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Institutional settings for adaptive water management. The use of conceptual models for comparing two case studies in the Rhine basin

Sabine Moellenkamp (1)
Machiel Lamers (2)
Eva Ebenhoeh (1)

1. Institute of Environmental Systems Research (USF), University of Osnabrueck, Germany
2. International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University, the Netherlands

Abstract

In times of rapidly changing physical and regulatory environments, adaptiveness is one of the central parameters of sustainable water management. To investigate how different institutional settings support adaptive water management, two organisational settings in the Rhine basin are compared: the German sub-basin of the Wupper and the Dutch Kromme Rijn region. While in the German water association, membership is compulsory, members of the Dutch water board system are elected. Despite these different institutional settings both water boards are currently facing the challenge of implementing the European Water Framework Directive (WFD). How do these different settings influence the flexibility of the system to adapt to new external background situations while remaining effective in decision making? This question is being dealt with in a broader frame of a case study comparison.

In order to facilitate a comparison, the two institutional settings are analysed based on empirical data, and using the Institutional Analysis and Development framework (IAD) (Ostrom 2005). Using this common conceptual framework allows building models of these two cases which differ solely in their institutional settings, while the model of the underlying processes are the same. This paper will present similarities and differences of organisational structures in the two water management regimes. It will analyse the influence of these organizational structures on the implementation of the WFD and thus show one application of a new external situation. It will further outline how a model can be built to further analyse the situation in question.

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1 Introduction

In times of rapidly changing physical and human environments, adaptiveness is one of the central parameters for water management. Complexity of water management and an increase in uncertainties linked to key drivers, actors and boundary conditions require approaches enabling management to meet competing water demands and provide protection from water related risks. Adaptive management is seen as a suitable approach for natural resource management because socio-ecological systems are complex, adaptive, and self organising and management systems must be able to readjust to changes in the system being managed (Gunderson, Holling 2001). Huitema et al. (in review) have worked on institutional prescriptions for adaptive water governance, building especially on Lee 1993 and 1999. They stress the bioregional approach, an experimental approach, as well as polycentric governance and public participation as fundamental elements of adaptive governance.

We understand institutional settings as a broad umbrella of sets of rules, decision making procedures, and programs that define social practices, assign positions to participants in these practices, and guide interaction among occupants of individual positions. Contrarily, organizations are material entities with employees, budgets, equipment etc. In rough terms, organizations can be thought of as collective actors, who typically emerge as players whose activities are guided and constrained by the rules of the game of institutions in which they participate (also see Young 2002, 5; Ostrom, 2005).

In this article we examine different elements of institutional settings of two water management regimes on a regional scale in order to investigate their suitability for an adaptive management style. Special focus is put on the positions and responsibilities of different actors in planning and decision making processes. We analyse how different organisational structures and membership settings shape positions and actions of different actors as well as outcomes of planning and decision making processes and the effects on the outcomes with regard to effectiveness and flexibility.

The management regimes analysed here are both located in the Rhine basin: the

German sub-basin of the Wupper and the Dutch Kromme Rijn region. They thus have several similar settings and background conditions, but also strongly differing ones, especially due to their historical background.

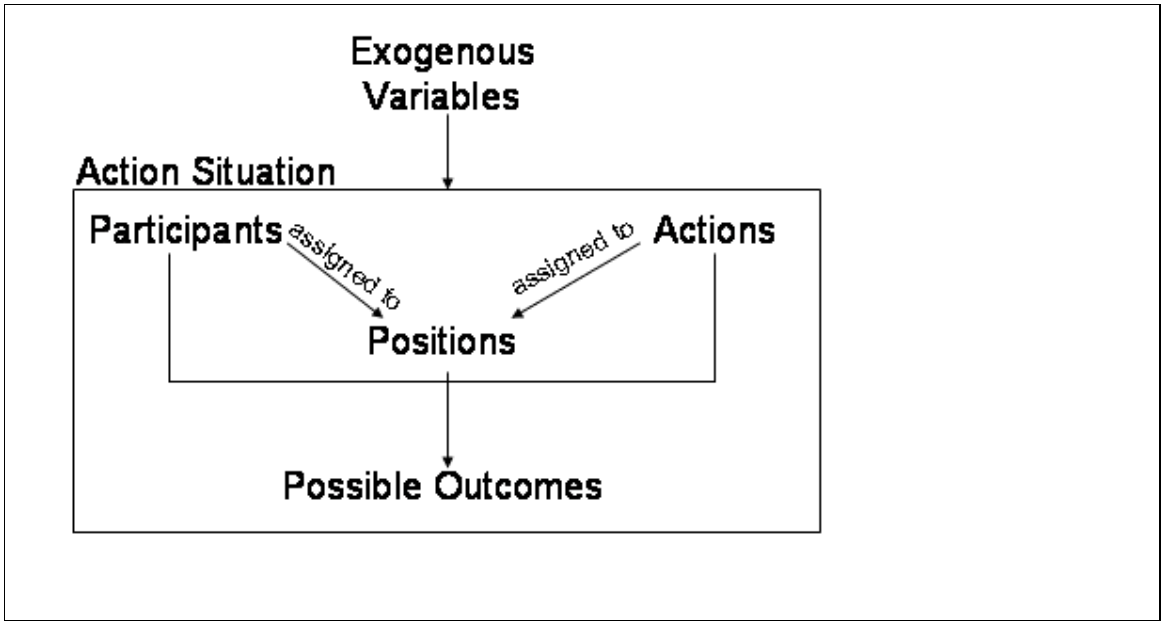
In order to facilitate the comparison of the two management regimes, we will use the Institutional Analysis and Development framework (IAD) (Ostrom 2005) and empirical data from the two cases. The IAD framework is used for discussion purposes in order to highlight similarities and differences in the institutional settings. It will also be used to design conceptual models, which will be further developed in next steps of this research.

We now provide some theoretical background to the use of the IAD framework before we introduce background conditions and methodological aspects of the study. It appears necessary to give the main characteristics of the two management regimes, which will be done in section four and more specifically the aspects of membership in section five. Then we discuss the findings in section six and come to a conclusion in section seven.

2 Institutional comparative analysis within the IAD framework

For the comparative institutional analysis in this study, a common conceptual framework is used, i.e. the Institutional Analysis and Development (IAD) framework (Ostrom 2005). In her IAD framework Ostrom proposes to study institutions by focussing on action situations in which participants with particular positions make choices under different institutional settings. A simplified internal structure of an action situation functions as follows: Participants are assigned to positions, which allow particular actions to the participants on these positions. The actions, which can be chosen by participants, depend on the position they are assigned to. Actions they choose lead to outcomes that can be evaluated in terms of adaptiveness. Action situations are influenced by exogenous variables, such as the biophysical environment, attributes of the community and the various rules that apply to an action situation. The internal structure of an action situation is displayed in Figure 1, simplified for use in the present study.

Figure 1: Action situation



Source: adapted from Ostrom 2005, 33)

Participants evaluate expected outcomes according to their own individual evaluative criteria, such as economic efficiency, equity, or conformance to general morality (Ostrom 2005, 66). Thus, which actions are chosen in a given situation is a combination of which positions are filled by which participants, the participants' expectations about outcomes, and the external influences.

The IAD framework allows investigating action situations at different levels. The meta-constitutional level sets the rules for the constitutional level, which in turn sets the rules for the collective choice level, which sets the rules for the operational level, on which the physical system is actually altered (Ostrom 2005, 58ff.). Thus action situations are considered to be nested. Another category is the domain, that is, action situations can be international, national, regional, or local. There can be, for example, constitutional action situations on the local level, if local people are in and have the capability to alter the rules of their collective choice situations. Also, on the international level, there are operational action situations, of, for example, actually writing down a proposal for a new international agreement.

The IAD framework allows a comparative analysis of which actors are participating in the management decision process and which actors are affected by decisions made. The possible actions of each participant determine his or her respective powers. We aim at finding action situations in both cases which are as similar as possible to highlight effects of differences on the respective decision making processes. This way, it is possible to depict and model which actors are involved in which parts of a decision-making process.

We conduct a comparative institutional analysis of planning and decision making processes of two water agencies in the Rhine catchment area. The structure of this paper largely follows the different steps taken in this analysis. First, important exogenous variables such as the natural background conditions of the case study areas as well as the common European obligations set out in the Water Framework Directive are briefly described in the next section. Second, the larger organisational structure of water management in the two cases is presented. Third, the participants, their positions and possible actions within the two water agencies are presented in the section afterwards where we discuss the membership setting, payment, and the role of other participants, making use of management charts. Fourth, in the discussion, differences and perspectives on outcomes of planning and decision making processes are evaluated in view of adaptive management and the WFD implementation. Finally, conclusions are drawn from this analysis.

3 Background conditions and methodological aspects of the case study research in the Wupper and Kromme Rijn

3.1 Common and differing background conditions

The institutional settings studied for this research are two regional water management agencies, one in the Wupper basin in Germany and the other in the Kromme Rijn region in the Netherlands. In both cases, a specialised agency is responsible for water management. In case of the Wupper this is a water association called Wupperverband, in the Dutch case a water board called Hoogheemraadschap De Stichtse Rijnlanden (HDSR). These are the central structures of comparison. Both are embedded in governmental structures, with competencies spread on state and

provincial or *Länder* level that are in different ways intertwined with regional water management institutions.

Both study areas are part of the Rhine basin, which is among the biggest and most important river basins in Europe, encompassing a catchment area of 185 000 km^2 (Hofius 1996, 3). The climatic conditions are rather similar, though the location within the basin differs significantly: the Wupper is an upstream sub-basin and the Kromme Rijn lies within the downstream part of the basin. This situation does not only cause hydropolitical differences, it also creates differences in the nature of the study areas. Whereas the Wupper basin is part of the central German uplands with hilly areas in its upstream parts, the Kromme Rijn is situated in a lowland region with prevailing drainage problems.

With the European integration, background conditions for water management in both basins become more and more similar, especially since the European Water Framework Directive (WFD) came into force in the year 2000. Overall management goals are aligned on European and on river basin level, but now differences in national and local implementation of the directive surface. While water management in the Wupper basin aims at achieving a good ecological status (Art. 4 WFD) for many of the water bodies, the Kromme Rijn was entirely classified as heavily modified, with the consequence that management goals are lesser and only a good ecological potential has to be achieved. Despite these differences in goal setting, implementation of the WFD can currently be seen as a major challenge in both basins.

3.2 The study areas – nature of the basins

The Wupper

The Wupperverband is the responsible water association in the Wupper catchment area, which is located within the "Niederrhein area" in North Rhine-Westphalia (NRW). This catchment encompasses about 814 km^2; the Wupper itself has a length of 115 km (MUNLV 2005, 1.1-1). Average discharge into the Rhine is about 15, 4 m^3/s (MUNLV 2005, 1.2-5).

The Wupper basin is a densely populated area with 890.000 inhabitants (MUNLV 2005, 1.2-6). The area has been industrialised in a very early stage. Both, high

population as well as industrialisation, led to early water quality problems, which have decreased considerably during the last decades, especially due to several waste water treatment plants. Water quality is no longer perceived as a major problem, although in the lower part of the basin some quality problems prevail (MUNLV 2005, 2.1.3.2-1).

Ecomorphological quality differs between a good quality in the upper and highly disturbed parts in the lower basin (MUNLV 2005, 1.3-1). During the last century many reservoirs were constructed, mainly for drinking water purposes (MUNLV 2005, 3.1.4-1), which today shape the ecomorphological structure of the basin with artificial lakes and a modified flow regime (MUNLV 2005, 3.1.6-10).

The Kromme Rijn region

The HDSR is responsible for water management in a central region of the Netherlands, located in the Provinces of Utrecht and Zuid-Holland. The total governance area comprises about 834 km², with approximately 750.000 inhabitants (HDSR 2003).[1]

The Kromme Rijn is a small river running in the centre of the Netherlands in the Province of Utrecht. It is one of many old arms of the Rhine Delta running through the Netherlands. It was dammed off at Wijk bij Duurstede in the Middle-Ages. Today it runs from Wijk bij Duurstede to the city of Utrecht, to provide water for its canals, and discharges into the Vecht. The Kromme Rijn is a slowly running river with a length of 25 km and a width of approximately 15 metres. Its average discharge is approximately 5 m^3/s (Grontmij 2006). In the Kromme Rijn region different types of agriculture can be found including dairy farming, fruit orchard, and others, each with specific needs in terms of water management.

3.3 Methodological aspects

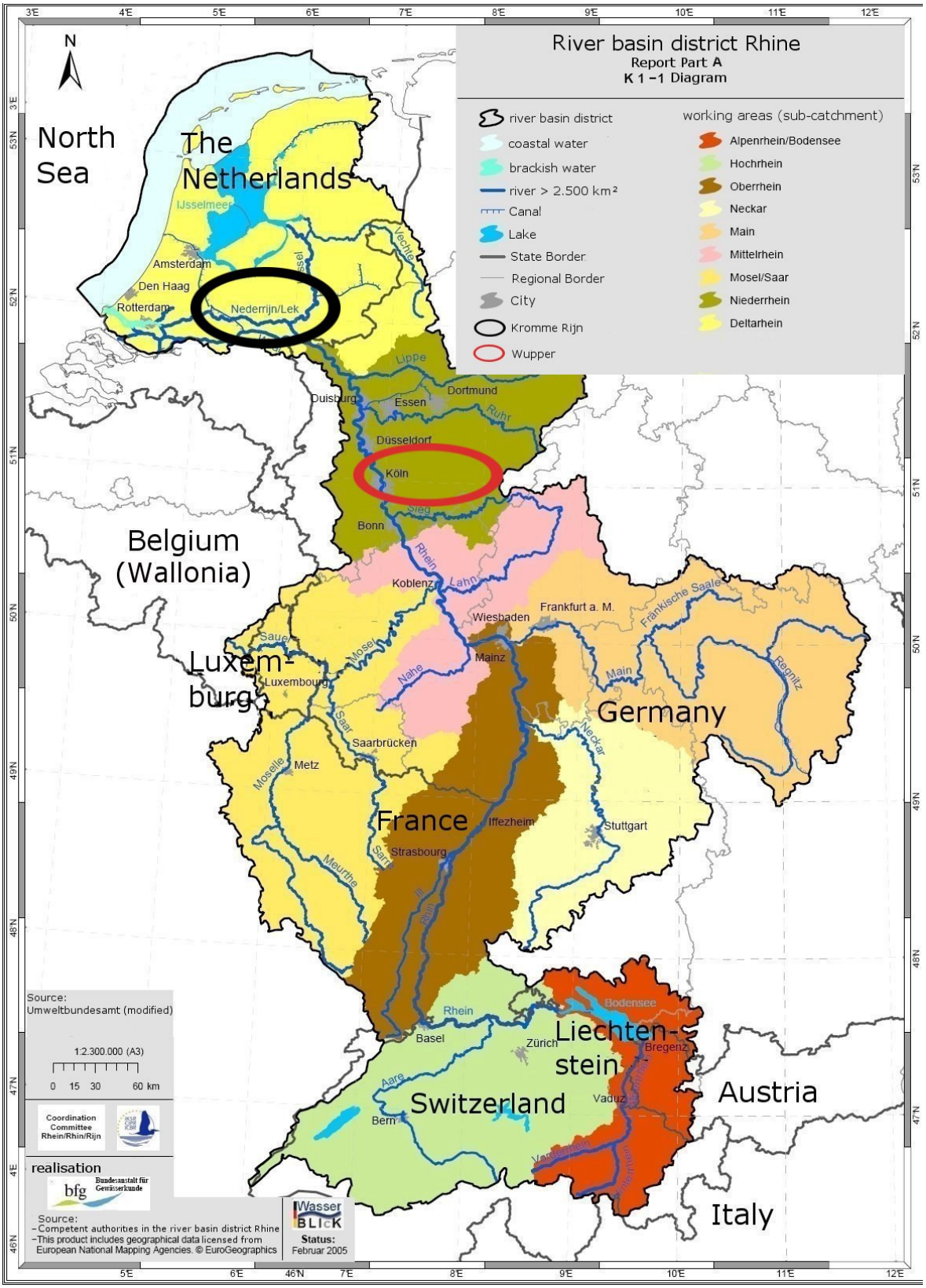
Research leading to this article is part of the NeWater-project (Pahl-Wostl et al. 2002), in which a broader comparative research between different basins takes place.

[1] Although the governance area of the HDSR is larger than the Kromme Rijn region we focus on this region in our analysis. This is because of the involvement of one of the authors in several planning processes in this sub-region of the HDSR as part of the NeWater project.

Apart from document research, this article builds on interviews conducted with experts from the Wupper and the Kromme Rijn management systems from late 2006 to spring 2007. Interview partners were selected upon their function and chosen among members and heads of water agencies, expert personnel, higher level water authorities, and non-members affected by water management.

While concept and interview guidances were developed jointly and adjusted for the Wupper and the Kromme Rijn, interviews were conducted in a semi-structured way, leaving open the possibility for closer examination of aspects perceived to be central for only one of the cases.

Figure 2: Location of the Wupper and the Kromme Rijn within the Rhine basin



Source: Umweltbundesamt (modified)

4 Water management in the Wupper and the Kromme Rijn – organisational settings

Water management in both study areas is based on a central water management agency, the Wupperverband and the HDSR, which are embedded in higher scale management structures. In the following, we examine their organisational settings.

4.1 The management of the Wupper basin

4.1.1 General water management settings in Germany

Water management in Germany is to be understood within the German federal system, i.e. functions are distributed between the Federal Government and the Federal *Länder*. Additionally, communities (towns, districts, and municipalities) have a certain degree of discretion (right of self-government), although they are part of the respective Federal Land.

The Federal Government is only empowered to specify a general legal framework for the Federal *Länder*. Although the Federal Government's legislative powers in the area of water have been extended in 2006, the German *Länder* still hold a very important position in water management. They are responsible for enforcing provisions relating to water, including Federal laws, and hence the exercising of executive powers in water resources management.[2] (BMU / UBA 2006, 16)

Enforcement of water resources management regulations is the sole responsibility of the Federal *Länder* and municipalities. In North Rhine-Westphalia, like in most other Federal *Länder*, water resources management follows a three level structure of general administration, with a supreme authority on *Land* level (the Ministry), an intermediate tier (a district government) and a lower tier (districts or towns not belonging to a county). Which authority is responsible for managing a water body depends on its classification in different levels.

Additionally to the three-level structure, also the local authorities have responsibilities in water management, particularly within the context of self-administration. Central

[2] Some exceptions to this rule exist, which are not explained here.

water supply and sewage disposal as well as the maintenance of small waterbodies are a traditional responsibility of local authorities (BMU/UBA 2006, 18). In order to ensure autonomous and effective implementation of water supply and sewage disposal, communities have recourse to a variety of operating forms, such as water associations, which can be a co-operation between different local authorities and other water users. Associations vary across different *Länder* in terms of tasks assigned to them, regional coverage, and organisational structure.[3]

North Rhine-Westphalia has a special situation of coverage of water associations for small river basins, which is strongly linked to its industrial historical background (BMU / UBA 2006, 20). Here, water associations (*Sondergesetzliche Wasserverbände*) cover water management tasks on the scale of small river basins, allowing for management on bioregional scale, while other competencies stay on higher administrative levels and thus show the need of close interaction.

4.1.2 The Wupperverband – one basin management association

The Wupperverband is one of the water associations in North Rhine-Westphalia, which were enforced by a special law. It was founded in 1930 by the law on the Wupperverband (*Wupperverbandsgesetz*). In order to enable this association to cover interdependent water management tasks formerly dealt with by municipalities themselves, its area of responsibility covers the entire Wupper catchment. Here, the Wupperverband holds responsibility to deal with a wide range of water management aspects, such as pollution, flood and water scarcity problems. According to § 34 of the Law on the Wupperverband, the Wupperverband is liable to the Ministry for Environment, Nature Protection, Agriculture and Consumer protection (MUNLV).

Membership is compulsory and forced by law for specific user groups in the basin, namely municipalities, districts, industry in terms of water users, as well as drinking water producers. Members finance the Wupperverband by membership fees and are represented in its different bodies; e.g. the general assembly *(Verbandsversammlung)*. Chapter 4 covers the structure of membership in more detail.

[3] As the variation of water associations in Germany is very high, the following sections solely deal with the water association in question, the Wupperverband, and do not provide a general overview of different forms of water management associations, which is done by Monsees 2005.

The founding motivation of the Wupperverband was mainly linked to the early industrial use of water in this area. Resulting water pollution had eliminated formerly abundant fish, such as the salmon, as early as 1830. Also for the population living alongside the river, its bad water quality and smell had become a problem.

A first co-operation of municipalities in the Wupper catchment dates back to 1896 and solely aimed at building dams in order to produce water for industrial uses and later also for drinking water purposes. This co-operative gave inspiration to also tackle the water quality problem by means of a specific association, which was finally founded by a Prussian Special Law on the Wupperverband in 1930 (see www.wupperverband.de). The main idea for both foundations was to tackle problems across borders of municipalities in a specialised body on sub-basin scale.

Today, the Wupperverband is a public corporation (*Körperschaft des öffentlichen Rechts)* with a staff of about 370 employees, mainly with technical and administrative expertise. Its main duties are fixed by law (§ 2 of the Law on the Wupperverband) and cover waste water treatment and sludge disposal (11 treatment plants), flood protection and low water management, drinking water provision, ecological development of the water courses, as well as investigation of water management facts.

While management of the Wupperverband is highly interlinked with local and regional management bodies and agencies, a horizontal co-operation of water associations in the Bundesland of NRW exists only since 2006, when the working group *"Arbeitsgemeinschaft der Wasserwirtschaftsverbände Nordrhein-Westfalens"* was founded. Its aim is to discuss solutions to current water management challenges, especially concerning duties that originate from new laws on *Land* level, and which need to be implemented by the water associations (www.wupperverband.de).

4.1.3 New strategic directions linked to the WFD implementation

Since 2003, the Wupperverband has set itself new strategic goals which point away from a mainly technology oriented association aiming at water treatment and provision towards a more holistic management paradigm, also considering ecological aspects of water management, which goes along with the new and ecologically motivated goals of the WFD (Wille 2005). To this extent, it has started to develop its own strategic goals in "strategic documents" which are updated yearly and have the

aim to provide a common ground for the members of the association on different aspects such as how to deal with climate change. In line with this development, the Wupperverband pursues the goal to open up for new and informal co-operation with other user groups such as fishery. The Wupperverband wants to take into account socio-economic interrelations by using new forms of co-operation such as workshops. An experimental setting in the sub-catchment of the Dhünn shows how the Wupperverband plans to implement these new ecological and social directions, also in a more open format with participation of non-members. (Wupperverband 2005)

At the same time, the Wupperverband does not have the legal competencies to implement the WFD, which remain with state authorities which also have the responsibility for public participation according to Art.14 of the WFD. By the Ministry of Environment, lower level state agencies, such as the *Bezirksregierung*, were assigned a coordinative role for the WFD implementation, with co-ordination on river basin scale and thus on the same spatial extension as the water associations.

Especially in North Rhine-Westphalia, where big water associations exist, this decision caused long discussions on the division of competencies between state authorities and water associations. Today, the law on water (LWG NRW) states in §2d that affected water associations have to be included in the creation of river basin manage.85312 0 Td (p)Tj 8.17566 0 Td (a)Tj 3.72714 0 Td (s)Tj 2.52483 0 Td (m)Tj

stakeholders themselves, when it comes to the official WFD implementation.

In practice, co-operation is going on quite well between the Wupperverband and the state agencies, but co-operation is not always transparent for all stakeholders, as events take place on different levels and are orga ised by different agencies. For example the *Wupperforum,* an informational conference aiming at informing stakeholders a out the WFD implementation, is conducted by state agencies in parallel to other events organised by the Wupperverband.

Due to an . 17566 0 Td (r)Tj 3.72714 0 Td (i)Tj ompassing reform of the state administration in NRW, the higher level system is currently under reconstruction , which is one of the ma or challenges of a timely WFD implementation. For the water asso i iations this reform has rought about uncertainties on

4.2 Water management in the Kromme Rijn region

4.2.1 Tasks and responsibilities in Dutch regional water management

Water management in the T

In the following section we will primarily focus on the role of water boards in regional water management, and their relations with other authorities.

4.2.2 The Dutch Water Boards system

Water boards are specialized regional water management authorities with a decentralized character, legal tasks, and a self-supporting taxation scheme. The institutional development of Water Boards has a long history. They developed in the 12th and 13th century as a result of efforts of local people to build dikes, create agricultural land in a river delta and develop governance systems to manage (Kuks 2002; Van Steen and Pellenbarg 2004). Under French authority water management was reorganized in the early 19th century with the development of various state authorities, and coordination of thousands of local water boards under control of provincial authorities. This reorganization resulted in many mergers and the number of water boards reduced from 3500 in 1850, to 2500 in 1950. As a result of the flooding disaster of 1953 the national government launched the Delta project which further reduced the number of water boards (Raadgever and Mostert 2005). More recent threats of both flooding and drought have stirred a tendency towards greater professionalisation, stronger government, increasing tasks and responsibilities (towards integrated water resource management), and continued mergers and scaling up of water boards (Enserink, Kamps et al. 2003). At the moment there are 27 water boards dividing the Netherlands into different governance regions. Dutch water boards collaborate and coordinate their activities through the Union of Water Boards (www.uvw.nl).

Although originally established to protect people from flooding by means of dunes, dikes, and canals, the responsibilities of water boards have been extended in the course of history. Water boards are responsible for water quantity by actively managing ground water and surface water levels by means of canals, pumping stations, dams, and sluices. In the 1970s and 80s, water quality issues emerged resulting in management of waste water purification plants and discharge permits. Nowadays, water quality management is a major goal of the water board. Recently, water boards have received a major role in the implementation of the European Water Framework Directive extending their responsibilities to ecological issues, such as biodiversity and habitat protection. All of these tasks are shared with the state

authorities and other regional authorities (Jaspers 2003; Raadgever and Mostert 2005).

4.2.3 Water board: Hoogheemraadschap De Stichtse Rijnlanden (HDSR)

The HDSR is a public authority responsible for regional water management tasks set out by Dutch state and administrative law. The HDSR was founded in 1994 and experienced a similar development as described above. Before 1968, in the Kromme Rijn area there were about 25 water boards, each with their own polders, weirs, and pumps. These were all joined under Water Board the Kromme Rijn. Later, the Kromme Rijn merged with the water boards of Lopikerwaard, Oude Rijn en Woerden, to form the current boundaries of the HDSR. These mergers and increasing scales have had significant impacts on the scope and practice of water management in the region. The governance region of the HDSR lies largely in the Province of Utrecht, with a small part in the Province of South Holland. There are numerous municipalities in the region. Water management plans by the HDSR and municipalities have to follow policy directions from the Province of Utrecht and are approved accordingly.

5 Membership similarities and differences

5.1 The Wupperverband

5.1.1 Membership settings and decision making bodies

The membership setting of the Wupperverband is fixed by law (§ 6 of the Wupperverbandsgesetz) as to the fact that members are municipalities and districts within the Wupper catchment, drinking water suppliers and other water using enterprises. Members belong to one of these four groups and are thus a mixture between individual members and representatives of municipalities. Membership is compulsory and can be seen as a relatively static element.

The members of the Wupperverband are represented by their delegates in the general assembly (*Verbandsversammlung*), which encompasses a maximum of 101 delegates for a period of five years. Apart from the above mentioned member groups, a delegate from agriculture as well as a delegate from nature conservation takes part in the meetings of the general assembly. The general assembly meets once a year

and in turn elects the council of the association (*Verbandsrat*) from among its members. The council has 15 members that need to belong to the different member groups and are classified in a complex procedure (§*16 Wupperverbandsgesetz*). Today it is constituted as follows: Six members from cities of the basin, one representative from districts (except city districts), two representatives from water providers, one representative from industry, and five persons representing employees (three from the Wupperverband, two from outside) (www.wupperverband.de). The council is elected for five years and in turn elects the managing director (*Vorstand*). Further committees exist that are responsible for construction matters or finances and are also elected by the general assembly.

Experts and administrators of the Wupperverband are linked to the bodies of the association through the managing director. Experts pursue day-to-day work, while important decisions are fed back to members of the association. The managing director is thus a funnel-shaped element of the whole system and communication as well as strategic action is highly dependent on him.

According to the Law on the Wupperverband (§20), the managing director prepares decisions of council and general assembly and leads the expert body. Important decisions and strategies, as for example the budgetary planning, need to be approved by the council (§17). Also, the members can vote out the managing director. The position of the managing director bears much power as he is located at a central stage between the expert body and the members of the association.

Current practice shows that neither council nor general assembly veto decisions prepared by the managing director so that decisions are usually taken unanimously. An expert of the Wupperverband states that this is mainly due to stabilized membership fees, which are of utmost importance to the members of the Wupperverband and their main point of interest. Another reason is early information of the members so that they have enough time to check back possible decisions. Apart from that, strong controversies are discussed in informal meetings between the concerned parties in order to find a compromise outside the formalised bodies that can later be confirmed by vote in the formal decision making structures. (Direct information from an expert of the Wupperverband on 04.05.2007)

This situation was different some 10 years ago, when the meetings were characterised by heated discussions and considerable vetos by members. This

situation changed with the change in person of the director.
Management strategies and style of the Wupperverband thus depend very much on the management style of the managing director as well as on his strategic abilities.

Compared to the Dutch situation which will be shown in the next section, the inhabitants of the Wupper catchment have less and only indirect influence on the decisions taken in the Wupperverband. The inhabitants elect the mayor of the municipalities as their political leader who then names the representatives of the respective municipality in the bodies of the water association. The same holds for the districts and their representatives. The population is thus only indirectly represented; the inhabitants of the basin do not have a right to vote for delegates to represent them and take decisions for them. The other delegates do not have a direct link to the general public at all and are named directly by the respective members.
Only few years ago, a legal discussion was conducted on the question of democratic legitimization of water associations (see Tettinger et al. 2000, referring to another, but comparable water association in NRW). Here, Salzwedel comes to the conclusion that no lack of democratic justification exists for the water associations, because their activities are controlled by regional government and they work within close ties of regional law. The laws on *Länder* level have got even tighter due to directives and laws on higher scales which limit the possibilities for water associations to take free decisions. Instead, the water associations are more and more considered to be fulfilling bodies of the government than autonomous associations, which in turn limits the need to be democratically legitimized. (Salzwedel 2000, 71 ff) Finally, no forms of new governance structures in terms of elective systems were broadly discussed and no decision on a new governance system was necessary.

5.1.2 Payment schemes

The work of the Wupperverband is predominantly financed by the fees of its members which are weighted in proportion to an individual member's water use and / or pollution. It further often draws on public grants for specific projects that it undertakes. The members pay the Wupperverband for its service to clean the water or to maintain drinking water reservoirs and thus for the benefits they obtain from its undertakings. Membership fees are classified in 11 different groups corresponding to the use of water. Groups correspond mainly to the spheres of pollution, water course

maintenance, flood protection, use of hydropower, water consumption, or provision of drinking water *(§3 Satzung*).

Representation in the bodies of the association and the corresponding voting rights are linked to the level of fee which is being classified in “fee units” (for a general overview on Water and Soil Associations in Germany see Monsees 2004). The fee unit is calculated from the full amount of fees and each member paying one or more fee units can send a delegate to the general assembly. Those members who do not reach a fee unit are represented by delegates from a list which is admitted according to the sum of lower fees. This procedure assures that also small enterprises can be represented in the assembly.

Fees are used in different ways to pay for services of the Wupperverband. Services such as waste water treatment are paid from total fees. Contrarily, restoration projects need to be paid by the member who promoted the restoration, possibly a municipality or a district.

It is not yet clear who pays for the implementation of the WFD. The managing director argues that corresponding measures should predominantly be paid for by state authorities, as they hold the official responsibility to implement the directive. A small amount could still be paid by the association; here it would be very positive to pay it jointly from the total fees and not by the municipality which directly profits from the measure. (Interview with the managing director on 21.03.2007)

One major point in the current management strategy is to keep fees on a constant level, as members of the Wupperverband are not willing to accept increasing fees or are not even able to pay higher fees, as for instance some municipalities. As long as the managing director keeps fees constant he also has a good standing in the members´ bodies giving him strategically a better position.

5.1.3 Membership development

Membership is fixed by law and until today only few changes have taken place which never affected the main membership structure (i.e. members are the following groups: municipalities, districts, industry, and drinking water providers and a representative from agriculture with a consultative voice). Apart from opening up for a representative from an environmental NGO, who was granted an observer role, no

changes have taken place affecting this initial structure. Though, within these structural boundaries, development has taken place, especially concerning the membership of representatives from industry.

While in previous years the member group representing industry had a considerable share in the general assembly, industry today has a minor role in the water association. The actual relation between representatives from municipalities and from industry is about 4 to 1 (Interview with a member of the expert body of the Wupperverband on 09.05.2006). Thus, influence of municipalities has grown considerably. This is due to two reasons: declining industrial activities in the area as an external condition and a "self-made" raise of the minimum fee determining whether a polluter is classified as a member of the Wupperverband. The latter decision came into force in 2000 and aimed at reducing the number of members (especially the number of small enterprises) in order to simplify procedural aspects and to concentrate on more important users and polluters (Interview with a member of the expert body of the Wupperverband on 09.05.2006). Within the group of industry, a development from metal production towards chemical industry took place, representing the changing industrial structure of the area.

We can conclude here that the initial membership structure has not been changed and only been adapted within the legally given setting.

5.2 The HDSR

5.2.1 Membership and decision making in the Dutch water board system

Water boards like the HDSR are functional democratic public authorities governed by a council of members elected by the citizens living in the water board region. Elections take place every four years. Despite the possibilities of the public to be involved, voter participation is estimated at only 25 %. It is also estimated that an even lower share of the public actually knows what water boards are and what their duties are (Enserink, Kamps et al. 2003). Representation is organized according to a complex system in which interest, taxation and representation are coupled. This means that those who have the greatest interest in services provided by a water board pay proportional taxes but also have a correspondingly strong representation in the water board council (Huisman 2002; Kuks 2002; Van Steen and Pellenbarg 2004; Raadgever and Mostert 2005). The following membership categories are

differentiated in the water board general council according to different user groups and interests: industrial users, inhabitants, land owners, and owners of buildings. The amount of taxation that the water board receives from these membership categories determines how many representatives each group gets. Members are chosen both by direct and indirect elections. Every citizen or user can make him or herself personally eligible for election. Depending on the user group, individuals can cast between one and three votes on different categories. For example, a farmer is often able to vote for a citizen's representative, a building owner's representative and a landowner's representative, while a citizen renting accommodation is only able to vote for a citizen's representative. Industrial representatives are indirectly chosen by the Chamber of Commerce. We have to note that a new water board law is currently being developed containing changes in the rules for membership elections.

Elected representatives of these categories become members of the General Council and are responsible for decisions taken by the water board. The general council elects an executive council among its members, responsible for daily issues, planning processes, and preparation of general council meetings. The general council meets every month for decision making. Apart from that, general council members take seats in several committees responsible for aspects of water management (e.g. finances) and specific regions. The executive council meets every week. In addition, its members take part in various commissions responsible for aspects of the organisation. Executive and general council are chaired by a dike-reeve, appointed by the Ministry of Transport, Public Works and Water Management. For planning and implementation, water boards rely on a considerable organisation of civil servants, including policy makers, lawyers, technicians and construction workers, headed by a secretary-director.

5.2.2 Payment schemes

Water boards are self-financed by a taxation scheme and raise fees and taxes directly from residents, landowners and firms located in the region. These fees and taxes are not uniform throughout the country but reflect regional variations in expenses water boards have to make in order to fulfil their tasks (Huisman 2002). The Water Board Act of 1992 defines that the costs of these tasks need to be covered by different categories of groups with different interests in services offered

by the water board and therefore different tax levels (e.g. landowners, owners of houses and buildings, users of commercial and industrial facilities, and inhabitants). Three taxes and levies are applied:

1. Inhabitant tax: to be paid by every tenant of a living accommodation for flood protection and quantitative water management.
2. Property tax: to be paid by owners of land and estates for flood protection and quantitative water management.
3. Pollution levy: to be paid by households and facilities contributing to water pollution (Huisman 2002).

5.2.3 Membership and decision making at the HDSR

The HDSR general council consists of 30 members. Citizens are represented by twelve members, land owners and owners of buildings are each represented by seven members, and industrial users by four members. Agriculture, the city of Utrecht, as well as a range of smaller towns are interest groups represented proportionally in the general council.

Planning for decision making is steered by the executive council and prepared by water board policy experts. The HDSR executive council consists of four general council members assisted by the secretary-director and chaired by the dike-reeve. The HDSR counts approximately 280 civil service employees. Depending on the case, representatives of other authorities are engaged in different phases of a planning process for early synchronization with provincial and municipal water management plans. Ultimate decisions are made by the general council. Decisions are generally made based on consensus. According to an executive council member, voting procedures are hardly ever seen and in the odd case when consensus cannot be reached, dike-reeve and secretary-director usually know the appropriate voting procedure (Interview with HDSR executive council member on 5-3-2007). Consensus building in Dutch water management goes back to the history of collective action in the evolution of Water Boards.

5.2.4 Membership development

All relevant interest groups are able to be included in water board council decision

making processes by means of democratic elections. However, these decision making processes are not known for their swift responses. According to a water board policy maker general council members often experience difficulties with reaching consensus and sticking to previously made decisions. Direct personal consequence of decisions, limited background knowledge, and limited involvement in planning processes cause these delays. To ameliorate this, representatives of stakeholder groups are increasingly invited to participate in initial phases of a planning process, such as problem elicitation, and identification of solutions (Interview with an HDSR policy maker on 5-3-2007). All interviewees are convinced of the long term effectiveness and the qualitative advantage of stakeholder participation.

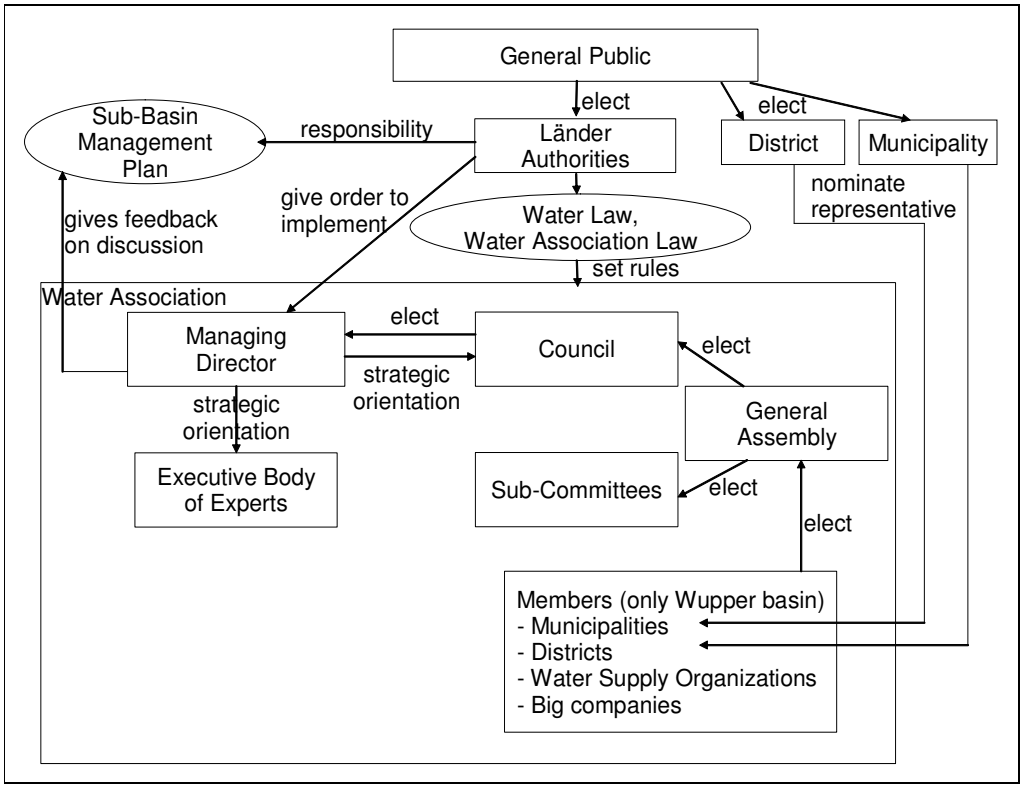
There are critical voices arguing that the decision making function of water boards should be disposed and that its tasks should be divided between provinces and municipalities. Others argue that shifting water management tasks to other authorities would not mean that decision making would be easier. One executive council member notes that these calls are mainly due to the invisibility of water boards. If water boards communicate better to the outside world and show what they do, citizens would appreciate their work much more (Interview with HDSR executive board member on 5-3-2007).

Compilation of a water board council is subject to a structure that is fixed by law. However, the low attendance rates at water board elections, invisibility of the work done by water boards, and problems of decision making has caused the national government to prepare a new water management law in which the membership structure will be adapted. The idea is to change the election procedure from a personal election to a system of political parties, so that water board elections would politicize more. According to a water board policy maker this would also entail that decision making discussions would take place on a less personal level and that decisions could be reached more easily (Interview with an HDSR policy maker on 22-3-2007). This new water management law is not clear on how to safeguard the interests of particular user groups of water management, and was therefore blocked by the Dutch Senate. It is clear that changing the election procedure of water boards would entail large shifts in regional water management style.

5.3 The management systems in an overview

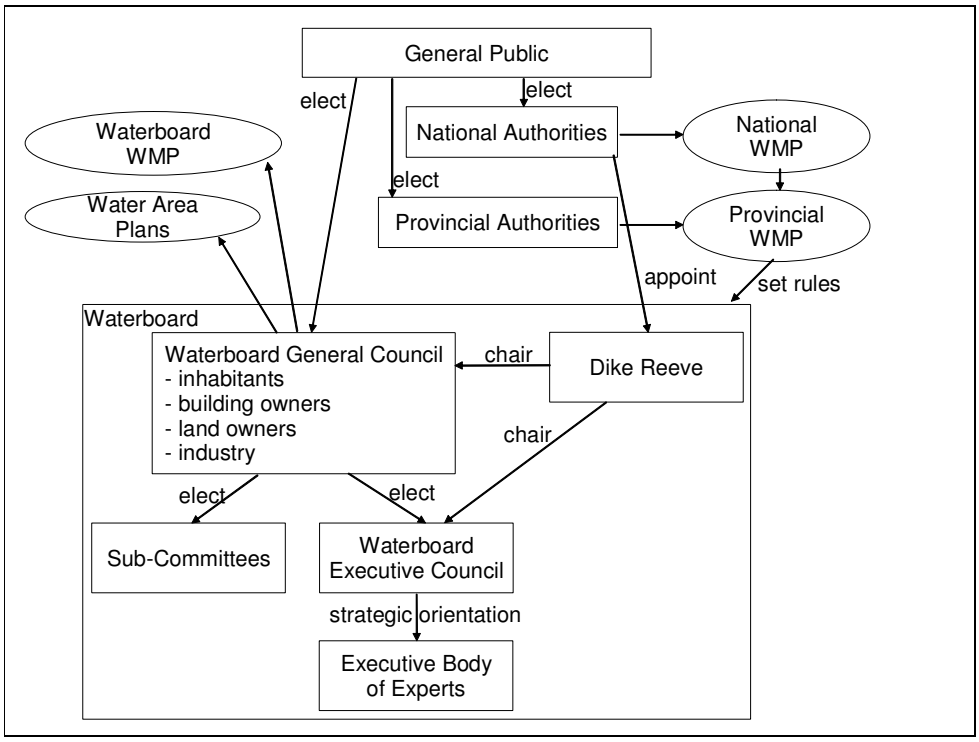
Based on the material presented and analysed in the previous sections, two graphs were elaborated representing the organisational structures of both water agencies and their position in the larger water management regime (see figure 3 and 4)[4]. A number of basic differences and similarities can be observed between the two graphs. First, it becomes clear that compared to the German situation the general public in the Netherlands has more opportunities to influence water management decisions, since representatives of the management board are elected directly from the general public, as discussed above. Second, in the HDSR case a wider range of stakeholder groups are directly involved in water board decision making, which is closely linked to the election process, whereas in the Wupper case for example the wider public is only indirectly represented by Municipalities and District representatives. Also the central position of the managing director in the system of the Wupperverband can be recognised in the graph.

Figure 3: The Wupper case



[4] In the graphs institutional bodies are represented by a square box, whereas plans are presented in oval boxes. In the Dutch graph WMP stand for Water Management Plan.

Figure 4: The Kromme Rijn region case



In the following two tables major differences and similarities of the institutional settings between the Wupperverband and the HDSR which have surfaced so far are summarized. In the next section we will discuss these differences and similarities in more detail.

Table 1: General settings of the water management agencies

Comparative aspects – general setting		
	Wupperverband	**Water Board HDSR**
Members	Municipalities Districts Drinking water producers Industries	Inhabitants Land owners House and facility owners Industries
Main tasks	Waste water treatment, sludge disposal Flood protection, low water management Drinking water provision Ecological development of the water courses	Waste water treatment Flood protection Discharge permits Surface water quantity management Ecological development of the water courses
Bioregional approach	River basin approach	Both river basin and regional approach
Founding	Waste water treatment	Drainage

motivation	Water provision	Flood prevention
Democratic legitimization	Indirectly through the representatives of the municipalities and districts Also: legal discussion if democratic legitimization is needed, as the obligations to act within provisions of law are very tight.	Inhabitants elect the water board Council (within different user groups)
Expert body	About 370 technical and administrative employees, management of day-to-day questions, preparation of strategies of the association, lead by managing director	About 280 technical and administrative civil servants lead by the secretary director.
Recent structural changes	No major changes in membership setting, but movement from industry dominated to municipality dominated. Increasing openness for non-members in roundtables etc. Extension of tasks (e.g. ecosystem protection, etc.)	Increased governmental scale due to mergers. Increased participation of user-groups in planning. Extension of tasks (e.g. ecosystem protection, groundwater) Upcoming changes in membership election
WFD implementation competences	Legal competence with state authorities, but Wupperverband itself sets new strategic goals towards more integrated and ecologically oriented management	State waters implemented by national government. Regional implementation in the hands of the Water Boards.

Table 2: Membership settings of the water agencies[5]

Comparative aspects – Membership		
	Wupperverband	**Water Board HDSR**
Membership setting	Fixed membership groups. Membership compulsory	Fixed membership groups, members are elected from inhabitants within the membership groups
Non-members affected by decisions or measures	Different interest groups are positively or negatively affected but not a member: fishery, recreation, nature protection (general population is represented	All user-groups that are affected by the water board have the possibility to be directly represented in the water board

[5] The three combined categories as well as their evaluation for the Wupperverband are partly derived from Monsees 2005, 22.

making powers	managing director. Informal meetings of members and experts and or managing director outside the formal organisational structures. Mostly formal feedback from members in the formal bodies (normally unanimously, meetings mainly on strategic orientation). Much power with the position of the managing director.	personnel and the Executive Council. In many cases stakeholder groups are invited in the planning phase. Decisions are made by the General Council based on consensus. Both Councils are chaired by the Dike-Reeve
Beneficiaries / payers congruence	Beneficiaries and payers are congruent concerning questions of water quality management. Due to new and broader goals not all affected parties are members.	Beneficiaries – payment – decision making congruence (interest-taxation-representation triplet)
Beneficiaries / decision makers	Beneficiaries are members and non-members. Members formally and informally involved in strategic decisions; voting rights depending on their share in fees. Municipal representative with delegated decision making power. Today, decisions mostly unanimously often in line with proposition of managing director. Affected non-members involved only informally. Currently movement towards better co-operation with non-members	Beneficiaries – payment – decision making congruence
Payers / decision makers	Members formally involved in strategic decisions; voting rights depending on their share in fees. Representatives from municipalities are not individual members. Municipalities hand fees through to individual water users. But formal decisions mostly unanimously, often in line with proposition(decisions prepared by expert body and managing director). Formally adopted by general assembly and other bodies, but generally no vetos: Congruence mainly formally	Beneficiaries – payment – decision making congruence

6 Discussion – institutional perspectives

6.1 Action Situations

For the analysis we need to distinguish three levels, the constitutional level, the collective choice level, and the operational level. The constitutional level is represented by the national policy directions and the WFD transposed into *Länder* or State law, which set the formal rules for the water agencies on how to implement the WFD. The collective choice level encompasses different scales on which the provisions of the WFD are transformed into strategies and later on measures that will directly affect the rivers. Implementing the measures is the third, the operational level (Ostrom 2005, 58ff.).

Table 3: Categorization of different action situations in the process of implementing the WFD according to domain and level

Domain Level	Länder / State	Regional (Sub-basin)	Local
Constitutional	Define, how WFD is to be translated into Strategies and Measures		
Collective Choice	Transform WFD into Water plans	Transform WFD, State Law and / or Water Plans into strategies and measures	Transform State Law and Water plans, regional water plans into strategies and measures
Operational	Take measures	Take measures	Take measures

For our analysis, the most interesting action situation is the regional collective choice action situation of the Wupper and Kromme Rijn water agencies. Participants[6] of the

[6] We use the term 'actors' for all persons involved in or affected by management decisions, much like the term stakeholders. The term 'participants' refers to those who are involved in an action situation, thus in the present case all persons involved in the management decision making. Affected persons with no influence on decision making are not considered to be participants. However, they can become participants if they get involved formally or informally, for instance by making public demands or criticizing management decisions.

collective choice action situation in the Wupper case are the delegates of the general assembly, the managing director, and experts (i.e. the personnel of the Wupperverband). Participants in the HDSR case are members of the general council, the dike reeve, the experts, and the additional stakeholders that are invited to participate in earlier phases of the planning process. Members of the Wupperverband council or the HDSR executive council are members of the general assembly / general council, who hold an additional position. The same is true for members of the various sub-committees of the general assembly and general council. The member organizations of the Wupperverband send delegates into the general assembly, but only these delegates participate in the decision making processes in the Wupperverband in order to develop strategies and measures. Therefore, the member organizations are not considered to be participants. The same is true in the HDSR. Only the elected representatives in the general council are considered to be participants, not the general public, which elects these representatives. Additionally, representatives of other regional and local authorities and stakeholder groups participate in the planning phase organized by experts.

6.2 Exogenous Variables: different historical background and new common policy frame

While both management agencies are organizational settings for the collective provision of public goods, they have developed from a different historical background, linked to the nature of the public good they were established for. The Wupperverband emerged from an industrial background oriented towards water quality management and drinking water provision while the Dutch water board regime emerged from a background of drainage and flood prevention, and quality management later on.

Right from the start, the Wupperverband was constructed on a river basin approach, including the most relevant actors concerned with water quality. While this setting is respecting natural boundaries, it comes to inconsistencies with existing and still relevant boundaries of other administrative units such as districts, causing a polycentric system with different spatial entities.

In the Netherlands, up-scaling of small water boards resulted in a different kind of polycentric system of water governance regions, largely following features of the water system and inconsistent with governance boundaries of the Provinces. Many of these historical factors explain to a large extent the challenges that are currently

faced with regard to outcomes of planning and decision making processes and new common policy directives.

Since the last several years, the overarching policy background conditions for both water management regimes become more and more similar in Germany and the Netherlands, which is mainly due to the European integration process. Especially the European Water Framework Directive has led to a new policy frame and new strategic orientation of both governance structures. Both water agencies were previously technology oriented, the Wupperverband more on the water quality side, the HDSR more on the water quantity side. With the general shift towards more ecologically sound management and the legal requirements of the WFD, both water agencies are merging in terms of their function. As the regional water management authority the HDSR is responsible for the implementation the WFD on the regional level. The Wupperverband does not hold legal responsibility to implement the WFD but has also reshaped his management strategies for WFD conformity. As a result, both agencies do pursue water management that takes into account the whole water system, including ecological aspects such as passability for migrating fish species. An HDSR expert mentions that in the Netherlands, ecology has always been second after safety, water quality and quantity. Now ecology will become a steering principle in water management. Water will be less seen as a utility good and more as an entity with intrinsic and independent interests (Interview with an HDSR policy maker on 22-3-2007). The managing director from the Wupperverband has similar remarks and states in an interview that a paradigm shift is currently taking place in the Wupper basin that is also due to new management goals that are linked to the WFD (Interview with managing director of WV on 21.03.2007).

Seeing that the functions are moving towards increasing equivalence, the governance structures of the water agencies are still reflecting the initial water management strategies. In the Wupperverband, members are still linked to water quality aspects. The interests of industry are represented while the interests of fishery are not represented among its members. At the HDSR, the organizational structure reflects the Dutch historical approach of democratic water boards. Since water policy concerns everyone behind the same dike, a democratic institutional setting with elections has proven to be appropriate and is still in use and thus members can change and new members can get on board more easily.

Summing this up, external factors in both cases include the embeddedness in a polycentric system with spatial misfits and existence of the WFD transformed into *Länder* law and water plans of different authorities in the Netherlands. Different external factors are the historical focus on water quality in case of the Wupperverband and water quantity in case of the HDSR.

6.3 Boundary rules

Boundary rules define who can become a participant of and hold positions in an action situation (Ostrom 2005, 194ff.). In our case, they determine membership of the associations' general assembly or the water board general council, who becomes managing director and dike reeve, as well as how many and what kind of experts are recruited. The managing director of the Wupperverband is elected by the members of the council, while the dike reeve of the HDSR is appointed by a state ministry. However, they hold different positions. The managing director has more influence than the dike reeve, as he also holds decision making power. The dike-reeve functions primarily as a process facilitator.

The delegates of the Wupperverband general assembly are elected by members of the Wupperverband, while membership is compulsory to a given set of water users/ polluters. In order to investigate how membership and election procedures could be changed, we would have to focus the investigation on the constitutional level, in which this boundary rule is set.

Members of the HDSR council are directly and indirectly elected by the general public and specific beneficiaries of water management services. In the case of the Wupperverband, the general public has no direct influence on the members of the general assembly, only indirectly via the municipalities and districts as well as on the boundary rules. This may lead to a misalignment, if strategic orientation changes, while the participants of the collective choice action situations stay the same.

Thus, membership in the Wupperverband does not co-develop with the observed change in goal and strategy of the Wupperverband which is to broaden its work towards more integrative settings and ecologically oriented management. Taking into account that the current challenges identified by the Wupperverband are no longer linked to problems of water pollution or drinking water provision, but rather to the

ecological status of water bodies, restoration of river stretches and reintroduction of aquatic species, new groups of stakeholders are affected and could be involved in the management. The membership structure fixed by law is too inflexible to include new groups easily, but a need to reform this structure is not perceived by the Wupperverband. Only slight changes of the boundary rules were possible, for example by including a representative of an environmental NGO into its general council.

Among the interviewees in the Wupper regime, there is no consensus whether changing the membership structure is desirable or not. The managing director considers a change of the membership setting neither necessary nor feasible in practice. From the perspective of a higher level water authority though, it would be useful to adapt the membership structure to current challenges, for example by including further polluters or water users representing sectors such as fishery and water sports. However, it would be difficult for these users to pay membership fees, as they are usually oriented towards recreation and possibly not willing to pay. From the point of view of the members of the Wupperverband, opinions differ from total negation of new members to positive votum. Some mention in the latter case that new members might cause difficulties in decision making due to new interests that need to be taken into account and that membership does not per se mean a better possibility to influence decisions. Also from the point of view of non-members, there is no clear opinion on this point. While some interviewees are in favour of increasing their informal relationship with the Wupperverband, or would favour a new consultative group for non-members, others are satisfied being a non-member, which could also be linked to the fact that members are obliged to pay a membership fee.

The Dutch system with its element of elections seems more adaptive, as it allows for democratic representation and involvement of those groups that are currently affected by decisions on regional water management. If a new decision affects fishery, fishermen are able to become a delegate as they can become candidates to the elections. Also, as a result of national policy directives and the WFD, stakeholder involvement and public participation in early phases of the planning processes are becoming common practice in drafting regional water plans. At the HDSR this is no exception and both experts and Executive Council members, are very much focused

on implications of their decisions for user-groups and on views of the general public.

Although the Dutch system seems to be more adaptive to include new members, it is generally recognized by the interviewees that this comes at a cost. According to water board policy makers there are large differences in background and capabilities of the Council members, and this has a large impact on decision making. Some Council members have extensive experience in governance, for example in companies or other public authorities, while others do not. Some Council members may have extensive knowledge on water management or other relevant disciplines, while others lack this knowledge. Council members often come from very different professional and personal backgrounds, ranging from farmers to environmental lobbyists. They are elected in the Council to represent particular user groups. The experts conclude that as a result Council members are often only representing their own interests, and thereby slowing down the decision making process or braking out of decisions already made (Interviews with two HDSR policy makers on 5-3-2007 and 22-3-2007). An upcoming change in the constitutional rules for the water board elections will influence the boundary rules for membership.

6.4 Participants, positions and actions in planning and decision making

Within this formal frame of historically grown organizational structures, the capacity to adapt to new challenges differs. In the following section we will discuss different positions taken in the planning and decision making processes of both water agencies and their relation to the issue of adaptive management.

6.4.1 The position of experts

In water management a high level of expert knowledge is needed. This is illustrated by the fact that both water agencies contain a large body of experts and technicians. From the interviews it becomes clear that in both cases the expert knowledge plays a very important role in planning and decision making processes.

Folke et al. (2003) make a difference between knowledge carriers, who are able to directly perceive and collect data from the real world, and sense makers, who are

able to interpret this data and provide meaningful information to others. Of course, these two positions can be fulfilled by one person. For adaptive management it seems to be important to collect and combine knowledge from different sources and spatial scales, and make both the knowledge and resulting interpretations available to decision makers (Folke et al. 2005).

An HDSR Executive Council member notes that when he started, one of the first things he had to adjust to was dealing with experienced water experts and deep insights in the problem matter. Besides understanding policy plans and retaining control in the decision making process another challenge for Executive Council members is to translate complex policy plans and multi-interest compromises into lay-man terms to convince the public (Interview with HDSR executive board member on 5-3-2007).

The Wupperverband equally holds a large body of experts and technicians and policy makers from higher administrative scales positively recognise this technical and water management knowledge. Expert knowledge is a central asset of the Wupperverband and a basis for the decisions prepared to be voted for by its members. The members´ trust in the decisions prepared by the managing director is also due to the high level of expertise in the expert body of the association.

6.4.2 The position of leadership

In complex social-ecological systems, leadership seems to be one key element for enabling adaptive management (Folke et al. 2003). Olsson et al. (2004) investigate two examples of successful adaptive comanagement processes and find that in both cases a key person, who was able to transport a clear and convincing vision and was trusted by other stakeholders, was central to the success of the management process. In addition to providing a vision and building and keeping trust, leaders can deal with conflicts, combine different sources of knowledge, and mobilize support for change (Folke et al. 2005).

We have shown above that in the Wupperverband the overall organizational setting is fixed by law and is rather stable. But still a change in management goal and style has taken place in the association during the last years. While this is also due to the general direction of higher scale laws towards more ecological water management, an important reason seems to be on the personal level of the managing director, who

holds a central position in the planning and decision making process of the Wupperverband. His position is situated between the expert and policy making body and the member bodies. This strategic and powerful position enables the director to shape the water management in one or the other direction.
If the director aims at achieving good ecological quality within the legal framework of the Land, and if he is at the same time able to avoid an increase of membership fees, and sells his ideas strategically well to both sides – the members and the experts – he is able to shape the management style. This strong dependence on one person is also perceived by many interviewees, in the positive sense, that the current managing director enabled a change in management style. As long as the managing director is open for new developments, this personal dependence is thus not hindering the management. On the contrary, it can even be more effective, because long discussions can be avoided. But of course this dependence is also a weak point of the system as the work of the whole system depends very much on the personal and strategic abilities of that one person.

In the Dutch water board system the dike-reeve holds a central position as chair of both member councils. Director of the civil servant organization, or the secretary-director, is another central position in the organizational structure. Both positions are influential bringing experience into the process and knowing the rules of the game. However, decisions are made based on consensus by the members of the General Council. As we have seen in the previous section, it is argued that factors such as limited experience and knowledge in water management, and direct involvement with the issue of General Council members, tend to make these decision making processes ineffective. The position of both – the dike-reeve and the director – however, was never mentioned in the interviews as problematic for the effectiveness of decision making.

It might be the case that these fundamental differences can be linked to the general governance systems in Germany and the Netherlands. While Germany is a more hierarchical and bureaucratic system in which much depends on the personality of key persons, the Dutch approach can be located in a more consensus-based society which is based on broad discussions.

6.4.3 Participation of relevant non-members

As a result of national and regional policies as well as the WFD, stakeholder participation is becoming more and more a requirement in both water agencies and already gets common practice in planning processes of the Dutch water board. In fact, participation of representatives of relevant stakeholder groups in the early planning phase is increasingly seen as an effective way to smoothen the decision making process. In the HDSR the extent to which stakeholder participation is allowed in the planning process is decided on a case by case basis. According to a water board policy maker, the problem is that many aspects of water management do not allow for participation. She states that it has to be very clear from the start on which aspects stakeholder can participate and which are not negotiable. Often, despite having been clear on the scope of the planning process, once stakeholders are allowed in they believe that every option is open for discussion. In such cases it is very difficult to return to the issue at stake (Interview with an HDSR policy maker on 5-3-2007).

As seen above, the Wupperverband also opens up informally to other groups, especially with its new strategic goals to include non-member stakeholders into discussions. This is done by inviting representatives of interest groups to participate in workshops and broader processes, which can partly overcome the non-inclusion of new evolving stakeholder groups into the formal procedures by becoming a member of the association. Thus informal co-operation which takes place without any transparent and overall structure is one way to involve new groups of stakeholders into the discussion.

6.5 Next steps of the comparative analysis: agent-based models

A complementary approach to case study research, which can potentially enhance insights gained in case studies and case study comparisons, is to build empirically based, agent-based models (Janssen and Ostrom 2007) of the investigated cases. It is planned in a next step of this study to build such models in which the analysis presented here will play a major role. Modelling in general and agent-based modelling in particular can be seen as an enhanced and more rigid way of “process tracing” (Homer-Dixon, 1995) which mitigates the problem of testing hypotheses on the basis of a few case studies only. In order to build models, it is necessary to have a thorough but abstracted knowledge of the basic and most important causal

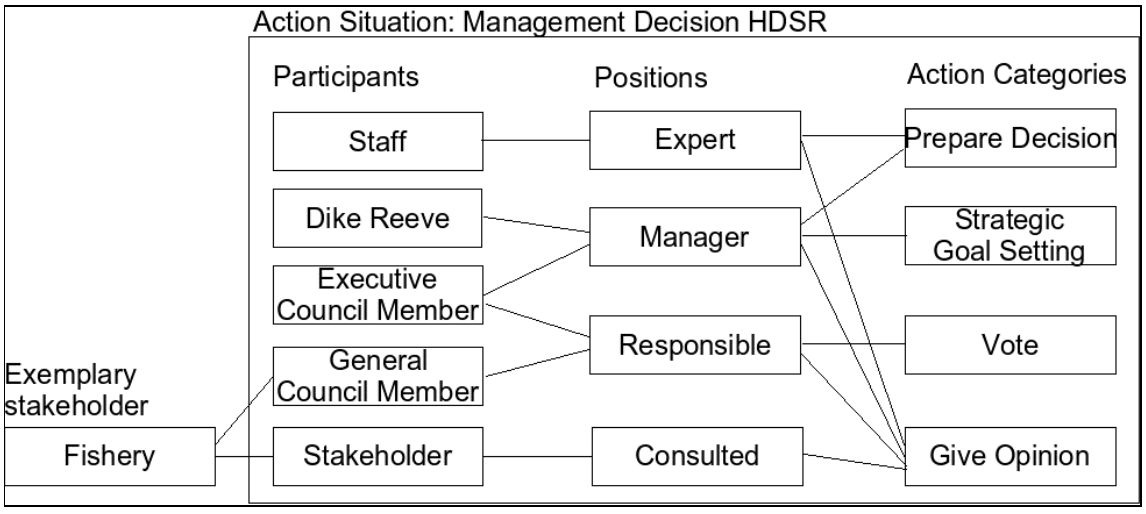
processes at work in a specific situation – the case study at hand.

The model will be built to represent the real world processes. In our case, the model is then altered only slightly to match each of the cases under investigation. The situation that only slight changes are necessary, is achieved by grounding both models in a common conceptual framework, in our case the Institutional Analysis and Development (IAD) framework (Ostrom 2005). This modular framework allows independent exchange of parts and processes in the model.

For the present research, a first step towards modelling of both cases is to represent each case in the IAD framework. This allows a comparative analysis of which actors are involved in the management decision process and which actors are affected by chosen decisions. The possible actions of each participant determine his or her respective powers. We aim at finding action situations in both cases which are as similar as possible to highlight effects of differences on the respective decision making processes.

Diagrams like Figures 5 and 6 point to differences discovered in the case studies presented above, showing participants, positions, and actions.

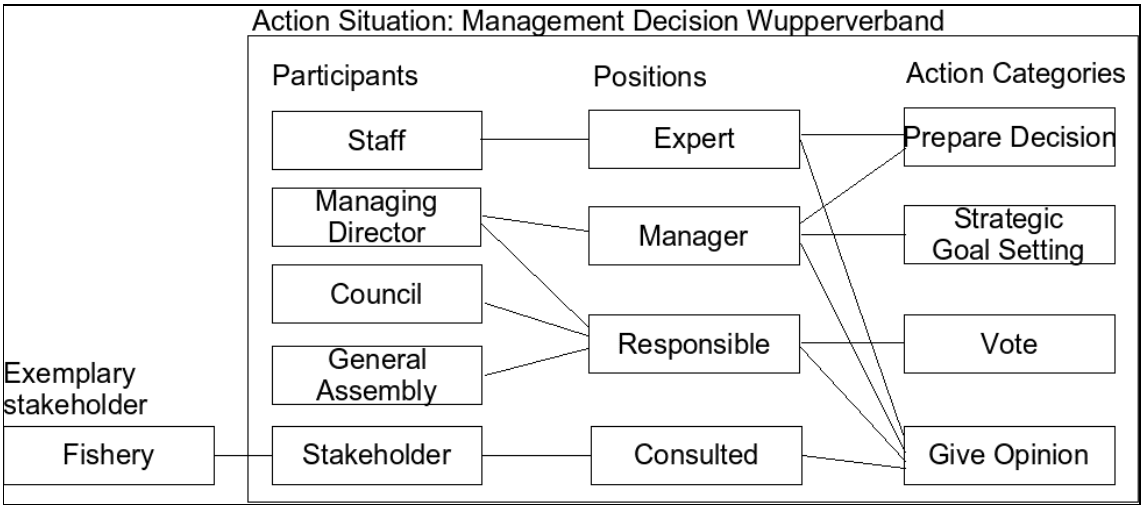
Figure 5: Action situation: Management decision at the HDSR



In the HDSR, all affected stakeholders are represented in the general council, which

is the body that votes on the management plan. However, only a part of the general council, the executive council is involved in its preparation.

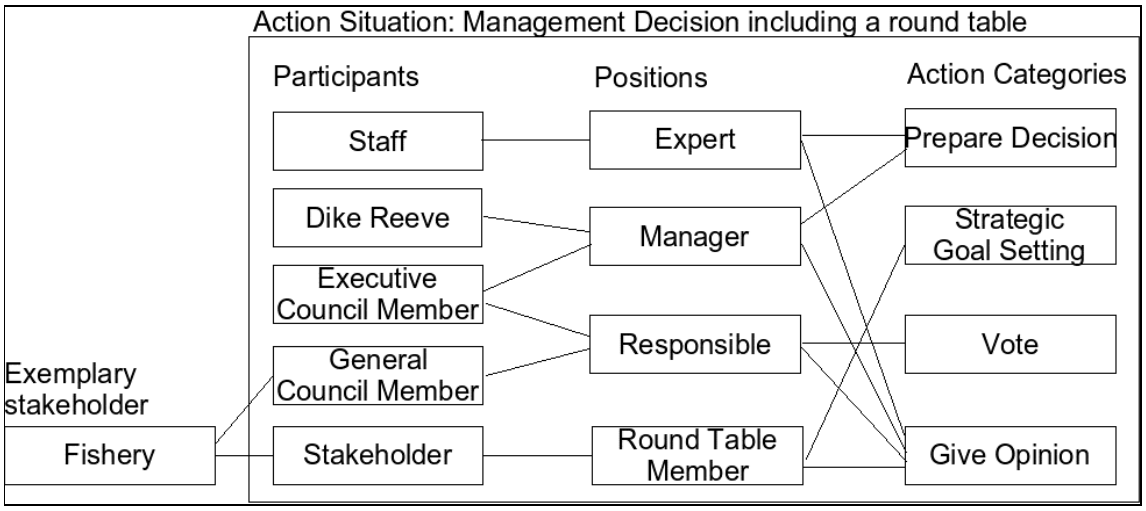
Figure 6: Action situation: Management decision at the Wupperverband



In the Wupperverband, on the other hand, some stakeholders are not represented in the General Assembly of the Wupperverband, since they are not members. These are only consulted if and when those actors preparing decisions think it is necessary. They have no other means of influencing management plans.

The current situations can be contrasted in the model with thought experiments and model replication of existing management experiments, like introducing more extensive stakeholder involvement in form of a round table which actually may take strategic goal setting out of the hands of professional managers. In this case, membership is not so important, as depicted in Figure 7.

Figure 7: Possible action situation: Management decision including a participatory process



These three different scenarios are used as settings for an agent-based model, in which management decision making is investigated. The focus lies on the question how the structure of an action situation, consisting of participants, positions and possible actions, determines agent decision making. In the present case, differences in power, especially concerning affected stakeholders, may lead to different management decisions in each case.

If, on this abstract level, model outcomes match empirical findings, this model increases our understanding of causal processes and mutual influences of variables on model outcomes. We can play around with the model, in order to understand underlying dynamics. Models help even before such a result, because during a model building process researchers are forced to use a coherent framework, stringent definitions, as well as extensive abstractions. This adds rigour to the analysis and helps to point out black spots of previous analyses. By making knowledge gaps apparent, which might have stayed hidden without the model, model building guides further analysis.

Since comparisons of model outcomes and empirical findings necessarily need to stay on the same abstract level as the corresponding model, the model used here

cannot be predictive, but it is descriptive. Its objective is to explain and compare decision processes, not to predict their outcomes. At the same time, this model is embedded in a research program to investigate impacts of different factors of management regimes on adaptiveness of their management decisions. Within this program this model is used as a hypotheses testing technique. The underlying idea is to use stylized agent-based models of management regimes to test regimes' reactions or adaptive capacities in different situations.

7 Conclusion

In this paper the differences and similarities between two regional water agencies in the Rhine basin were compared with regard to planning and decision making processes. While the basic frame of the organizational setting of the water management regimes still differs, the common frame of the WFD seems to drive an evolution towards equivalence in function. Both water agencies have set new goals concerning a more ecologically sound management and open in a sense for new groups – formally or informally. While a strict frame of the general organizational structure prevails, both systems are able to adapt within this frame, but in different ways.

Using the IAD framework we have compared the positions and actions of participants in the planning and decision making processes of both water agencies. With regard to the evaluative criterion of flexibility, we can conclude that both water agencies face different challenges. Compared to the Wupperverband, the HDSR was valued higher in terms of the flexibility of the system to adapt to the changing needs of inhabitants and users of the region and to changing management goals. The HDSR system has a democratic feedback loop so that changing conditions can easily be anticipated. In the case of the Wupperverband changing the membership structure to better represent the interests of other users and inhabitants would entail changing the law, which is not regarded as necessary by the actors interviewed.

With regard to effectiveness, the Wupperverband seems to be performing better. We have seen that the leadership position of the managing director of the Wupperverband stimulates effective decision making processes. The quality of the decisions made is determined to a large extend by the managing director. On the

other hand the democratic structure of the HDSR, despite being a positive element, can hamper effective decision making because of direct involvement and the complexity of the issues at stake. We can conclude that balancing between both effectiveness and flexibility proves to be a challenge for the water agencies.
Remarkable enough stakeholder and public participation is considered in both case studies as a possible way to face new challenges. At the HDSR, both public and stakeholder participation in the planning process is currently employed to anticipate difficult decisions at a later stage. At the Wupperverband relevant stakeholder groups that are non-members are increasingly invited for workshops and informal meetings. This way, at least until changes in the institutional setting are made, both the flexibility and effectiveness of planning and decision making processes can be guaranteed.

This analysis guided by the IAD framework is a first step to compare and contrast the management regimes under investigation and the impact of the Water Framework Directive on these regimes. This first step feeds into a development of an agent-based model, in which the structure of a regime, existing positions, and influences of stakeholders with differing interests determine the decision making of a management regime. Processes which were observed in the real world shape the model simulation, which in turn will guide further analysis and hypothesis development.

8 Literature

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) / Umweltbundesamt (UBA) (edit.) (2006): Environmental Policy. Water Resource Management in Germany. Part 1 - Fundamentals. Berlin.

Enserink, B. / Kamps, D. et al. (2003): Public Participation in River Basin Management in the Netherlands. (Not) Everybody's concern. HarmoniCOP, Workpackage 4. Delft, RBA- Centre, Delft University of Technology.

Gunderson, L. and C. Holling (2001): Panarchy: Understanding Transformations in Human and Natural Systems.

Grontmij (2006): Ecologische doelen voor de Kromme Rijn. Afleiding van MEP en GEP volgen de officiele KRW methode en de Praagmatische methode. In opdracht van: Hoogheemraadschap De Stichtse Rijnlanden. Amsterdam, Grontmij.

Folke, C. / Hahn, T. / Olsson, P. / Norberg, J. (2005): Adaptive Governance of Social-Ecological Systems. In: Annual Review of Environmental Resources, 30:8.1-8.33

Folke, C. / Colding, J. / Berkes, F. (2003): Building resilience and adaptive capacity in social-ecological systems. In: Berkes F, Colding J, Folke C, (eds.): Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Cambridge UK: Cambridge University Press, pp. 352-387.

HDSR (2003): Waterbeheersplan Houten, Hoogheemraadschap De Stichtse Rijnlanden.

Hofius, K. (1996): The River Rhine. Geography of its catchment area. In: Deutsches IHP/OHP-Nationalkomitee (edit.): The River Rhine – Development and Management. Koblenz. 3-11.

Homer-Dixon, T. (1995): Strategies for Studying Causation in Complex Ecological Political Systems, Project on Environment, Population and Security, Washington D.C.: American Association for the Advancement of Science and the University of Toronto [online] URL: <http://www.library.utoronto.ca/pcs/eps/method/methods1.htm> (April 11th, 2007).

Huisman, P. (2002): How the Netherlands Finance Public Water Management. European Water Management Online.

Janssen, M. and Ostrom, E. (2007): Empirically based, Agent-based models, in *Ecology and Society*, 11(2): 37 [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art37/> (April 11th, 2007).

Huitema, D. / Egas, W. / Möllenkamp, S. / Mostert, E. / Pahl-Wostl, C. / Yalcin, R. (in review): Adaptive water governance. Assessing adaptive management from a governance perspective. To be published in Ecology and Society.

Jaspers, F. (2003): Institutional arrangements for integrated river basin management. In: Water Policy 5, 77-90.

Kuks, S. (2002): The Evolution of the National Water Regime in the Netherlands. Euwareness Netherlands. Enschede, University of Twente.

Landeswassergesetz - Wassergesetz für das Land Nordrhein-Westfalen (LWG) - In der Fassung vom 25. Juni 1995. GV. NRW. S. 926; 2000, 439.

Lee, K.N. (1993): *Compass and gyroscope. Integrating politics and science for the environment*. Island Press. Washington.

Lee, K.N. (1999): Appraising adaptive management, In: *Ecology and Society*. 3 (2). [online] URL:http://www.conecol.org/vol3/iss2/art3/

Ministerium für Umwelt, Naturschutz, Landwirtschaft und Verbraucherschutz (MUNLV) (edit.) (2005): Ergebnisbericht Wupper - Wasserrahmenrichtlinie in NRW – Bestandsaufnahme. Düsseldorf.

Olsson, P. / Folke, C. / Berkes, F. (2004): Adaptive Comanagement for Building Resilience in Social-Ecological Systems. In: Environmental Management 34 (1). 75-90.

Ostrom, E. (1990): Governing the Commons. The Evolution of Institutions for Collective Action. Cambridge University Press.

Ostrom, E. (2005): Understanding institutional diversity, Princeton University Press.

Pahl-Wostl, C. / Downing, T. / Kabat, P., Magnuszewski, P. / Meigh, J. / Schlueter, M. /Sendzimir, J. / Werners, S. (2002): Transitions to Adaptive Water Management: the NeWater Project. Project report. Working paper 1.

Raadgever, T. and E. Mostert (2005). Governance, institutions and participation. Case study basin the Rhine, country report the Netherlands. NeWater Project report. Delft, RBA-Centre, Delft University of Technology.

Monsees, J. (2004): The German Water and Soil Associations - self-governance for small and medium scale water and land resources management. In: Zeitschrfit für Bewässerungswirtschaft. 39 (1). 5-22.

Monsees, J. (2005): Operationalisierungsprobleme einer vergleichenden Institutionenanalyse zur Gewässerunterhaltung. ICAR Discussion Paper 6/2005. Humboldt-Universität Berlin.

Salzwedel, J. (2000): Wasserverbände im Zerrspiegel demokratie-theoretischer Gedankenspielereien - ein Beitrag zu Vorlagebeschlüssen des Bundesverwaltungsgerichts vom 17.12.1997 betreffend Emschergenossenschaftsgesetz und Lippeverbandsgesetz NRW. In: Tettinger, P. / Mann, T. / Salzwedel, J. (2000): Wasserverbände und demokratische Legitimation. Verlag Franz Vahlen. München. 67-92.

Satzung des Wupperverbandes vom 09.08.2007. In der Fassung der Änderungen vom 21.04.1995; 28.11.1996; 17.04.1998; 07.01.1999; 06.12.2001 und 08.12.2005.

Tettinger, P. / Mann, T. / Salzwedel, J. (2000): Wasserverbände und demokratische Legitimation. Verlag Franz Vahlen. München.

Young, O. (2002): The Institutional Dimensions of Environmental Change. Fit, Interplay and Scale. MIT Press, Cambridge, Mass.

Van Steen, P. and P. Pellenbarg (2004): Water Management Challenges in the Netherlands. In: Tijdschrift voor Economische en Sociale Geografie 95 (5). 590-598.

Water Framework Directive (WFD) – 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. OJ L 327/1.

Wille, B. (2005): EU-Wasserrahmenrichtlinie – Chance zur gemeinsamen Gestaltung der Wasserwirtschaft. In: Kommunalwirtschaft Sonderausgabe Oktober 2005. 75 Jahre Wupperverband. Kooperation und Netzwerke für die Wasserwirtschaft. 26-28.

Wupperverband (edit.) (2005): Modellversuch des Wupperverbandes für eine integrale und effiziente Wasserwirtschaft am Beispiel des Einzugsgebietes der Dhünn. Unpublished.

Wupperverbandsgesetz; Gesetz über den Wupperverband vom 15.12.1992. In der Fassung der Änderung vom 07.05.1995.