is therefore to focus more on issues of solidarity, in order to reveal to what extent nations cooperate in the development of climate change

adaptation policies.

At last, it can be mentioned that there was a bias toward flood issues. This was because more information on the problem of flooding was available than on drought issues. Furthermore, not all normative principles were equally applicable to drought issues. As it is expected that water shortages are an increasing problem in catchment policies, it is suggested that further research should focus more on drought issues.

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Appendix I
List of abbreviations

BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherkeit	German *Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.*
CIS	Common Implementation Strategy	Strategy for the implementation of the Water Framework Directive.
DGWGHW	Dutch-German Working Group on High Water	
DLG	Dienst Landelijk Gebied	Reference: DLG, 2012.
DP	Delta Programme	Translation of the Dutch *Deltaprogramma.*
DP2012	Delta Programme 2012	Second evaluation of the Delta Programme.
EU	European Union	
FRD	Flood Risk Directive	*Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks* (reference: EC, 2007).
HWBP	High Water Protection Programme	Programme in the Netherlands.
ICPR	International Commission for the Protection of the Rhine	
IPCC	Intergovernmental Panel on Climate Change	Organisation of the United Nations.
IRMA	Industrial Research Monitoring and Analysis	
KliWa	Klimaveränderung und Konsequenzen für die Wasserwirtschaft	German co-operation project *Climate change and consequences for water management.*
LCW	Landelijke Coördinatiecommissie Waterverdeling	Reference: LCW, 2011.
LWG	Landeswassergesetz	German legislative document on water management at the level of a federal state.
MKULNV	Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen	

NBW	Nationaal Bestuursakkoord Water	Dutch legislative piece (reference: NBW, 2011).
NRW	North-Rhine Westphalia	
OSPAR	Oslo and Paris Conventions for the Protection of the Marine Environment of the North-East Atlantic	
PDRR	Programme Directorate 'Room for the river'	
PGC	Permanent Netherlands-German Border Commission	
PKB	Planologische Kernbeslissing	*Planning Key Decision*, Dutch governance instrument.
PLEN-CC	Plenary Assembly-Coordinating committee	Organ of the ICPR.
SG	Strategy Group	Organ of the ICPR.
TFEU	Treaty on the Functioning of the EU	
UBA	Umweltbundesamt	German *Federal Environment Agency.*
WFD	Water Framework Directive	*Directive 2007/60/EC of the European Parliament and of the Councilof 23 October 2000 establishing a framework for Community action in the field of water policy* (reference: EC, 2000).
WHG	Wasserhaushaltsgesetz	German legislative document on water management at the federal level.

Appendix II
Topic-list for the interviews

Explanation of my research

- Central research question;
- Demarcation of the subject:
  - case-study on Rhine catchment;
  - spatial: Germany, the Netherlands, and transboundary governance;
  - thematical: water quantity issues (floods, droughts);
- The concept of "reflection" and its relation to policy "performance".

General questions

- Exploration of policies on water quantity issues;
- The implementation of the WFD and the FRD;
- Additional questions;
- Request for (links to) policy documents.

Normative principles

- A reflection on the use of the following set of normative principles:

1.	Precautionary principle	Grundsatz der Vorsorge
2.	Principle of preventive action	Grundsatz der Vorbeugung
3.	Solidarity principle	Grundsatz der Solidarität
4.	Polluter-pays principle (Cost-recovery)	Verursacherprinzip
5.	Source principle	Ursprungprinzip
6.	Proportionality principle	Grundsatz der Verhältnismäßigkeit
7.	Subsidiarity	Subsidiaritätsprinzip
8.	Sustainable development	Grundsatz der nachhaltigen Entwicklung