WATER GOVERNANCE AND INSTITUTIONAL CHANGE

PROEFSCHRIFT

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Preface

This dissertation on water governance and institutional change has its roots in two major European research projects on which I worked in the past years. First, it is rooted in the European research project EUWARENESS (European Water Regimes and the Notion of a Sustainable Status). In 1999 Hans Bressers and I developed this project in cooperation with research partners in Belgium, France, Spain, Italy and Switzerland. It was funded by the European Committee and became one of the first socio-economic water research projects under the 5th Framework Program for Research. The theoretical challenge of this project has been to elaborate on institutional regimes, the interaction between public policies and property rights, and 'governance' as a concept that helpful in identifying regime transitions. The project began in 1999 and was finished in 2003, resulting in two book publications in 2004. We coordinated this project at the Center for Clean Technology and Environmental Policy (CSTM), in which more than 20 researchers in 6 European countries participated. I wish to thank all the participants in the EUWARENESS-consortium for their contributions to this project, in particular: Peter Knoepfel, Corine Mauch, and Adèle Thorens at the 'Institut de Hautes Études en Administration Publique (IDHEAP)' in Lausanne, Switzerland; Ingrid Kissling-Näf at the Swiss Academy of Sciences in Bern, Switzerland; Bruno Dente and Alessandra Goria at the 'Istituto per la Ricerca Sociale (IRS)' in Milan, Italy; Joan Subirats, Meritxell Costejà and Nuria Font at the 'Universitat Autonoma de Barcelona (UAB)' in Spain; Corinne Larrue, Iratxe Calvo, Jean-Marc Dziedzicki and Isabelle Verdage at the 'Université Francois Rabelais de Tours' in France; Frédéric Varone and David Aubin at the 'Université Catholique de Louvain (UCL)' in Belgium.

The second European research project in which this dissertation is rooted, is the 'Water supply authorities preventing agricultural pollution' project. This was another project that Hans Bressers and I developed and that was

coordinated at CSTM and funded by the European Committee under the 4th Framework Program. The project included case studies from Germany, the Netherlands, England and Wales, the EU, and the USA. The theoretical challenge of the project was to learn from the interaction between agricultural and water policy communities and how this interaction results in inter-organizational policy making with environmental goals. Although this project started in 1993 and resulted in a book publication in 1998, the project consortium already shared a common interest in policy networks issues. In 1991, the consortium started to prepare an international book publication on 'Networks for Water Policy: A Comparative Perspective', edited by Hans Bressers, Larry O'Toole and Jeremy Richardson. Frank Cass Publishers published it in 1994 as the special issue of Environmental Politics, as well as a book in 1995. I wish to thank all the participants in this consortium for their inspiring visions on policy network issues and on the political aspects of water management.

Other important impulses for this dissertation came from the two research periods that I spent in the United States. In 1992 I got the opportunity to become - together with my future colleague Dave Huitema, who now is affiliated with the Vrije Universiteit Amsterdam - participants in the exchange program between the Faculty of Public Administration in Twente and the Master of Public Administration Program at Auburn University in the United States. A five-month stay at this American university allowed me to become familiar with concepts in American public administration and policy science. My stay was supported with a travel grant from the Dutch Science Foundation (NWO). We had a wonderful time on campus, where I shared an apartment with my roommate Paul Harris, a great American personality with a warm heart for Europe. It was also an interesting acquaintance with the American culture of the Deep South in a time that Spike Lee launched his movie Malcolm X, and the Clinton-Gore ticket was running for the presidency of the United States after so many years of republican dominance in American politics. It was probably shameless in the eyes of the predominantly republican campus that Dave and I 'rolled the tree' (an old tradition on campus to roll the old tree on Toomer's corner with toilet paper after a football game victory for the Auburn Tigers) on the evening of Election Day when George Bush Sr. announced on television - before all votes were counted - that he would recede. The election polls were not too close too call those days.

In 1995 I prepared another visit to the United States to work on a study on groundwater governance in the State of Florida, in order to make a comparison with my Dutch case study for the previous mentioned EU project. Florida has particular similarities with the Netherlands in the field of groundwater pollution problems. I could make use of a preliminary study conducted by

Ellis Brand (nowadays Ellis Immerzeel), who participated in 1994 in the exchange program with Auburn to write her master's thesis for the University of Twente. My visit to Florida in the fall of 1995 was made possible with a travel grant from the Netherlands Institute of Government (NOB) and the warm support of Walter Rosenbaum, professor of political science at the University of Florida, who submitted a stimulating letter of invitation. I stayed for three months in Florida together with Loret Plettenburg, who was affiliated as a master's student with CSTM. The research period in Florida offered her an opportunity to write a master's thesis on an aspect of groundwater governance complementary to the subject that Ellis Brand dealt with. Loret and I interviewed about 80 people across the State of Florida and drove by car about 12.000 miles in 9 weeks. It was a wonderful journey. In the margins of our travel schemes we had a chance to experience the unspoiled beauty of 'living waters' like the Ichetucknee Springs in the north and the Corkscrew Swamp in the south. In Florida I learned to see wetlands, and started to appreciate the flat Dutch landscapes much more. I also learned how much Florida and the Netherlands have in common as far as water management is concerned. Not only do the Florida water management districts resemble the Dutch waterboards, but both are also making a strong effort of ecosystem restoration after decades of engineered interventions in water systems that were formerly quite natural. I wish to thank Dave Huitema and Loret Plettenburg for their great company and friendship during both research periods in the United States.

I am especially grateful to my promotor Hans Bressers who guided me to build this dissertation on a variety of research projects. He played a very supportive role in the elaboration of concepts, and was stimulating when I needed it to keep the dissertation project going. He has a remarkable ability to create solutions in situations where other people only see problems. We developed a good way of cooperating, which worked quite well in the European projects we did together. The pleasant aspect of attending a foreign conference with him is that you always find a way to do the most important sightseeing in cities like Barcelona, Seville, Pisa, Milan, Turin, Lausanne, Bern, Tours or Paris. I also highly appreciate the continuous efforts he made over the past 15 years to keep the CSTM institute steady-going within university surroundings that have often been rather turbulent. In this context I also wish to thank my colleagues at CSTM for their contribution to a comfortable working climate at CSTM, which was definitely helpful to get this dissertation done. I would like to give special thanks to Ada Krooshoop, who did all the editing work for this dissertation. Furthermore, she has been helpful to offer assistance on dissertation matters under all circumstances. I also wish to thank Mike Maier and Katharine

Owens - American native speakers at CSTM - who provided important help in the final dissertation phase with language editing.

Since 1999 I have not only been affiliated with the university, but also with 'Waterschap Regge en Dinkel', the waterboard for the Twente region where I am an elected member in the executive committee. At the end of 1998 I ran for a seat in the waterboard as a delegate for my district Enschede. My running mate in the elections was Dave Huitema and we tried to be a sort of Clinton-Gore ticket. Anyway, we developed and implemented a campaign strategy that proved to be successful. That was the start of six years as an elected administrator in water management practice. While holding the portfolio 'finance and economic affairs', I learned to see in terms of performance indicators. That inspired me to write a dissertation chapter about the public performance and the efficiency performance of water services. I am grateful to Paul van Erkelens for his comments on a draft of this chapter. Also to write in this dissertation about the evolution of water regimes in the Netherlands, it was helpful for me to lean on what I learned from water management practice at the waterboard. Furthermore, I always welcomed my days at the waterboard as a pleasant variation on my university job. I am very grateful to my colleagues in the executive committee and the management team of the waterboard for their fraternal spirit. In this administration period we developed and implemented the most ambitious program ever, and we may be proud on the results that have been achieved over the past six years. Never change a winning team, they say. But change logically comes with new elections, which make democracy work at the waterboards.

I wish to specially thank my family (in particular my parents-in-law) and friends for all the moments that they allowed me to work on this dissertation when I actually had to join family life. My dear children Emmilie and Anne-Sofie get the party I promised to celebrate the completion of this piece of work. I am deeply grateful to my parents for the windows of opportunity they created for me in life. I am looking forward to have them joining my dissertation day. The final note is for my wife Josee, and includes the lyrics of an American song I often try to play the Harry-Connick-way on the piano: "If they asked me I could write a book / About the way you walk and whisper and look / I could write a preface on how we met / So the world would never forget / And the simple secret of the plot / Is just to tell them that I love you a lot / Then the world discovers as my book ends / How to make two lovers of friends"!

Stefan Kuks
October 2004

PART FOUR
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Chapter 1

Introduction

The human dimension in water governance

'Water', one of the most precious natural resources, is firmly on the international agenda. For instance, the Second World Water Forum in The Hague on 17-22 March 2000, which I attended for one day, underlined the importance of considering water as a basic human right. The Forum participants called the urgent attention of the Ministerial Conference to the water crisis that the world is now experiencing. This crisis affects us all, particularly the poor and vulnerable in society - a majority of whom are women and children in the South - as well as the environment. Water is not only considered essential for human health (drinking water and sanitation), it is desperately needed by millions of poor women and men in rural areas for productive reasons: to grow the family's food or to generate income. To preserve water resources, there are many challenges that must be tackled locally, nationally and internationally. This is not only a matter of assigning and redistributing access rights to water services. It is also a matter of participation, including the rights by communities to manage their own water resources, if they can do so without government intervention and without harming the rights to water services of others downstream or the environment. Key issues that are debated worldwide concern the issue of privatization and the issue of full cost recovery of water services. Although at the Water Forum it was advocated that the provision of water services should not be the exclusive business of governments, a lot of disagreement existed about the extent to which it might be the business of private companies. It was also agreed at the Water Forum that providing water services should not be free of charge. Although the costs of water services should be fully charged to users, based on management that is accountable to them, there is still a lot of debate about the extent to which appropriate subsidies may be made available to low income groups (World Water Council 2000).

There is a huge variety of water issues that contemporary society has to deal with. Not only issues of health, sanitation, pollution, access and shortage, but also issues of flood. Scenarios on global warming and climate change predict that water will become a threat for all low-lying areas across the world. Because this dissertation has been written from a Dutch perspective, it deals a lot with Dutch water issues and the way in which these issues have been handled in the Netherlands. Prominent water issues in the Netherlands are flood protection and water pollution prevention. We want to investigate how collective action with respect to Dutch water issues has evolved, in which context it is achieved, how this context is changing, and how shifts in the context lead to shifts in collective action. We are not only interested in collective action by governmental authorities in terms of public policy making; we are also interested in collective action by non-governmental actors in terms of participation and self-organization. We want to learn from the case of the Netherlands compared to other European countries which share a common European policy background (part two of this dissertation), as well as to the American state of Florida that has particular similarities with the Netherlands in the field of groundwater pollution problems (part three of this dissertation).

This introductory chapter will survey the human dimension in the history of water governance, to discover the various institutional aspects of the governance concept. We already find primitive forms of water governance (flood protection and water drainage) in the middle ages. These were bottom-up initiatives of landowners, which still exist as water boards (section 1.1). Water governance in a more centralized form appeared around 1800, at the end of the age of enlightenment and after the French revolution, when many European states developed a civil code. It was the start of the development of a public domain, which mostly dealt with the engineering of large water works (section 1.2). In the 1960s the traditional approach of water engineering became criticized. New stakeholders entered the arena around water policy making, which politicized water engineering. Since then, the human dimension of water governance became more apparent (section 1.3). In the 1990s society became aware of the limits to human control. A new co-evolutionary perspective on living with the natural dynamics of water has been adopted (section 1.4). The human dimension of water governance points at several institutional aspects of the governance concept that we touch on in section 1.5. It is a useful leg up to chapter 2 of this dissertation in which we deal with a more specific elaboration of the governance concept. In section 1.6 we stipulate the main questions of the dissertation, and explain the outline of the dissertation as well as the order of the chapters.

1.1 The interpretation of floods in the Middle Ages and renaissance

In 1508 Michelangelo started work on the frescoes of the Sistine chapel ceiling in Rome. One of his first panels was 'the flood', based on the Genesis story in the Old Testament. At that time Michelangelo had hardly any experience in the fresco technique. His trial and error method of working slowed down the realization of the first panels, which disappointed his employer pope Julius II. The realization of the flood panel was also complicated by the huge amount of human figures he had chosen to depict in unusual, intricate and anatomically correct postures. For Michelangelo the painting of the flood was not only an artistic challenge, it also had an outspoken religious meaning to him. He was used to considering heavy weather events as punishments by a wrathful God. Years later, when Florence and Rome struggled with river floods due to heavy autumn showers, he remarked that this would punish the Italians for their shameful sins. Michelangelo's hell and damnation thinking and the inspiration for his flood panel date back to his youth in Florence, where in 1492 the whole city was under the spell of the Dominican friar Girolamo Savonarola. His horrific sermon in the Santa Maria del Fiore narrated terrifying visions with daggers and crosses against a dark thunderous sky above the city, a forecast of heavy trials and adversity for the Florentine citizens. The deluge in Genesis was an evocative image for Michelangelo, which did not remind him of the power of nature, but of the furious Old Testament God as envisioned by Savonarola's apocalyptic preaching. The flood panel depicts human figures trying to save their properties from the rising water. It is believed that Michelangelo must have witnessed various evacuations of people living along the Tiber in Rome and the Arno in Florence in high water periods. The flow of the Tiber was not controlled by dykes and the river regularly overflowed its banks. In 1506, when the Tiber suddenly flooded due to heavy rainfall, Michelangelo himself experienced the loss of a load of marble in the harbor of Ripa, three kilometers downstream from the Vatican (King 2003).

This story illustrates that in the era of Michelangelo it was not unusual to consider flooding as a result of the failures of human beings in relation to God, and not as a failure of water governance as we call it today. However, there is also evidence that already in the Middle Ages people were used to interpret flood damage as the result of insufficient collective action. In 1421 the Netherlands experienced one of the most radical flood disasters of the Middle Ages during the night from 18 to 19 November. This disaster is known as the Saint Elisabeth Flood, named after the feast day of Elisabeth of

Thuringen. In one night the Saint Elisabeth Flood turned a large and prosperous polder of about 30,000 hectares into an inland sea in the delta area of the Maas southeast of Rotterdam, which had been surrounded by dykes for more than 150 years. According to written tradition about 70 villages and neighborhoods disappeared and about 4,000 people were drowned by the high water. The flood could be so devastating because of a neglect of dyke maintenance and control, which caused several weakened dykes to burst. In fact, disputes between followers of the counts of Burgundy and followers of the counts of Holland, known as the "Hoekse en Kabeljouwse twisten", resulted in a sort of civil war taking away the time and money that had to be invested in dyke maintenance and control.

Although water could be an enormous threat due to unpredictable weather conditions causing floods, it also attracted people to set up settlements close to navigable rivers or in delta areas where harbors and halting places for shipping traffic could bring prosperity to local communities. In the Netherlands, as early as the 11th and 12th century, local communities started to organize themselves to manage water in order to protect settlements and cultivated land against high water. Dykes were built to protect against flooding for the sea and the rivers. At that time, removal of peat (used as fuel) and clay (used as building material) was already causing land subsidence, demanding additional measures. The first democratic district water boards were established in the 13th century. The rulers of the Dutch republic soon recognized them as competent water authorities. They were democratic stakeholder organizations consisting of elected representatives from local farming communities. In the Netherlands, these water boards may be considered the first attempts towards systematically organized water governance.

1.2 The development of a public domain and a state corps of water engineers

For a long time the Dutch water boards remained rather autonomous organizations, independent from the central government. However, throughout the 18th century various flood disasters in Dutch river basins demonstrated that the rather small-scale approach of water boards lacked central coordination and a broader scope. At that time many people were concerned about the devastating impact of these flood disasters, which threatened the safety and survival of large parts of Dutch territory. It was evident that the fragmented water governance system, ruled by provinces and water boards, was losing its grip on the situation. However, de-

centralized authorities were not willing to give up even the smallest part of their jurisdiction. Another obstacle was that private landowners in the flood plains could assert their rights by obstructing public intervention. Nevertheless, by the end of the 18th century the criticism of water managers gave an impetus to a movement of state reformists to politicize water management and to plead a more centrally governed unitary state. In 1795 the reformist ideas got a chance when the French invaded the Netherlands, wiped out the existing 'Republic of the Seven United Provinces', and allowed the reformists to establish a Batavian Republic (1795-1806). In 1798 the new republic adopted legislation which allowed the central government to exercise supervision over all de-central public authorities with a water governance task. Related to this, a state water authority ('Rijkswaterstaat') was established as a corps of engineers that would take the lead in a nationally coordinated approach to water governance. In practice, this appeared to be a form of extreme centralization resulting in great tensions between the state and provincial authorities. During the following Napoleonic era (1806-1813) the French rulers vigorously pursued their centralization of water governance (Bosch 2001). In fact, the establishment of Rijkswaterstaat in 1798 marks the transition from a local, uncoordinated approach to tackling water problems in the main water systems based on a nationwide overview.

The Dutch transition in water governance at the end of the 18th century was not alone in Europe. The 18th century had been the 'age of enlightenment' in which French philosophers appealed to the autonomy of reason and to the emancipation of science from theological dominance. First of all, this implied that flooding should no longer be seen as a punishment from heaven, but as a natural phenomenon on which mankind could anticipate. It created community spirit to undertake public action in the field of water governance. But also important, the philosophers of the enlightenment introduced natural rights into practical politics: liberty of the person, security of property and freedom of discussion were now considered commonsense views on fundamental human rights. The French revolution proclaimed individual freedom, the liberation of property, and the abolition of privileges for the upper class. This resulted in a clear distinction between public law and private (civil) law with three intentions: (1) to detach political rights from ownership of land; (2) to prevent public authority falling into private hands and being traded as private property rights; (3) to prevent arbitrary public interventions in private property. The constitutional reforms and civil codes introduced in many European countries in the first half of the 19th century, reflected the political liberalism, proclaimed by the French revolution, and the upcoming economic liberalism in the early 19th century. The economic

liberalism movement proclaimed that the public government should not intervene in the free play of economic forces. The economic order would perform best with every individual pleading its own interests. In general, the first civil codes in Europe declare that property is the right to freely enjoy a matter as well as the right to completely dispose it and to use it. However, this right could be restricted when it comes into rivalry with civil rights of other property right holders, or if a public interest, defined by public law, should prevail. If someone enjoys a property that harms the public interest, he could be forced to surrender it (expropriation) in exchange for compensation for property loss. These limitations place severe restrictions on the extent of private property, especially in the case of flowing water (Van den Bergh 1979).

The early 19th century was the start of both the protection of civil property rights and the development of a public domain from which the private domain could be restricted. During the 19th and 20th century, the evolution of the property rights structure has shown for many countries that the State increasingly requires allowance of public use as a limitation on private property. In general, countries have been moving to a model in which public law has become more and more relevant for the State to gain resource control for the public interest (Young 1982; Van der Hoeven 1989). As far as water governance is concerned, under the influence of Napoleon, who strongly adhered to State intervention and central regulation, many rivers were made State property for reasons of navigability and military defense. State agencies were established to pick up flood protection, dyke fortification and the engineering of other large water works. Reducing the effects of unpredictable flooding and improving the use of rivers as a means for transport should not only be left to bottom up initiatives by private owners or local communities.

In the 19th century states were not only concerned with protection against water as a threat (the governance of flood protection and water drainage), but also with the distribution of water as a source of life (the governance of water distribution, irrigation and water shortage prevention). For instance in Spain, an 1879 Water Act re-organized institutional arrangements for surface water allocation, as previously introduced under Muslim rule on a national scale. The modernization (in the early 20th century) of agriculture, industrialization and the growth of the cities led to the development of a large-scale water storage and transfer infrastructure. In 1926 the ‘Confederaciones Hidrograficas’ (Drainage Basin Authorities) were created to group all major water users of each river basin, and to allocate the water

resources made available by major hydraulic engineering works. (Costejà e.a. 2004).

1.3 The politicizing of water engineering and the discovery of the human dimension

Until the 1960s of the 20th century, water governance in many states appears to be dominated by an 'engineering approach', resulting in artificial solutions for water resource problems and generating other resource problems. For instance, engineered systems for irrigation and drainage lead to improvement for specific purposes, but they also cause water depletion and disrupted ecosystems of watercourses. In Spain the very uneven seasonal and geographical distribution of water supply and demand has led to the construction of an extensive water storage and redistribution infrastructure. In the Netherlands the need to protect the land from high water and the tradition of artificially draining low-lying areas have given the country a complex hydraulic infrastructure. The flow and level of almost every water system in the country is artificially controlled. In many countries the traditional approach to providing flood protection has been strongly biased in favor of providing engineered measures (embankments, canalization, and so on) to keep floodwaters away from human settlements. However, from the 1960s on this traditional engineering approach became criticized, concurrent with a discovery of the human dimensions of water governance.

First, there has been increasing attention from the 1960s on the negative effects of engineered water works. The Netherlands, for instance, struggled with critics from various groups in society on the predominant civil engineering orientation in Dutch water management. In fact these criticisms, which started to find expression in the 1960s and 1970s, politicized water management and initiated a debate in society on water values. The critics placed a greater value on the meaning of 'open' water for recreation, nature conservation, water storage, and the experience of unspoiled space in an already crowded and highly planned country. The intensification of agriculture since the 1950s and the related canalization of natural watercourses and deterioration of landscape were also criticized. These criticisms resulted in a more participatory process of water policy making and a gradual greening of water engineering. From the 1980s on, nature conservation and ecosystem protection became focal points of water management. Water engineering solutions nowadays must take into account the resilience and natural dynamics of the ecosystem (Disco 1998).

Second, there has been a shift from curative solutions for water pollution problems (building water supply and sewerage networks, and constructing installations for water purification and treatment) to a more preventive orientation focusing on target groups and influencing their polluting behavior. Industrialization, urbanization and population growth in the first half of the 20th century increased the demand for better housing, water supply and sanitation. After World War II and during the period of economic recovery, this tendency continued strongly, and raised concerns in the 1950s about how to meet the demands for natural resources by a growing economy and a growing population, which was demanding a higher living standard. Dutch society had to shift gradually from supply oriented water management to demand side regulation. In the meantime, there was a growing awareness that sanitation measures would not be enough, and that something should be done about the increasing pollution of water resources related to the expansion of economic activities after World War II. Around 1970, many European countries, on the basis of international agreements, adopted legislation to protect surface water quality and to stimulate preventive behavior. Consequently, the causal relation between groundwater quality and diffuse pollution from agricultural sources gained attention and resulted in preventive strategies to affect farming practices. The delayed effects of past pollution through underground water on our future water supply stock have stressed the importance of a preventive approach.

Nowadays, we are aware that both the space dimension and the time dimension of water governance are important. Space makes us aware that water cannot be dealt with in an isolated, controllable way or just only as a commodity, but also that the relationship of water with its natural environment should be taken into account. Water is part of the ecosystem, as is the use and transport of water by humans affecting the ecosystem. The space dimension also makes us aware of scale issues. Water governance, or lack thereof, may have effects that cross boundaries of local, regional and even national administrations. For instance, river floods in the Dutch trajectory of the Maas can be prevented to some extent if French and Belgian authorities take measures that give more room to the river upstream. The river basin approach, introduced by the European Water Framework Directive in 2000, also advocates rethinking the scale of governance and to cooperate and coordinate on the scale of river basins as a whole, especially with respect to aspects of water quality.

The time dimension of water governance makes us aware that human activities in the past may have an enormous impact on the future. This includes pollution that is underway and affects the quality and availability of

water resources for the future. In the Netherlands, an alarming scenario report by the research institution Alterra in 2003 predicted that the 2015 targets of the European Water Framework Directive would still not be met if we stop today with farming on two third of the Dutch agricultural area (Alterra 2003). The time dimension is also relevant when we realize that urban or economic development in floodplains of rivers negatively affects the future resilience of the river system and thus might increase the chance on flood damage. More indirectly, there are a lot of theories on the impact of human activities (emissions from traffic, energy production, industries) on a phenomenon that is variously described as global heating, greenhouse effect or climate change. Our human consumption today will have a global impact in the long run.

1.4 The limits of human control and the perspective of co-evolutionary adaptation

Accepting the human dimensions of how water affects our lives, is quite a different attitude than the hell and damnation attitude in the age of Savonarola and Michelangelo. Nevertheless, even 500 years after the thunder and flood that Savonarola forecasted to come down from heaven due to God's ire, there are still human dimensions of water flooding as well as limits of human control to discover. In December 1993 and January 1995 river floods in the Dutch part of the Rhine and Maas river basins resulted in the evacuation of more than 200,000 inhabitants and caused enormous damage to property. In October 1998, another high water crisis in the Netherlands triggered the awareness that the Dutch hydraulic infrastructure is facing increasing problems in keeping high water under control. Although climate change causes a rising sea level and higher rainfall peaks, which strengthens the dynamics of river basins, it is especially human interventions in river basins that have caused an enormous loss of space which is needed to store excessive quantities of water. Past land use decisions have not accounted for a delta area completely relying on artificial control of water levels, and needing space along rivers to allow river levels to rise and fall in a natural way. Water management has always served land use decision making, but people became aware that it should be the other way around: land use planning should consider water as a guiding principle for decision making. Nowadays, the challenge faced by the Netherlands is to harbor water in a crowded delta area.

Despite what we learn from every flood we encounter, there are still 'thunder and flood' disasters that we may understand and forecast, but that we cannot

control. In 1992, when I stayed for a few months in the Southeast of the United States and visited Florida to survey if water governance in this state would be an interesting case study, I witnessed the devastating effects of Hurricane Andrew which in August of that year slammed into South Florida. The hurricane devastated Homestead, Florida City and parts of Miami, then continued northwest across the Gulf of Mexico to strike the Louisiana coastline. In all, the storm caused 15 deaths directly, 25 deaths indirectly and $30-billion in property damage, making it the costliest disaster in U.S. history at the time. More than 250,000 people were left homeless; 82,000 businesses were destroyed or damaged; about 100,000 residents of south Dade County permanently left the area in Andrew's wake. Andrew also had a severe impact on the environment: it damaged 33 percent of the coral reefs at Biscayne National Park, and 90 percent of South Dade's native pinelands, mangroves and tropical hardwood hammocks. It is difficult to be prepared to a hurricane and to anticipate as we can anticipate river flooding. We can anticipate it in the short term with the help of a weather forecast and some protective measures, but we can hardly control it by means of preventive measures in the long run. There is a stream of co-evolutionary thinking in multidisciplinary scientific approaches of ecosystem and water governance which emphasizes that human responses to natural disasters are not so much a matter of improving control but more a matter of human adaptation to changes in ecosystems (Gunderson, Holling & Light 1995; Jeffrey & McIntosh 2004). So, besides attempts to improve control, water governance could also be based on the strategy of learning to live with the force of nature and adapting to the natural dynamics of water.

It seems that an adaptive strategy is more difficult to accept in societies where a high level of flood protection already exists and where the population is habituated to it. A Dutch study on 'water consciousness' among the population learned that people only appreciate policies that aim at more natural dynamics in water systems if the existing level of high water protection remains guaranteed (IVM 2003). A high public performance in the field of flood protection results in a decreasing disaster tolerance. It also seems that an adaptive strategy is more difficult to accept in a risk-society where risks are increased by a high density of inhabitants, industrial activities and transportation networks in the same area. Due to an increased impact of disasters in such high-density societies, they tend to be more risk averse and have a lower disaster tolerance (Rosenthal 2001). The challenge of course is to use an adaptive strategy as a means for risk avoidance and to explain to the public the sustainability rational of making water systems more resilient.

1.5 The conceptual understanding of water governance

In the beginning of this chapter we used the term 'water governance' for collective action to address water issues. For instance, the first water boards in the Netherlands could already be labeled as institutions for water governance, because they were self-governing networks of actors, irrespective of their legitimacy as official government authorities. Besides the use of the term 'governance' for self-organizing networks, other uses are also distinguished in the recent literature, such as the minimal state, corporate governance, the new public management, good governance and socio-cybernetic system (Rhodes 1996). In his analysis of the concept of governance, Rhodes makes a distinction between chaos of the unregulated 'market', the overly rigid notion of 'hierarchy' established by a traditional bureaucratic government, and 'governance' which he defines as an emergent property of self-organizing, inter-organizational networks. Björk and Johansson (2000) have formulated the following notions that constitute a common ground and the lowest denominators for a governance theory. Such a theory:

- is about the society governed with new means and methods, which create new prerequisites for organizing societal actors;
- points out that actors are coordinated in other ways than through traditional hierarchies;
- is about the state having ambitions to govern and thereby the state as a more or less important actor;
- is not primarily about the outcome, but about processes in a more or less static political system;
- is not normative.

In chapter 2 of this dissertation we elaborate more on the concept 'governance' and how we want to use it for our research. In this chapter we want to abstract from the described evolution of water governance a few issues, which we think matter for a governance theory.

We first want to mention the *level issue*. This governance issue is about the fit between the hydrological scale of water systems, the problem scale at which water problems become manifest, and the administrative scale at which water problems and the human solutions to those problems are administered. We noticed that the space dimension of water governance leads to the awareness that the solution to a water problem might be found in an area other than that in which the problem is experienced. For instance, the Netherlands experiences as a downstream country, the delta of four European river basins: it has to receive excessive river flows, which may be

reinforced due to river canalization in upstream countries, as well as pollution from transboundary sources. This has consequences for the spatial dimension of the river system, as well as for the potential use of downstream river water as drinking water.

A second issue we want to mention is the *participation issue*. We have seen that water governance is no more a matter of isolated engineering. The politicizing of water engineering has created an arena through which a broad variety of interest groups and other stakeholders want to be involved and participate in decision making. Water governance has also become more complex due to an expansion of the public domain and increasing interrelatedness with other policy sectors (land use planning, environmental management, nature conservation). The process of policy making requires more interactions with policy making in other policy sectors.

Third we perceive the relevance of a *perspective issue*. The interpretation of water problems varies over time and among stakeholders. This is evident by the paradigmatic change of water governance in the Netherlands in the 1990s, where new river floods have fundamentally changed the perspective on flood protection. The adoption of an adaptive strategy is still controversial. In general, different stakeholders have different perspectives on the structure of water problems and the solutions that they think are needed.

Fourth we have seen that the *property rights issue* does matter as an issue of governance. The transition in European states after the French revolution has settled a demarcation between the public and the private domain. Since then, the public domain has expanded, resulting in an increasing communalization of the use of water resources. Privatization tendencies in the late 20th century have reopened the debate on the desired public/private divide in water governance.

A fifth issue of governance could be the *steering issue*, which is about the question of how to control human behavior that affects water. This issue directly results from the discovery of the human dimension in water governance. Excessive use and pollution of water resources need regulation of human behavior. Three steering models are often debated: the regulatory model based on a command and control strategy, the economic steering model based on financial incentives, and the communicative steering model based on knowledge and opinion transfer.

A final issue we perceive as important is the *implementation resources issue*. Water governance needs all kinds of resources to become effective. The transfer of such resources could be rather complicated and also raises the question of how efficient water governance could be. One could think of spatial resources in terms of land property that is needed for the realization of water works and for the allowance of more natural dynamics in river flood plains. The transfer of this resource type raises questions about expropriation and compensation for property loss. One could also think of financial resources, needed for the production and delivery of water services. In this context three financing principles are often discussed in relation to water governance: the principle of full cost recovery, the affordability principle, and the polluter pays principle. Finally one could think of information resources that are necessary for water policy making, for monitoring water systems, and for monitoring human behavior in order to enforce regulations.

1.6 The questions and outline of this dissertation

This dissertation is about water governance and institutional change. The focus on water governance means that we are interested in collective action with respect to water issues, which is not restricted to government action by public authorities, but includes involvement and participative action by private stakeholders. Furthermore, it means that we are not only interested in the 'action aspect' of collective action, but also in the complexity of the institutional context in which collective action is embedded and achieved. The focus on institutional change means that we are interested in the evolution of the public domain, the interaction with the private domain, and the shifting boundaries of the public/private divide.

We will start this dissertation with an elaboration of the governance concept. What are the elements that constitute a water governance structure? Although the concept recognizes that the state is an important actor having ambitions to govern, it also advocates looking at the ambitions and role of non-governmental actors in collective action with respect to water issues. We will search for an elaboration of the governance concept that takes into account multi-level, multi-actor, multi-perspective, multi-instrument and multi-resource aspects of collective action. We also want to understand the role of property rights in water governance, especially the demarcation between the public and private domain. We will try to link the governance concept to the concept of resource regimes, which is better equipped to consider natural resources from a property rights point of view. After having identified the constituting elements of a governance structure and a resource

regime, we are interested to learn about the dynamics of water governance. How can shifts of governance be explained? What triggers generate shifts of governance? What conditions determine if triggers have an effect? What are the implications of shifts in governance for the demarcation between the public and private domain? In addition, we are interested to find and understand examples of water governance in which non-governmental actors have played an influential role. To summarize, we formulate five research questions that are central in this dissertation:

1. *How can we elaborate the elements of a water governance structure, if we want to understand shifts in governance?*
2. *What are the main institutional shifts in water governance that can be perceived in the Netherlands and in a wider European context?*
3. *How can these water governance shifts be explained in terms of institutional conditions that determine - as intermediate mechanisms - the change effects of external triggers?*
4. *What are the implications of governance shifts for the demarcation between the public and private domain?*
5. *What institutional lessons can be learned from governance arrangements in which non-governmental actors do play an influential role?*

The chapters of this dissertation have been produced as independent papers, articles, book chapters or deliverables for various research projects. Some of them have been integrally published before; others are largely or partly based on earlier publications. At the end of this dissertation a more detailed account for the earlier publication and co-authorship of chapters can be found. Despite the independent project based production of the various dissertation chapters, we believe that the research programmatic agenda behind the various projects creates a degree of coherence between the subsequent chapters, as we demonstrate below.

In the *first part* of this dissertation we deal with the theoretical framework for the various studies that follow. This part deals with the first research question of the dissertation: “How can we elaborate the elements of a water governance structure, if we want to understand shifts in governance?” In chapter 2 we elaborate the governance concept into elements that constitute a governance structure. The elaboration connects with the scientific work of various scholars in the policy science field. While chapter 2 focuses on the management of natural resources from a public domain (although in interaction with private actors), chapter 3 focuses on the management of natural resources in a broader sense. Chapter 3 deals with a regime theory on the interaction between the public and the private domain. It also takes into

account the domain of collective property and the 'no property' (res nullius) domain. Regime theory is based on the notion that property rights determine the accessibility of water systems as a natural resource for various users and use functions. Both chapters not only elaborate the elements of a governance structure and a resource regime, but also deal with the institutional dynamics of governance and resource regimes. They identify conditions that determine both the stability and the dynamics of governance structures and resource regimes.

The *second part* of this dissertation is compiled of several studies on water resource regimes in Europe, both on a national and a local (water basin) scale. This part deals with the second, third and fourth research questions of the dissertation: "What are the main institutional shifts of water governance that can be perceived in the Netherlands and in a wider European context? How can these shifts of water governance be explained in terms of institutional conditions that determine - as intermediate mechanisms - the change effects of external triggers? What are the implications of governance shifts for the demarcation between the public and private domain?" The chapters in part two have been produced in the context of the international research project Euwareness (European Water Regimes and the Notion of a Sustainable Status)[1], of which the author has been coordinator together with the promotor of this dissertation. The main question for the researchers in this project was whether the regime for the management of a water system provided sufficient guarantees for its sustainable use, by diminishing or preventing rivalries between users and use functions. The following sub-questions have been discussed: Do integrated water regimes lead to more sustainable water use? What are important indicators for integrated water regimes? Under what conditions can integrated water regimes be achieved? What could be the influence of Europe and national conditions, to achieve regime transitions at water basin scale? Chapter 4 of this dissertation deals with the evolution of the water regime in the Netherlands on a national scale during a two-hundred-year period, mainly focusing on the most recent 50 years. We identify the main transitions in the evolution of the national water regime and try to find the explaining triggers and conditions. Chapter 5 compares the evolution of the Dutch national regime with the national regime evolution in five other European countries: Belgium, France, Spain, Italy and Switzerland. This chapter evaluates the various stages of regime evolution that these six countries have achieved, and identifies the most influential triggers and restraints to regime change across Europe. The

[1] The Euwareness project has been funded under the 5th Framework Programme of the European Union (contract number EVK1-CT-1999-0038) and co-ordinated by the University of Twente (CSTM).

following two chapters shift the attention from the national level to regional and local level cases. Chapter 6 includes an in depth analysis of the most recent regime transition in the Netherlands on the scale of two water basins: the IJsselmeer basin and the Regge river basin. Although this chapter starts with a brief recapitulation of the regime evolution on a national scale over the last 50 years, as discussed in chapter 4, sets the national context in which the case studies at basin scale have taken place. Chapter 6 includes an analysis of the causality between triggers, conditions, regime changes and effects in terms of resource sustainability. Chapter 7 is based on a comparison of twelve case studies at basin scale across the six countries that were involved in the Euwareness project, including the two Dutch case studies that have been described and analyzed in chapter 6. Chapter 7 starts with a recapitulation of the analytical framework as described in part one, but further specifies this framework as far as necessary for the comparative analysis of the twelve European case studies, especially concerning the conditions that determine whether triggers ('change agents') generate regime change.

The *third part* of this dissertation selects the agricultural pollution of groundwater sources that are needed for drinking water supply as a special case of water governance. One of the most interesting features of this case is that it allows us to look closely at the role of two non-governmental actors in water governance that are rather well organized: the agricultural sector and the water supply sector. The case study demonstrates the limited control capacity of governmental actors and their dependence on the self-organization of private and semi-private sectors in society. The structure of groundwater governance includes institutional gaps that in the Netherlands and several other European countries have been bridged by negotiated agreements between water suppliers and farmers. These negotiated agreements are examples of institutional arrangements on the edge of the public and private domain. Therefore, part three deals with the fifth research question of the dissertation: "What institutional lessons can be learned from governance arrangements in which non-governmental actors play an influential role?" Chapters 8 and 9 have been produced in the context of the international research project 'Water supply authorities in Europe preventing agricultural pollution' that was designed by the author together with the promotor of this dissertation.[2] Chapter 8 deals with the case of groundwater governance at the national level in the Netherlands. It identifies the problem context, the regulatory context (at national and European level), as well as

[2] The project 'Water supply authorities in Europe preventing agricultural pollution' has been funded under the 4th Framework Programme of the European Union (contract number EV5V-CT94-0368) and co-ordinated by the University of Twente (CSTM).

the network context. The network context analyses the institutional dynamics of agricultural issues in the water supply sector as well as the institutional dynamics of environmental issues in the agricultural sector. Chapter 9 deals with the consequences of the national context for institutional arrangements at the regional level in the Netherlands. It explains how negotiated agreements between water suppliers and farmers are settled in a setting of specific motives and resources on both sides. Negotiated agreements are interpreted as a transfer of resources based on resource dependency and resource susceptibility. In chapter 10 we compare the Dutch case of groundwater governance with a similar case in the American State of Florida.[3] The reason for comparing the governance structure of groundwater and drinking water protection in both states is that the problems underlying the policies in both states display a number of remarkable similarities. Therefore, our questions are: Do different states that have similar problems develop similar governance structures? Or are there conspicuous differences? If there are differences, how can these be explained in terms of institutional conditions that determine the stability and dynamics of a governance structure?

The *fourth part* of this dissertation deals with market forces in water governance. In this part we revisit the fourth and fifth research question of the dissertation: "What are the implications of governance shifts for the demarcation between the public and private domain? What institutional lessons can be learned from governance arrangements in which non-governmental actors do play an influential role?" In the previous part, chapters 9 and 10 teach us the importance of keeping the water supply sector on board in the borderland of the public domain. Water suppliers, although a semi-private sector, can function as a key actor for the achievement of more sustainable oriented groundwater governance. To follow up this conclusion, we have chosen for chapter 11 to move to the privatization debate on water services in the Netherlands at the end of the 1990s. As a result of the liberalization of several European markets for utility services, it was debated in the Netherlands to allow more market forces for the production and delivery of water supply and wastewater treatment services. In chapter 11 we analyze this debate as a discussion between defenders of the private domain (the market) and defenders of the public domain. Advocates of privatization

[3] The study of the Florida case has been financially supported with a travel grant from the Netherlands Institute of Government (NIG), and has been facilitated by the Department of Political Science (in particular prof.dr. W.A. Rosenbaum) at the University of Florida in Gainesville (FL). The results of this study have been presented and discussed at the 2nd joint conference of the University of Florida and the University of Twente on 'The Politics of Sustainable Development: Institutions Across Social Scales' in Gainesville (FL) on February 17-19, 2000.

believe it is the best way to save on utility costs and to increase their transparency. Opponents believe that the Dutch water sector already provides high quality services for low prices, while including an additional public performance that is not attractive for the market to take care of. The analysis in chapter 11 aims to clarify this debate and to undo it from its ideological traits by making a distinction between the public performance, the efficiency performance and the commercial performance of water services supply. We argue that the performance of water service providers should not only be assessed in terms of efficiency, but also in terms of the effects on the water system (to be considered as a public performance). We also argue that a public provider in principle could be competitive in terms of efficiency.

In *chapter 12* we end up this dissertation with an epilogue, to revisit the research questions that are formulated in this introductory chapter. It presents a summary and reflections on water governance, institutional change, and the public private divide in water governance.

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Part one

Theoretical Framework

Chapter 2

The meaning of governance

From conception to elaboration

2.1 Introduction

The mission of sustainable development is in several respects an especially demanding form of societal change (Bressers & Rosenbaum 2000: 532-536). This is one reason that in social science studies of sustainable development the concept of 'government policy' often is replaced by the broader term 'governance'. There is growing recognition that government alone does not determine the future development of sectors in society; these are shaped through the interaction of many actors. Within such networks of actors, the government can adopt a position that is more or less central and dominant. This change in view represents a shift in accent from government policy, or 'government', to 'governance'. The governance pattern consists of all the consequences of the interplay among all the actors involved (Kooiman 1993: 258) in interventions to promote sustainability.

In addition, recognition is increasing that sectors in society are not governed on one level, or on a number of separate levels, but through interaction between these levels. These levels often reflect the various tiers of government, but not necessarily; other powerful actors may provide direction at a certain level where no government authority is active. In the same way, actors may also operate on more than one level. Thus, there is a growing recognition as well that policy problems often contain various interacting levels (e.g., environmental problems). This reality poses an issue that has been called 'multilevel governance'. Yet governance is a broad and often confusing term because it is used in many different ways (Peters & Pierre 1998; Lynn et al. 2000a, 2000b: 234; O'Toole 2000: 276). "There are almost as many ideas of governance as there are researchers in the field" (Björk & Johansson 2000: 1). There is clearly a need for more synthesizing of this concept.

This theoretical chapter develops such a synthesis in the form of a governance model to aid in comparing governance structures. In many ways, this is complimentary to ongoing comparative studies of government.

Various contemporary approaches in policy science already focus on changes in government policy when making comparisons (Sabatier & Jenkins-Smith 1993, 1999; Baumgartner & Jones 1993). In addition to a focus on long-term changes in policy (diachronic study), there are also comparative studies of policies in a certain sector and different sectors (synchronic study) that should be facilitated by the governance model developed in this chapter. As far as developments in time are concerned, this is primarily intended to provide indications of the relations between the various elements of the governance structure. Additionally, the model is concerned less about the actual interaction processes (activities and interactions between actors) than with the more structural elements of governance, which form both the inputs and outputs of such policy processes. In the context of this dissertation, we give extra attention to the distribution of governance between various scales and levels.

The central questions of this chapter are:
1. Which elements make up a governance structure?
2. In what ways do changes in these elements influence each other?

In the next section, we develop the model of governance based on various approaches taken in studies of public administration. In developing our vision on the elements of governance, we start with the term ‘policy’ and expand this, using various components, into a ‘governance pattern’. The succeeding section presents a vision of the mutual influences between the elements of governance, including the multi-scale issue. Finally, the chapter ends with a short conclusion.

2.2 Elements of governance

In the literature that sails under the flag of governance and in the more general policy science literature, there is an overwhelming load of components that can and should be included in a synthesis model of governance. At first glance this may seem to make the endeavor a ‘mission impossible’. However, within policy science literature is considerable old wine in new casks; many ‘new’ approaches present only one or two new aspects to what is already known. So it makes sense to state our own starting point, then expend it with specific additions from the literature.

2.2.1 Interaction processes and 'instrumentation theory'

The policy science approach as it developed at the University of Twente emphasizes the policy process as social interaction. Over the years, attention has shifted from viewing policy as a sort of production process with semi-finished and final products to a vision in which actors are the central concern. In this vision, the course and outcomes of the processes depend not only on the inputs to the process but mainly on the characteristics of the actors involved, particularly their objectives, information, and power. All other factors that influence the process do so when they influence the characteristics of the actors involved. This also applies to the influence of policy instruments on behavior. Not all characteristics of actors, however, are determined by policy, and so it is not possible to describe a policy without paying attention to the actors involved in that policy themselves (Bressers 1983).

Moreover, the processes in this vision are not confined to a single series or cycle, but are part of a large number of societal processes in which government authorities sometimes participate and sometimes do not. All these processes are connected to other processes in a complicated web via their inputs and outputs, and possibly indirectly linked to *all* other processes. Each definition of a sector of society draws more or less arbitrary boundary around a cluster of processes in this web. Although the boundaries between policy development and policy implementation often are diffuse, in research practice they are often drawn to coincide with those between higher and lower tiers of government (Bressers & Honigh 1986).

What we call an 'instrumentation theory' stems from these perspectives. It focuses on the effect of policy instruments on target groups of policy (Bressers & Klok 1988; Klok 1991; Bressers 2001). It also recognizes that instruments do not influence the characteristics of the actors involved separately but rather collectively as an 'instrument strategy'. Policy instruments and strategies have various properties - for example, a certain relationship between target group behavior and government reaction to this behavior, or giving resources to or taking resources from the target group. Such properties of instrument strategies affect their applicability in practice. Klok emphasizes that some of the instruments are designed to give those implementing a policy the power to apply other instruments (Klok 1991: 176-194) and also that the implementing organizations depend on sufficient capacity and expertise (Klok 1991: 163-164; Bressers 1983: 218-237 and 256-274). In his thesis Arentsen (1991) exhaustively discusses the relationship between the policy organization and policy implementation.

Later publications on this approach (Bressers & Kuks 1992; Bressers, O'Toole & Richardson 1994; Bressers, Huitema & Kuks 1994) have paid

more attention to the interrelations between the actors, including actors that do not directly participate in the processes under examination. Klok (1995) gives primary importance to the allocation and removal of resources in such relations and in the classification of policy instruments. The relationships between actors within such policy networks are seen as an important factor in the development of the content of policy (Bressers 1998; Bressers & O'Toole 1998; Ligteringen 1999). In addition, the relationship between policy processes at the various administrative levels is explicitly dealt with (Bressers, Kuks & Ligteringen 1998). During this theoretical development, the approach to policy as an interactive process and the instrumentation theory based on it gradually grew into an integrative policy science approach, uniting elements from a variety of other approaches.

This brings us to the provisional elements of governance: (1) Administrative and other scale levels; (2) Actors in the policy network; (3) Policy objectives; (4) Strategies and instruments; and (5) Organization and resources of implementation. In the next sections we compare these elements with issues emphasized in a part of the literature that deals explicitly with 'governance' and also propose some limitations of our elaborated model.

2.2.2 Governance literature

If one examines the literature in which the term governance is prominent, the first impression is diverse definitions and different contexts. We must inevitably make an initial choice among this diversity of approaches. The following discussion introduces the way we use the term 'governance' in relation to the conceptual diversity of uses in the literature.

Rhodes (1996) lists six categories of publications on governance. Our impression is that two of these differ rather strongly from the other categories, in both interpretation and context (see Björk & Johansson 2000: 1). Corporate governance comprises a large number of theories and studies on the management of companies, often from a stakeholder perspective. Good governance is often used in development studies to indicate the administrative capacity as the context for sustainable or otherwise successful development. In these two categories the term is generally used in about the same way as we would use the term administration.

The other four categories, in our opinion, are more closely related to each other and to the debate within the policy science community.[1] Rhodes (1996)

[1] A seventh school, not mentioned by Rhodes but discussed in numerous publications, is that of international governance. Within the field of international relations, it has long been usual to refer to the administrative relations within and between various international organizations and associations by the term governance. Many of these publications use the term without further explanation, suggesting an implicit meaning much the same as public

identifies the four categories of literature that are most relevant to our concern with defining governance as the minimal state, new public management, socio-cybernetic systems theory, and self-regulating networks. The factor common to all is that they search for forms of coordination that do not fit comfortably with the market-hierarchy distinction (compare Arentsen & Künneke 1996; Rosenau 2000: 11-16) once common to governance theory. At the beginning of the 1980s, there was talk of overloaded polities in which "regime stability is threatened by…the related problems of governmental effectiveness and popular consent" (Rose 1980: 107). The reaction to this was advocacy of less state and more market. Thinking in terms of governance is also an answer to the erosion of the state literature during the 1980s. Rhodes (1997: 19) writes: "The process of hollowing out…is central to understand the shift from unitary state to a differentiated polity." Instead of discussing these four categories separately (see Björk & Johansson 2000: 3-7), we prefer to introduce another distinction.

Each of these approaches is built to some degree from empirical observation but, more importantly, a non-normative vision. This normative bias almost always implies that a more limited role or presence of government authorities delivers better governance. This bias is weakest in the socio-cybernetic approach (e.g. the work of Kooiman [1994], which we think is proposed as a rather one-sided exponent of this bias) and most obvious in the idea of the minimal state. However, the normative debate is not our primary interest. Here we investigate the administrative aspects, which are highlighted as governance.[2]

Implicitly, our position is that 'governance without government (Peters & Pierre 1998: 223) is not a goal in itself. A further limitation of our treatment is related to this issue. Some authors are looking mainly for a more or less stable institutional arrangement in addition to the market, in which communities of private actors are able, without outside intervention, to promote their collective interests. In contrast, our interest does lie in such outside interventions, irrespective of whether they are intentional, or are undertaken by one or more government authorities with horizontal or vertical (hierarchic) relations. In doing this, we concentrate more on change

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administration (e.g., Marks et al. 1996; Hovden 2000; Jordan 2000). Other publications do make specific use of the term governance (e.g., Young 1994; Rosenau 2000), and these are assigned to the other categories depending on the meaning given to the concept. The *first limitation* on the way in which we use the term governance, therefore, is that we ignore the use in business administration, development studies and international relations in so far as it simply means administration, or in any discussions outside the public administration or policy science disciplines.

[2] Thus, the *second limitation* on the way in which we use the term governance is that we ignore the normative debate on the role of government authorities.

than on stability. It also means that many rules-in-use, customs and traditions, property rights, and so on are seen more as the subject matter of governance to be influenced - and as such, part of the instrumental strategy- than as the main business of the governance system (compare Young 1994: ix and 163[3]).

Institutional rules can be considered an arena in which the actors operate, and so can be linked to the modules of instrument theory (Fenger & Klok 2000); we are looking for their context: a broader concept of governance. For example, if research into the implementation of policy shows that many people do not apply for rent rebates because they do not realize that they are entitled, because people do not want to ask for money, or because they do not feel they have the right to a rent rebate, these are direct explanations for their behavior. But this raises a further question: is there an explanation-behind-the-explanation? In the next section, therefore, we will treat institutional approaches as part of policy science.

2.2.3 Multilevel coordination and multifaceted problems

The term multilevel has become the most common prefix attached to governance. It relates not only to its multiple nature but also particularly to the interdependence between levels (Smith 1997). According to Lundqvist (2001), the challenge of environmental governance is to develop "social choice mechanisms that combine two ostensibly incompatible qualities: authoritative (including the possibility of state intervention) and flexible, self-adjusting and 'reflective', with a considerable influence on those governed." Further, there is a "more encompassing multilevel view of governance needed" for one reason because "problems (like sustainability issues) are multifaceted." The component problems "require different scales and the interactions between the scales require multilevel coordination." Without such coordination, there may be a race to the bottom with disastrous implications for the social problem. But this does not have to involve a higher authority. In certain circumstances, multilevel or inter-level games can lead to a race to the top (Scharpf 1997b). Blomquist and Schlager (1999: 7, 39-43) also emphasize the relationship between many facets of the problem and the horizontal and vertical coordination this requires. The same is true for Rosenau (2000: 10-11).

[3] Although Young looks for the substance of governance in institutional arrangements, March and Olson (1995: 11) put thinking in term of governance *opposite* the institutional perspective, as a consequence of the exchange perspective. For them "the core artistry of governance is winning coalitions and policies." Clearly, we do not agree with either.

2.2.4 Multiactor networks

Rosenau (2000: 5) also assumes the multilevel character of governance. He talks of "evolution of multi-level governance, a form of rule in which authority is voluntary and legally dispersed among various levels of community where problems are located and local needs require attention." And he adds a second element, "shifting the balance between hierarchical and network forms of organizations, between vertical flows of authority and horizontal flows."[4]

2.2.5 Multi-instrumental steering mechanisms and multiresource-based implementation

O'Toole (2000: 276-279) treats governance in the context of studies of the implementation of policy strategies. He calls governance "difficult to denote with precision," adding to the multilevel and multiactor aspects "the multivariate character of policy action." He refers to Milward and Provan (1999: 3), who state: "The essence of governance is its focus on governing mechanisms - grants, contracts, agreements - that do not rest solely on the authority and sanctions of government." He also points to the work of Lynn, Heinrich, and Hill (2000a, 2000b), who approach governance from the public management perspective. Although they set themselves the task of developing a broad and comprehensive model of governance, their background is clearly present in their thinking. They begin by noting that policy programs are implemented in a web of many diverse actors, an assumption that distinguishes it from the rest of the literature. As a consequence, the model of governance they develop concentrates not only on the objectives (including output indicators) and instruments (treatment) of policy, but also the resources and organization of implementation. The model differs from the usual overviews mainly because it clearly shows that these aspects of organization and resources can take a wide variety of forms and have a multifunctional character (2000a: 257-258). Peters and Pierre (1998: 226-227) also consider, besides the emphasis on networks, the blending of public and private resources and the use of multiple instruments to be features of the governance concept.

[4] He also draws on Rhodes (2000: 60), citing: "Networks are the analytical heart of the notion of governance in the Study of Public Administration." One of the advantages ascribed to networks is that they are essential for learning processes (Knoepfel & Kissling-Näf 1998). Kickert (1997), in his overview of public governance in the Netherlands (and in his other work), pays much attention to network approaches.

This exploration of the governance literature has broadened our definition of the five aspects mentioned at the end of section 2.2.1. In our opinion, the elements of governance are:

1. Levels (not necessarily administrative levels): governance assumes the general multilevel character of policy implementation.
2. Actors and their networks: governance assumes the multiactor character of policy implementation.
3. Perception of the problem and objectives (not just objectives): governance assumes the multifaceted character of the problems and objectives of policy implementation.
4. Strategies and instruments: governance assumes the multi-instrumental character of policy strategies for policy implementation.
5. Resources and organization of implementation: governance assumes the complex multiresource basis for policy implementation.

We believe that using these five elements, the governance pattern can be described for a certain policy field in a specified place and time. But what should be described within the framework of these five elements? Which questions (or indicators) can operationalize these elements (or dimensions). The governance literature itself gives no clear answer yet. In the next sections we describe these five elements of governance in more detail.

2.2.6 Visions and synthesis from the policy sciences literature

We have developed our five elements further using various policy science approaches. Many of these approaches have purposes other than identifying elements of the content of policy and governance. For example, they can be used to explain long-term policy changes, or the effectiveness of policy instruments. However, these policy science perspectives can also enrich our approach to governance as we have illustrated in the extended analysis published separately in Dutch (Bressers & Kuks 2001). Here we only report some especially relevant conclusions.

In their classical treatments of decision making, Herbert A. Simon's (1997 [1945]) *bounded rationality* and Charles E. Lindblom's *incrementalism* (Lindblom 1959; Baybrooke & Lindblom 1970 [1963]) emphasize the limited human capacity to process information. Opening the possibilities of non-incremental policy changes has to do with *megapolicy changes* (Dror 1971), which involve a recognition of the task of government. Allison's (1971) *bureaucracy model* specifically addresses the standard approaches and repertoires of organizations, which restrict flexibility in conducting policy.

The rule based *institutional rational choice approach* (Kiser & Ostrom 1982; Ostrom 1990, 1999) draws attention to the way in which actors enter the policy network or are excluded from it. Furthermore scope rules determine the extent of certain positions, competencies, and other sources of power. Ostrom also distinguishes between different levels of analysis. This layered structure is not the same as a classification of administrative layers. A compromise between both interpretations of the term level is to speak about levels within a concept of multilevel governance. This implies that often the administrative bodies with a larger scaled domain will set rules that form a context for more operative decision making in smaller domains, next to some decisions that can be regarded as directly operative.

In the *advocacy coalition framework* (Sabatier 1988, 1991, 1999; Sabatier & Jenkins-Smith 1993, 1999), a particularly important idea is that coalitions of actors in the policy network do not merely represent the division between government and other actors, but also contain actors from both of these groups sharing certain beliefs. We can identify various layers. In the deep core are issues relating to the perception of problems, the division of the costs of policy implementation, the desirability of contributions from experts, politicians, and the general public and other relevant values and preferences. The derived aspects contain elaborations for each given situation. Besides this layered structure, the importance attached to the perception of the problem is very significant. In addition to advocacy coalitions, there are actors who are more likely to have objectives that relate to policy processes than to the content of policy, and these actors are referred to by Sabatier (1988, 1991) as political brokers.

The *flow model of the policy process* (Kingdon 1995 [1984]; Zahariadis 1999) examines how three relatively autonomous flows can come together each time a decision has to be made. Political entrepreneurs promote this by making use of windows of opportunity (or creating them). From a multiscale perspective, the convergence of problem perception, policy opportunities, and political salience should not take place at different levels (such as when there is concern about a problem at a single state level while solutions are being sought at the federal level).

In the *actor centered institutionalism* of Scharpf (1997a), explanation takes place primarily in terms of the distribution of preferences for alternatives. Much attention is also paid to information, but only to direct information and not so much to frameworks for interpretation (see the next section).

A large number of current theories in policy sciences can be characterized as *cognitive approaches:* cognitive maps (Axelrod 1976), frames (Schön 1983; Schön & Rein 1994), discourses (Dryzek 1987, 1997), argumentation and the social construction of reality (Fisher 1995; Fisher &

Forrester 1993; Milbrath 1993) and cultural theory (Thompson, Ellis & Wildavsky 1990; Schwarz & Thompson 1990). Characteristic for these theories is that they all emphasize that the behavior of actors rests on their subjective interpretation of reality. Furthermore, this subjective interpretation is formed because observations of actors are given a place in frameworks of interpretation that provide meaning to these observations, but also distort them.

From all the preceding theories, aspects have been taken and used to enrich the meaning of the five elements of governance as described next.

2.2.7 A model of governance in five elements

Based partly on the previous discussion and partly on a slightly more detailed representation of the specifications from the previously examined approaches, we arrive at the refined description of the five elements of the governance structure we have identified. In the shortest form, the governance model consists of five questions: Where? Who? What? How? and With what? A characteristic feature of modern governance systems is that they have many aspects: they are multilevel, multiactor, multifaceted, multi-instrumental and multiresource-based.

(1) Levels of governance

Where? - Multilevel
Which levels of governance dominate policy and the debate on conducting policy, and in which relations? What is the relation with the administrative levels of government? Who decides or influences such issues? How is the interaction between the various administrative levels arranged?

(2) Actors in the policy network

Who? - Multiactor
How open is the policy arena in theory and practice, and to whom? Who is actually involved, and with what exactly? What is their position? What is the accepted role for government? Who has relevant ownership and use rights, or who are stakeholders in some other capacity (including policy-implementing organizations)? What is the structural inclination to cooperate among actors in the network? Are there actors among them who operate as process brokers or policy entrepreneurs? What is the position of the general public versus experts versus politicians?

(3) Problem perception and objectives

What? - Multifaceted
What are the dominant maps of reality? What is seen as a problem, and how serious is this considered to be? What do people see as the causes of this problem? Is the problem considered to be a problem for individuals or for society as a whole? What values and other preferences are considered to be at stake? Which functions are allocated to the sector? Is the problem seen as a relatively new and challenging topic or as a topic in the management phase without political salience? To what degree is uncertainty accepted? Where are the recognized points of intervention? What relationships with other policy fields are recognized as coordination topics? Which policy objectives are accepted? What are levels to which policy makers aspire (ambition) in absolute terms (level of standards) and relative terms (required changes in society)?

(4) Strategy and instruments

How? - Multi-instrumental
Which instruments belong to the policy strategy? What are the characteristics of these instruments? What are the target groups of the policy, and what is the timing of its application? How much flexibility do the instruments provide? Are changes in the ownership and use rights within the sector anticipated? To what extend do they provide incentives to learn? What requirements do they place on the availability of resources for implementation?[5] How are the costs and benefits of the policy distributed?

(5) Responsibilities and resources for implementation

With what? - Multiresource-based
Which organizations (including government organizations) are responsible for implementing the policy? What is the repertoire of standard reactions to challenges known to these organizations? What authority and other resources are made available to these organizations by the policy? Whit what restriction?

In the next section, we examine the types of connections that can be expected between the five elements of the governance structure.

[5] For example, some systems of emission charges or tradable licenses may require so much information that it makes them almost impossible to apply. The fine-tuning of the instrument is very important in this respect, and can make the difference between an effective intervention and a dead end.

2.3 Changing modes of governance

2.3.1 Introduction

In the following discussion, we explain how the multiscale aspect of governance is theoretically related to the other four elements of governance. Governance of sustainability, however, involves more than describing patterns of governance. Often it requires changes of the governance patterns.

There is a certain logical relationship between our five elements of governance. It is easy to see why each previous element imposes harder or softer limitations on aspects of the following element. However, there is no a priori reason for thinking that the mutual influences between the elements are restricted to this alone. In principle, the idea of mutual adjustments means that all five elements can influence all others in both directions.

Table 2.1 summarizes these relationships. Only short statements are given in the figure. First, we explain the premises behind these expected relationships. Then we elaborate the influences that the level and scale aspect receives from and exerts on the other elements of governance.

Table 2.1 Relationships between the Elements of Governance

Influence Of / On	Level	Network	Ambition	Strategies	Resources
Level	Continuation	Dominance of strongest actors	Dominant paradigm has level implications[6]	Target group covenants are national	Implementation made (un)attractive
Network	Logical sequence	Continuation	Fragmentation creates openness	Multilateral can lead to corporatism[7]	Resources as motive for co-operation
Ambition	'Composition' of problems aspects	Logical sequence	Continuation	Solutions in search of a problem	Ambitions on the 'Procrustus bed' of resources
Strategies	Mirroring the fragmentation of levels	The 'Network-Instrumentation model'[8]	Logical sequence	Continuation	Making them 'fit for use' (bottom up argument)
Resources	Dominance of strongest level	'Who gets what' games	Symbolic allocation	Logical Sequence	Continuation

Of course, there are various other theories besides mutual adjustment of elements of governance to explain stability and change (e.g., Lindblom 1959; Wildavsky 1982; Thompson, Ellis & Wildavsky 1990; Hogwood &

[6] Compare for instance 'sustainability' and 'residential environmental quality'.
[7] Which means both extra openness for some and closeness for others.
[8] See Bressers 1998; Bressers & O'Toole 1998; Ligteringen 1999.

Peters 1983; Kingdon 1995 [1984]; Luhman 1984; Sabatier & Jenkins-Smith 1993, 1999; Baumgartner & Jones 1993). Some emphasize conflict; others, more gentle forms of adjustment. Some emphasize external shocks; others, internal dynamics. Some emphasize interactions between actors; others, confrontations or syntheses of visions. Nevertheless, in all these theories, despite their different emphases, a joint basic conception prevails: a fundamental assumption of more or less vulnerable equilibrium. As a consequence, they all share the idea that there is a tendency that the better a development in one aspect fits with the context of other aspects, the more likely is the development to continue. This doesn't lead to a static situation, however, because numerous external inputs fuel almost continuous change processes that seem so ubiquitous that their character as adaptation processes is almost hidden. External change drivers will first affect one or more of the elements of governance that subsequently will evoke changes on all other elements, partly to encapsulate them and diminish their consequences (see Lindblom 1959). So we take up the familiar idea of mutual adaptation, this time not restricted to the adaptation of actors or interests in Lindblom's sense, but in a broader sense encompassing all the elements of governance we developed in the preceding section.

The idea of mutual adjustment also offers the possibility of explaining differences between the situations in two or more countries (see Chapter 10 on the differences in governance in the field of groundwater protection and drinking water policy in Florida and the Netherlands). According to this idea, differences in external factors, for example, in geological and hydrological features, or in solidly grounded aspects of governance, such as the constitutional allocation of competencies to government authorities, will indirectly bring about a series of differences in (other) elements of governance.

2.3.2 Premises

The premises and mechanisms that lie at the hart of these relationships are as follows.

(1) The best predictor of the status of an element in our model at a certain point in time is its status at an earlier moment. Each change takes energy and will not take place if the governance system is in balance. Only changes in other situations (within and outside the governance system and via the efforts of the actors) can bring about changes. This idea forms the basis for the five relationships in which an element influences itself, the so-called continuation relationship.

(2) The elements in our earlier model form a limiting or determining context for later elements. Conducting policy between administrative levels activates networks primarily at these levels. Those participating in these policy networks give shape to the perception of the problem and the ambitions in the public debate and subsequently in the policy itself. These, in turn, are the focus of discussion about policy strategies - because certain actors are considered to be a target group whereas others are not, and because certain intervention points in the policy field are utilized whereas others are not. The selected strategies and the required policy instruments, in turn, require the availability of an implementation structure and resources to make implementation possible (see also footnote 5). These ideas form the basis for the four logical order relationships. The five elements form a sort of cascade of influence.

(3) This logical order of influence, however, is not the only way in which elements of the governance cascade can influence each other. In fact, we believe that all of the other 16 conceivable relations are possible, including the influence of elements mentioned later on earlier mentioned elements. All 25 relations should be considered because it is possible that the influence of the network on the instruments and strategy works via the influence of the former on the ambition, etc.

(4) All these relations promote the mutual adjustment of elements. Such adjustments will always have an external source, which may consist of (a) major social developments, such as demographic, cultural, economic or physical (technological and spatial) developments, and (b) developments in other policy fields (Ligteringen 1998: 214-215 and following).

(5) None of these mutual influences occur in and of themselves but need social interaction to bring them about. This implies that an adjustment may take place along three possible perspectives: objectives (desire, ultimate basis: values), information (knowledge, ultimate basis: cognition), and power (ability, ultimate basis: resources) of the actors involved in the interaction (Bressers 2001). The mechanism of mutual adjustment, distributed over the five elements of the governance system, will tend to make values consistent, to make cognitions fit better into a common framework for interpretation, and to make resources act to mutually facilitate the elements.

Before we discuss each hypothesis separately, we examine the three perspectives of values, cognitions, and resources.

2.3.3 Values, cognitions, and resources

Why are objectives, information, and power (with values, cognition, and resources in the background) the useful perspectives when examining the relations between the five elements of the governance model? Because these elements are realized through social interaction. These three perspectives have proven exceptionally useful in explaining the dynamics of such processes. First, look at what is needed to make a simple object: making a chair requires the carpenter to have an object in mind, then expertise and also resources, such as tools and materials. In a multiple-actor process, goals also relate to the position relative to other actors as well as to information and resources (the last providing power).

There is also a long tradition of thinking in terms of these perspectives (Bressers 1983: 352-328) and even a connection between the social science disciplines and the three perspectives just mentioned. This connection is partial, though, and relates to the core principles of these disciplines rather than to any details, making a distinction in principle between individual and social methods of considerations.

The fundamental concept in economics is scarcity of resources and the decisions and bartering that result from this. In its classical version, the complexities of all other aspects (the social, cognitive, and value aspects) are reduced to assumptions of methodological individualism, complete information, and individual behavior that maximizes benefits. Because benefit cannot simply be equated with money, multiple objectives are formulated, for example, 'bureaucrats strive to obtain as large a budget as possible'. This is, in essence, an unethical and pragmatic premise. So, to sum up: 'A: that which gives the greatest benefit will be chosen.'

In political science, the social aspect of the distribution of resources, and so the power of one actor over another, is emphasized. Reasoning, then, is about the question of who is going to dominate the field. To sum up: 'B: Whoever has the most power is free to choose.'

Sociology is partly about understanding social problems, and psychology is partly about human skill in collecting and processing information. To sum up: 'C: It is not the facts that are important, but how what is observed is interpreted.' (Or: 'What is believed to be real is real in its consequences.')

Social psychology and communication sciences emphasize the transfer of information in mutual communication processes. Also, the role of information collection and processing is often emphasized in the process of making choices and power relations (and of the development of values). Also the 'argumentative turn' in policy sciences (Fisher & Forrester 1993) fits largely into this track. To sum up: 'D: the interpretations of reality are the product of a social construction.'

The value aspect is pivotal in ethics and other areas of philosophy. To sum up: 'E: people should want what is good.'

Regarding normative social aspects, imposing values on others, for example, the whole community, we enter the domain of the law. To sum up: 'F: The limits to what is good are set by rules.'

Of course, this characterization of perspectives (and certainly associated disciplines) is too rudimentary when forced into a simple matrix like Table 2.2, because each scientific discipline can borrow elements from the other cells. In doing so, it is often clear that they reject some of their own principles and integrate some of the principles of other social sciences into their own set of considerations.

Table 2.2 Perspectives and the social sciences

Scientific Perspectives	Individual	Social
Resources (power)	a. Choosing the greatest benefit	b. Those with most power can choose
Cognitions (information)	c. It is not the facts that are important but how what is observed is interpreted	d. Interpretations of reality are the product of social construction
Values (objectives)	e. People should want what is good	f. The limits to what is good are set by rules

All this illustrates the value of following these perspectives when a complete picture is required of the relations between social science concepts, such as the elements of the governance system we have identified.

The influences that the five elements of governance exert on each other will promote their mutual adjustment in a governance system. Changes within a governance system occur because other 'outside' factors, such as pressures to govern for sustainable development, alter characteristic features of one or more of the five elements and the other elements adjust themselves to this. These changes arise partly from the tendency of actors to try to fit the cognitions that play a role into a common framework for interpretation if there are no disturbances from outside. And, partly, changes occur from interdependence on resources among these elements. In the next section, we specify the expected relations between the elements of governance using all three mechanisms at the same time. We will limit ourselves to the influences arising from the level and scales aspect of governance, to avoid a too long digression on all possible mutual relationships between governance elements.

2.3.3 The interaction between the level and scales aspect and the other elements of governance

The influence of governance levels on the relevant actors in the policy network is logical because the relative importance of various levels translates in the multiscale setup into places to seek the relevant policy network(s). The other four relations are examined in some more detail here, where the arrows in the headings represent a tendency for the second element named to adjust to the first.

Level → Problem and Ambition
We can expect that values characterizing actors at a certain level of governance will influence the perception of a problem and the relevant policy ambition. At each level, most of the relevant values can be found, but the degree to which they are supported varies. So the dominant level influences how equality or balance between values is sought.

From the cognitive perspective (interpretation frameworks), a problem will be perceived at the level from which it is viewed. The problem of waste, for example, looks different at the national level (e.g., safe processing) than at the local level (e.g., impact of waste processing plants).

From the perspective of resources, the dominant level - as owner of the problem - will tend to conduct debate about the problem and policy ambition in terms of the relevance to that level. If there are other levels that have a strong position, this may lead to fragmentation of policy perception and ambition.

In the end, the composition of aspects that play a role in the perception of the problem and policy ambition will be determined partly by the status of the various levels. For example, when the position of the European Union (EU) strengthened in the domain of energy policy, it became a problem not only of secure delivery and reduced environmental burden, but also of liberalizing domestically restricted markets.

Level → Strategies
From the perspective of values, not many are linked to the selection of the administrative level, except the values held at the level at which a balance is desired (equality). The choice of strategy will reflect this.

From the cognitive perspective, strategies will be developed primarily for dealing with the problem at the level at which the policy is being developed or at least from which there is a clear view of the problem. If governance is divided between a number of levels, policy strategies will be developed at more than one level.

From the resources/dominance perspective, there will be a tendency to select policy strategies that do not threaten the distribution of responsibilities for developing policy at the various levels.

In the end, the characteristics of the chosen strategies will to some degree reflect the distribution of responsibilities between the various levels. Negotiations with Dutch importers and producers of white goods failed at first because the sector was afraid that EU guidelines would change the deal. Also, the multinational mother companies were hoping that EU guidelines would be more relaxed than the evolving negotiated agreement and withdrew the sector's associating from the negotiations. When a regulation was installed fixing the (almost) negotiated deal, the sector embraced it nevertheless and thereafter tried to promote the Dutch solution to become EU standard guideline; so both public and private governance were involved in an intricate multilevel game.

Level → Resources

This concerns a big leap over the more stepwise relations between these two elements. This means that there may not be much left for a direct influence of one element over the other.

From the values perspective, an attempt will be made to create a balance, not only in the way the problem is tackled but also in the allocation of resources between the various sub areas of the administrative levels.

From the cognitive perspective, the allocation of resources will mainly reflect what the problem is perceived to be.

From the resources perspective, the resources distributed will mainly be those that are available at the level concerned.

When the Dutch government wanted to strengthen the implementation of environmental laws by the local authorities after several other attempts, it turned to providing these with very substantial additional money flows, because other approaches simply didn't work well enough. This was done even though some professional observers labeled it as 'the one public authority bribing other authorities into obeying the law.'

Resources → Level

From a values perspective, we can expect the administrative level that gets the most resources, related to the problem domain, will feel most responsibility for the problem.

From a cognitive perspective, we can expect the administrative level that gets the most resources to strengthen its own interpretation of the problem as one belonging primarily to that administrative level.

From a resources perspective, we can expect that the administrative level that gets the most resources will, partly as a result of this, retain the strongest position.

All in all, taking up responsibilities in the multilevel governance setup depends partially on the possibilities to gather the resources necessary for the action that is perceived as a consequence.

Strategies → Level

From a values perspective, we can expect that the division of responsibilities between administrative levels associated with a particular strategy influences what people think about who should have these responsibilities, also concerning administrative level.

From a cognitive perspective, we can expect that the strategy raises the level of knowledge of the problem and the possible responses mostly in the administrative level that has most to do.

From a resources perspective, we can expect that the position of the administrative levels that have a more important role in the selected strategy will be strengthened relative to other levels.

When the national level in Italy proved incapable of concluding negotiated arrangements due to various (self)restrictions, the regional and local levels jumped in the gap by concluding a wealth of agreements taking over the initiative on various fields of the environmental problematic.

Problem and Policy Ambition → Level

From a values perspective, we can expect that the way in which the problem is described has implications for the administrative level that ought to feel most responsible for the problem.

From a cognitive perspective, we can expect a similar effect to occur regarding the question of what is considered to be the most suitable administrative level in the dominant paradigm, given the scale of the problems.

From a resources perspective, we can expect that, for a particular problem, a certain paradigm will strengthen or weaken the relative position of administrative levels on relation to the others.

All these phenomena appear to be present in the Netherlands because of the rise of the National Environmental Policy Plan and the target group approach. These have strengthened the national level (at which most covenants are agreed) with respect to the provincial and local levels (where most of the licenses are issued and which carry out most of the enforcement duties).

Network → Level

From a values perspective, we can expect that the dominant values of the actors in the network (as opposed to their own interests) can be relevant for the distribution of governance over the various levels.

From a cognitive perspective, we can expect that the dominant policy vision of the actors in the network can be relevant for the distribution of governance over the various levels.

From a resources perspective, we can expect that the dominant actors in the network will also influence the distribution of governance between the administrative levels and that this distribution will be a reflection of the relative position of the dominant actors.

Scientific 'epistemic' communities that are able to enter the policy network can have a considerable impact on the level were the problems are defined and measures are taken, for instance, to take the Mediterranean as a ecological unity (Haas 1990).

2.4 Conclusion: three mechanisms

In this chapter we have developed a model of governance to compare governance systems in different states or countries as they relate to a certain policy arena. We identified five elements of governance, one of which relates to the multilevel aspect. Moreover, we elaborated on change of governance patterns on the assumption that mutual adjustment will take place between the five elements of governance and that this mutual adjustment can be traced back to three internal mechanisms in the governance system. Changes in a governance system take place when outside factors intervene in one of the five elements of the governance system and other elements adjust to this new situation. Differences between times or jurisdictions work consistently through the governance subsystem from one element to another.

The first mechanism is that adjustment arises from the tendency of actors to act from a set of constant values. The second mechanism is that adjustment arises from the tendency of actors to use a common reference frame to interpret cognition. The third mechanism is that adjustment arises from the dependence of actors on each other's resources. Such dependence is clearly expressed in the demarcation of powers between administrative levels and between administrative actors.

The analysis in this chapter has shown that 'governance' involves more elements than policy objectives and the means to implement policy. These elements are not simply the sum of individual aspects but are closely linked.

We have illustrated how these interrelations work, especially on the field of governance across social scales achieving sustainable development.

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Chapter 3

Governance of water

Resource regimes and institutional change

3.1 Introduction

Water stress, which is pressure on the quantity and quality of water resources, exists all over the world. It appears in the form of many serious problems including water shortages, flooding, pollution and ecosystem damage. Water stress is partly the result of natural circumstances that determine the availability and status of water resources. However, water stress also results from human pressures on water resources and human water demands. We only have to think of the limited natural availability of water of sufficient quality to meet the demands of households, agriculture and industry. In fact, water stress is very often the result of conflicting water uses or use functions. Therefore, we could consider rivalries between users and use functions as an indicator of an insufficiently sustainable use of water systems. A water system means a discrete and homogeneous element of surface water or groundwater such as an aquifer, a lake, a reservoir, a stretch of stream, river or canal, an estuary, or a stretch of coastal water. We assume that the sustainable use of water systems requires an optimum distribution of use options among present and future users and use functions. As an example of distribution of use options one could think of the distribution between upstream and downstream users. An activity that pollutes water upstream (using a stream to discharge waste or waste water) could interfere with the downstream use of that stream for drinking water supply. Or an upstream weir could impede the downstream flow and dependent use options. Such rivalries not only exist between different (heterogeneous) use types, they may also appear among homogeneous uses (uses of the same type). In arid areas farmers may feel the need to co-ordinate the water use for irrigation. Or in the field of fisheries, quotas may be used as an instrument to prevent the depletion of fish stocks.

A water system is often demarcated as a river or water basin, which means the area of land from which all surface water run-off flows through a sequence of streams, rivers and, possibly lakes into the sea via a single river

mouth, estuary or delta. This implies that a water basin not only includes the waterbeds, but also the surrounding area of land from which the water bed receives and transports the water run-off. In this view the use of river flood plains for urban development should be considered as a use that interferes with using flood plains for river dynamics and flooding. Another example of a water use rivalry in a water basin is the rivalry between drainage of land for agricultural development versus the function of a minimum groundwater level for nature conservation.

In the European research project Euwareness (European Water Regimes and the Notion of a Sustainable Status) we focused on the sustainable use of water resources. The main question for the researchers in this project was whether the regime for the management of a water system provided sufficient guarantees for its sustainable use, by diminishing or preventing rivalries between users and use functions. To answer this question we focused on institutional regimes for natural resources, both from a public governance perspective (Bressers and Kuks 2001) and a perspective of private property and use rights (Ostrom 1990; Bromley 1991). The first perspective focuses on the management of natural resources from a public domain (although in interaction with private actors). The second perspective focuses on the accessibility of a natural resource in a broader sense, including the private domain, the domain of collective property and use, as well as the domain of 'no property' (res nullius). The second perspective is based on the notion that property rights determine the accessibility of water systems as a natural resource for various users and use functions. By applying both perspectives in a complementary way, we have developed a framework for understanding the access rights that users or use functions may possess or claim, and the proportion between and exclusiveness of the various domains. For instance, intervention from the public domain could be blocked by the existence of a private domain based on long-term concessions for water use (which, especially in Spain and Switzerland, appears to be a problem of redistributing water access rights). On the other hand, attempts initiated by the public domain to redistribute private property and use rights could be effective in providing a better access to or protection of alternative users and use functions. Another question could be how the exclusiveness of the public domain is interpreted by public authorities. Does the public domain offer equal access to society as a whole, or are specific users and/or use functions discriminated against in favor of others? A public domain could appear as a private domain in the hands of society at large, or as a 'no property' domain, owned by nobody and thus equally accessible to everyone.

In this chapter we will first present a theoretical framework for resource management, combining both steering dimensions (property rights and governance) into a comprising concept of resource regimes as social institutions (section 3.2). In this context we will elaborate further on different types of property rights and their meaning, as well as on the various elements of governance and their relevance for resource regimes. In section 3.3 we deal with criteria for the evaluation of resource regimes on their contribution to resource sustainability. In section 3.4 we distinguish different types of resource regimes (or phases in the evolution of a regime), based on selected criteria for regime evaluation. In section 3.5 we address the political context in which regimes exist and develop, with the conditions that lead to their change, and thus with institutional dynamics of resource regimes.

3.2 Resource regimes as social institutions

The starting point for our consideration of institutional resource regimes is the observation that institutions affect individual behavior and resource management. Institutions such as property rights, social norms, economic incentives and policy instruments have multiple impacts on individual behavior and strategies. Institutional economics and political science tell us how the degradation of the environment can be halted with the help of institutional design. Whereas policy theory concentrates on the effects of resource policies and applied instruments, property rights theory focuses on bundles of rights and their effects on the sustainable management of water resources. So far, the response to the deterioration in water resource quality arising from the effects of economic growth has taken the form of environment policy intervention. However, the capacity for government intervention in this area is limited due to implementation deficits, as well as the restriction of traditional environmental policy to selective policy instruments. Traditional policy analysis has focused mainly on the ex ante evaluation of state measures (e.g. the design of use and protection policies) and the resulting effects (e.g. on natural resource sustainability). Later on, policy science asked attention for the implementation and effectiveness of the actual programs that are put into operation. However, there has been little attention yet for the interaction between public policies (governance) and property rights, and in particular for management options to redistribute property rights. In this context, Coase (1960) already assumed that property and use rights must be clearly regulated to facilitate the effective, efficient use and management of resources. In his opinion, it is irrelevant who actually owns these rights as the use, which yields most profit, will always prevail. The internalization of external effects can, therefore, be brought

about through the (re)definition of property and use rights (Kuks & Neelen 1991).

In the Euwareness study, a theoretical framework for institutional regime analysis is used that combines property rights theory and institutional rational choice with approaches from political science (policy analysis, in particular policy design theory), thereby innovating the theory of institutional regimes.[1] The framework incorporates the ideas from the theory of property and use rights (especially those of Ostrom and Bromley). However, this theory has its limitations. There are at least three considerations that necessitate the development of a wider regime concept.

First, while Ostrom fails to take account of the possibilities for public intervention, we have added the political steering dimension to our approach. Ostrom's approach focuses on common-pool resources and - particularly in the earlier studies of irrigation - is based on the assumption of a homogenous demand for local commodities and services. In such cases it was possible to prevent the degradation of resources on the basis of voluntary co-operation, i.e. without state intervention. Although, this kind of solution is probably uncommon in highly developed societies characterized by increasingly heterogeneous demands and an expanding scope of effects, from an economic perspective, this can be viewed as a very efficient strategy. Such factors mitigate against local and regional solutions like common property. Thus, guidance of heterogeneous, growing and increasingly rivalrous use demands is required.

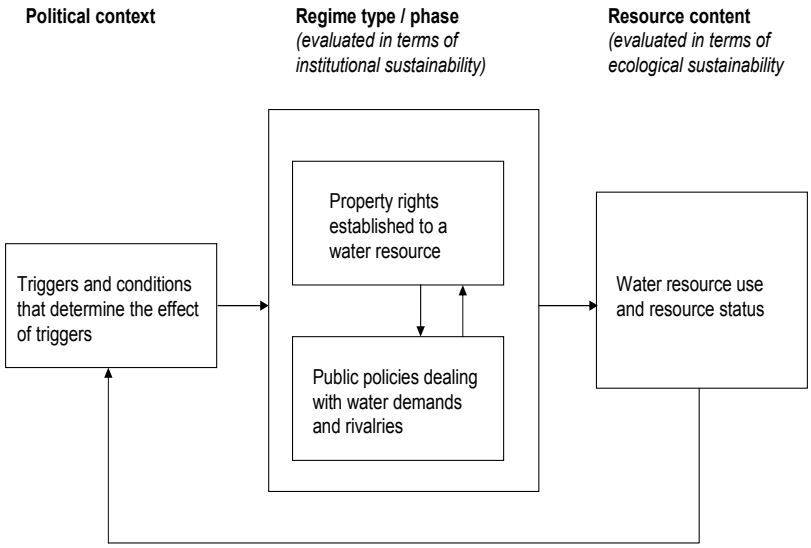
Second, state regulation of the production and consumption of certain goods and services of a natural resource is a common occurrence in everyday political life. However, consideration of the distribution of property and use rights alone is not sufficient for the analysis of the institutional framework. In most cases, there are several public policies which regulate the use of a resource and which, as a result of insufficient co-ordination, can result in the degradation of that resource. In fact, one should consider the influences of all other public (use oriented as well as protection oriented) policies on a specific commodity or the entire resource. Thus, guidance of inconsistencies between policies is required.

Third, unlike Ostrom and Bromley, we do not consider institutions a framework within which actions take place but the result of and an integral

[1] This framework has its roots in a Swiss project developed by Peter Knoepfel, Ingrid Kissling-Näf and Frédéric Varone, entitled 'Comparative analysis of the formation and outcomes of resource regimes in Switzerland', funded by the Swiss National Science Foundation and carried out in the period 1999–2002. For more information see www.idheap.ch; Knoepfel, Kissling-Näf and Varone (2000, 2001, 2003); Kissling-Näf and Varone (2000a, 2000b). Parts of this chapter are based on collaboration with Kissling-Näf (Kissling-Näf and Kuks, 2004).

part of the political process. In our opinion, institutions should not merely be understood as frameworks within which actions are carried out. They too are the product and integral components of the political process. Most of the literature concentrates on the analysis of regimes as they exist today. Less emphasis is placed on dealing with analysis of the process of regime evolution. In order to avoid further degradation of resources, it is important to know when and under what conditions in the political process the regimes can be changed and how this can be brought about and managed. Thus, guidance of the conditions that generate regime changes is desired.

Figure 3.1 Model of an institutional resource regime and its context



Institutions are usually understood as sets of rules which structure the relationship between individuals by determining their range of actions in certain situations. Institutions are both the result of past actions and the framework within which new activities take place. Institutions, and hence regimes, can change over time and become increasingly differentiated. Our theoretical framework for institutional regime analysis defines a resource regime as an institutional system with two steering dimensions (property rights and public policies) which in interaction affect the use and management of the resource. Thus, the main components of our research framework are given by triggers, the resource regimes and its two subsystems or steering dimensions, and the effective uses of the resources and their impact on the status of resource (see Figure 3.1).

3.2.1 Property rights as subsystem of a resource regime

Many authors have emphasized the impact of property rights on the use of natural resources and discussed the way in which existing property rights act as an institutional barrier to behavioral change in cases where such change is desired by policy makers. Property rights do matter, especially when they are rooted in customary traditions of water distribution and use. The work of Elinor Ostrom is well known in this respect. With her book 'Governing the Commons' she emphasizes the importance of regional and local institutional arrangements which are often based on a long tradition of informal but commonly shared water rights. Her work is inspired by cases she found in developing countries, as we discussed in the previous section (Ostrom 1990). In Europe, Bernard Barraqué made an analysis of the influence of water rights on the administration in various European countries. He noticed that "environmental lawyers seem to have overlooked the importance of a specific analysis of past customary laws governing the commons, from which one could try to derive institutional innovations for our present and future commons". He remarks that the local character of "customary institutions makes them less visible to those who primarily focus on legal systems or regulations at State level". Customs with respect to water as a sort of common property were maintained and even developed under the modern liberal State in areas subject to floods or droughts. Barraqué refers to the typical 'waterschappen' in the Netherlands and to the 'water tribunals' in the irrigated plains of southern Spain (Barraqué 1995; 1998: 353-354). In the United States two major legal doctrines have merged to deal with surface waters: the riparian doctrine (water is not owned; the landowner has a 'usufructuary' right only) adopted in the humid Eastern states, and the appropriation doctrine (water rights are acquired by actual use; the first user acquires the best right, the second user the second best, etcetera) which applies in differing forms in the more arid Western states (Lapping et al. 1989). Both doctrines demonstrate how specific hydrological circumstances have set customs which have developed into legal institutions. The other way around, are examples of Indian water rights, reserved claims dating back to the nineteenth and early twentieth centuries, that have high priority in the use and distribution of western waters (Frederick 1986: 11). This is an example of specific customs setting aside formal legal institutions. In their book on water use principles in the Middle East, Tony Allan and Chibli Mallat remark that water use patterns in the Middle East are not well known due to that legal systems often operate in "mysterious and approximative manners". Water use principles in the Middle East are often based on old Islamic rules and customs. "The more arid the zone the more subtle the rules to share water cycles. This refined art of managing scarcity does not mean

that society operates in an egalitarian manner. (…) Water in these regions tells the story of society and its modes of being shared are still today a real document on social order. (…) The scarcer the resource, the larger the demand, and the more emotional the attitude of individuals and governments towards any scheme that appears to change the status quo." Water is gradually becoming a commodity rather than a freely available and poorly regulated element in the economies of the Middle East. To re-assign access to water and to guarantee a security of access to water, law in the modern Middle East becomes an extremely complex confluence of customary law, Western based codes and principles and recent international law (Allan & Mallat 1995: 6-9). To conclude, customary rights on water act as an institutional barrier to behavioral change and to a more sustainable resource management. They preserve existing modes of water management. Debating the redistribution of such customary rights not only affects the sustainability of water resources, but also the equity of access to water resources. As Nicola Lugaresi formulates it: "One of the most controversial issues is the difference between water as a social right and water as a commodity. Water could be both, and could be neither. Water is not a social right in the sense that everyone is entitled to get as much water as they wish to. But water is a social right as long as it is the basis for life. Similarly, water is not a commodity in the sense that everyone is entitled to own it like one owns other commodities. But water is something precious and finite, therefore tradable and under economic evaluation (…)" (Lugaresi 2000: 76-77). In chapter 1 of this dissertation we raised the social-political issue of access rights. In chapters 11 and 12 we will elaborate on this controversy as it is related to a debate about the privatization of water services.

For this chapter it is necessary to focus on the elaboration of property rights as a subsystem of a resource regime. How do we define property rights? Property rights can be understood as social relations that define the titleholder with regard to something of value in relation to all others. Bromley speaks of a "triadic social relation involving benefit streams, rights holders and duty bearers". "Rights can only exist when there is a social mechanism that gives duties and binds individuals to those duties. (...) Notice that rights only have an effect when there is some authority system that agrees to defend a rights holder's interest in a particular outcome." (Bromley 1991: 15) A property rights system could be regarded as a system with communicational vessels of claims and duties, which means that allowing a specific behavior to one actor implies a restriction on the behavior of another actor. Young speaks of 'bundles of rights' and remarks that "(…) property rights virtually always guarantee owners the opportunity to use their property in a variety of ways while safeguarding owners against

unauthorized use of their property by others. At the same time, however, property rights virtually always include restrictions on the use of property by owners themselves, and there has been some tendency for these restrictions to become more extensive in modernized and densely populated societies. (…) bundles of rights may be more or less extensive, but they are practically never unlimited in the sense of placing no restrictions at all on the freedom of action of the holder of these rights." (Young 1982: 21-24)

Property rights are a combination of ownership titles and use rights. They both can be in one hand, but also be separated. For instance, when the owner of a house is renting the house, the renter is having use rights without the ownership. Young remarks that "ownership itself ordinarily encompasses use rights, but it is perfectly possible to acquire a right to use some natural resource without owning it. (…) Further, there are widely recognized use rights to some resources whose ownership status is hard to determine (for example, shipping lanes or the electromagnetic spectrum)." (Young 1982: 23) In the specific case of water resources, ownership is often related to the ownership of land. This can apply to both surface water and underground water. On the other hand, the ownership of the major water systems (coastal waters, estuaries, major inland lakes, major river basins, deep underground aquifers) is often not related to land ownership.

We have to make a distinction between private and public property rights. Private property rights are exclusive in the sense that property rights (ownership title and/or use rights) in the hands of one individual exclude that these rights can be claimed by another individual. According to Young "private property occurs when the relevant rights reside exclusively and on an undivided basis with single actors." (Young 1982: 22) In the case of public property rights, we have to distinguish between state property, common property and no property. According to Young, "common property, by contrast, occurs where the rights reside jointly in some group of actors who own undivided shares of the property in question. Under common property arrangements, each owner posses the right to use the property, and they jointly possess the right to exclude others from using it. (…) Additionally, the owners of a piece of common property may go a step further and create a managing authority to act on their behalf in handling the property. Analytically, this is the source of public property. (…) Beyond this, mixed cases may arise in which ownership involves both private and common property rights in an integrated bundle." (Young 1982: 22)

State property means that the state or a public authority (as if it were an individual) has private property rights. The difference with private property rights is that the state has to use these rights in the public interest. In other words, private ownership by the public could then serve as a guarantee for

access by all interested users. The state may do this in two ways: using these rights as a 'dominium eminens' (the public owner is using its rights under private law to exclude other users, in order to protect the public interest) or using these rights as a 'dominium serviens' (the public owner is using its rights to make the resource subservient to every user in order to protect the public interest) (Hennekens 1993, 1999). Of course, both conceptions could work together quite well, since public use can only be protected by restricting other uses. However, to prevent the state from being too exclusive and too arbitrary while using its rights according to a 'dominium eminens', in a country like the Netherlands the ownership of water has been changed into a 'no property' (res nullius), which forces the state to protect the public domain only by public law, in order to guarantee a 'dominium serviens' (see chapter 4). In that case, public property rights are not exclusive. It is useful to find out to what extent the public domain (i.e. the set of public property rights) allows various stakeholders to claim access to the utilization of water resources, or not.

In European countries, even in the early 19th century, water resources and the benefits they could generate were never completely subject to private property. There have always been restrictions on private ownership and private use rights by the legal definition of some public domain. During the 20th century, especially after World War II, an increasing nationalization or communalization of water resources could be perceived, regardless of the ownership arrangement. The State is increasingly controlling the access to water resources and is allowing more and more users to claim some form of access. Such State control is based on the power of eminent domain. "Though private property is often regarded as sacred, the rights of private owners have been significantly curtailed in many areas through the actions of public authorities, and the power of eminent domain is regularly used to take private property for public purposes in the absence of voluntary consent." (Young 1982: 24)

To summarize, different types of property rights exist for natural resources. Four traditional types of ownership are identified in the literature: no property, common property, state property and private property (see Table 3.1). In the case of private property, exclusive property title is in the hands of private individuals or corporations. In the case of no property (res nullius), we have a classical case of resources, for which access is not formally regulated. Common property can also be described as the groups' private property (Bromley 1991; Libecap 1993; Ostrom 1990). Whereas Ostrom stresses the existence in reality of multiple bundles of rights and the difficulty of working with four categories, Bromley states that for most purposes consideration of the four types of property bundles is useful. State

(public) property is special in the following respect: "In a state property regime, ownership and control over use rest in the hands of the state. Individuals and groups may be able to make use of natural resources, but only at the forbearance of the State. (...) Individuals have a duty to observe use/access rules determined by the controlling/managing agency. Agencies have right to determine use/access rules." (Bromley 1991: 23; 31) Based on this definition, the public domain (with or without State ownership) belongs to this type of regime, however, it does not really matter if there is formal state ownership. The public domain is characterized by the fact that there are only use rights regulated by the State.

Table 3.1 Property rights bundles

Type of property	*Definition*
State property	Exclusive title in the hands of the State: local, regional, province, national
	Access control by the State
	Decision-making by the State
Common property	Exclusive title in the hands of groups/corporations
	Possible exclusion of non-owners
	Access control by group/corporation (backed by the State)
	Decision-making by group/corporation
Private property	Exclusive title in the hands of individuals/ legal persons
	Access control by individual/legal person (backed by the State)
	Decision-making by individual/legal person
No property (res nullius)	Title in the hands of nobody/everybody
	Access control possibly by the State
	Decision-making possibly by the State

Besides ownership, a distinction is sometimes made between disposition rights and use rights. Both can be divorced from the ownership title and be in the hands of actors other than the owner. A disposition right refers to the right to transfer or sell use rights, or even to sell the resource itself. An appropriator in our case is someone holding a disposition right with respect to a water resource (i.e. the right to take possession of water). It could be the case that the owner has the actual ownership of a piece of land and the related water body, while the appropriator holds a concession to dispose of the water in this water body (which is the case when someone has a concession for the withdrawal and use of the water). A use right is the right to use a certain good or service provided by a resource. A user is the one holding a use right and having benefits of a water resource by consuming an acquired good or service. There are cases where an appropriator stands between the owner and the user, for example the case where a drinking water supplier as appropriator stands between the owner of an aquifer and the drinking water consumer. There are also cases where the owner and

appropriator are the same actor, and where the owner and users of the resource directly interact with each other.

There could be rivalry among appropriators/users claiming disposition/use of the same water resource. There might be rivalry because of different claims on a limited available resource stock, or there might be rivalry about externalities (external effects accompanying a use and affecting another use in an undesired way). Because of this competition, property, disposition and use rights do relate to each other as if they are communicational vessels: a restriction on one claim has the effect of protecting another claim. Rivalries could be solved by such a redistribution of property rights. This might be a redistribution of ownership titles (expropriation), disposition rights or use rights. In practice, it is sometimes hard to imagine how water stress problems could be understood as rivalries between property rights holders. Let us give some examples in case of four commonly appearing water stress problems: surface water quality degradation, groundwater quality degradation, droughts (water depletion) and flooding.

In case of surface water pollution, a rivalry exists between polluting activities (point and diffuse sources) on the one hand and the various functions of surface water (in terms of environmental quality or specific uses, like drinking water) on the other. To better manage this rivalry, point source polluters (especially industries and households) are regulated by various instruments, such as discharge permits or effluent charges, as well as by physical interventions in the sense of routing point source discharges through sewer networks to waste water treatment plants. It is difficult to imagine a property right that would allow effluent to be discharged into surface water[2], which means that this is more a rivalry that should be resolved by means of policy regulations than by the redistribution of property rights.

In case of groundwater pollution in particular, there is a rivalry between diffuse pollution sources on the one hand and the use of groundwater sources for drinking water production, while the general environmental quality of groundwater is also at stake. Considering the rivalry between farmers using agricultural land and water suppliers using the underground water body for drinking water production, the issue becomes clearer if we think in terms of a rivalry between property rights holders. The regulation of groundwater

[2] On the one hand one could argue - rather theoretically - that the absence of discharge regulations implies a right to pollute. On the other hand one could argue that even before the adoption of surface water protection legislation in the various countries, discharges were only allowed in so far as they would not harm any other stakeholder. Owners of a surface water body could claim a right to be protected from upstream surface water pollution.

pollution is not only a matter of policy regulation; it could also be regulated by a redistribution of property rights, since buying out farmers or compensating them for moving farming practices to another piece of land could be an option for water suppliers to resolve the issue of drinking water source pollution.

In case of water depletion, there is a rivalry between the various users and use functions of the same water body. Water scarcity is the result of excessive claims by users - industrial, agricultural, hydropower, and so on. If one admits that a minimum ecological water flow or water table should be safeguarded, then the pressure on the availability of water rises yet further. This is a typical case of rivalry between property rights holders. The rivalry could be typically managed by redistributing use rights, based on the assumption that only a limited amount of water is available. Water distribution then becomes a matter of distributing or redistributing water use quotas.

In the case of flooding it is not a scarcity of water but a scarcity of space in floodplains that is increasingly being recognized as the main problem. Again, this could very well be considered a rivalry between property rights holders, taking into account that land owners and users in flood plains are competing with stakeholders that claim space for water storage and river dynamics in floodplains. Redistributing land use rights could be a way of better managing this rivalry.

In all four cases we need to be aware that public authorities represent some specific uses that are not clearly represented by other specific users or stakeholders. This is especially the case for environmental and ecological functions of water resources. For instance, a European water quality directive establishes a use right for national governments to protect a water body for environmental reasons by restricting other uses as pollution sources. The use right itself is part of the property rights subsystem. How the use right is applied by a national government should be considered as part of the public policy subsystem within the resource regime. Such a public use right to protect the environment allows other stakeholders to claim the application of a public use right. For instance, an environmental NGO could go to court to enforce compliance with an environmental standard or the application of a standard by some public authority. While on the one hand public authorities represent specific uses, such as the environmental and ecological functions of a resource, on the other they are responsible for guaranteeing equal access to all users, which means they have to deliberate between various rival interests. Public authorities have to resolve conflicts between competing uses in the public interest of a sustainable utilization pattern.

3.2.2 Public policies as subsystem of a resource regime

While the evolution of property rights has been considered from a resource perspective, with the resource water itself being taken as a starting point for the identification of property rights, we shall consider the evolution of public policy from a policy problem perspective. This means that we shall analyze how and for what reasons national public policies try to intervene in the use of water resources in order to reduce policy problems (use rivalries) related to these water resources. We are interested in all public policies affecting the exploitation and/or the protection of water resources. The resulting division of phases may - but need not - be the same as the division of the phases in the evolution of property rights.

Both a narrower and broader concept of public policy were adopted in the Euwareness project. The narrower concept focuses on the traditional elements of public policy (policy design), i.e. policy aims, instruments, target groups, implementation arrangement, causal and intervention hypotheses, and considers a policy as it has been adopted, i.e. in terms of policy assumptions and planned policy interventions (Linder & Peters 1989; Kingdon 1984).

The broader concept focuses on public policy in terms of governance and, in addition to the traditional elements of public policy, identifies other relevant aspects and draws attention to the complexity of public policies by raising the following questions: Who were the policy makers and how does their policy initiative fit into the general scheme of policy-making by separate administrative levels and authorities (multi-level governance)?; To what extent is the policy initiative based on a co-production with various non-public actors (multi-actor governance)?; To what extent do the policy assumptions present a mixture of perspectives (multi-perspective governance)?; To what extent do policy interventions present a mixture of policy instruments (multi-instrument governance)?; To what extent must the policy implementation rely on a complex institutional arrangement (multi-resource governance)? (Bressers & Kuks 2001; 2003; see also chapter 2). Consideration of the traditional aspects as well as the broad concept should encompass the following elements:

1. Variety of levels and public authorities involved

Who were the policy makers and how does their policy initiative fit into the general scheme of policy-making by separate administrative levels and authorities? Is the national policy initiative based on an EU-policy initiative? Which national level ministries are involved in the initiative and to what

extent is the initiative co-ordinated or fragmented? What discretion does the national policy leave to the authorities at lower administrative levels?
Related element of narrower concept: institutional arrangement.

2. Variety of non-public actors involved
To what extent did the policy initiative recognize the interests of various non-public actors? Which users of the water resource, user organizations (intermediaries), stakeholders and/or advocacy coalitions participated? What are their relations with the policy makers? To what extent is the policy based on judgments formulated by an expert community?
Related element of narrow concept: target groups.

3. Variety of objectives and policy assumptions
Interventions by policy makers are based on policy assumptions and objectives which include their vision or perspective with respect to the policy problems and rivalries at stake and how these could be reduced by influencing the behavior of users or target groups.

About the objectives: Which policy objectives are accepted? What values and other preferences are considered to be at stake? What are the levels to which policy makers aspire (ambition) in absolute (level of standards) and relative terms (required changes in society)?

About the causal hypotheses: What are the dominant maps of reality? What is seen as a problem and how serious is it considered? What are the causes of these problems? To what degree is uncertainty accepted? Are problems considered to be a problem for individuals or a problem for society as a whole?

About the intervention hypotheses: Where are the recognized points of intervention? What relationships with other policy fields are recognized as co-ordination topics?
Related elements of narrow concept: policy objectives; policy rationale (causal and intervention hypotheses).

4. Variety of instruments
Which instruments belong to the policy strategy? What are the characteristics of these instruments? What are the policy target groups and what is the timing of its application? How much flexibility do the instruments provide? To what extent are multiple and indirect routes of action used?
Related elements of narrow concept: policy instruments; target groups.

5. Variety of responsibilities and resources for implementation
Which organizations (including government organizations) are responsible for implementing the policy? What level of authority and other resources are made available to these organizations by the policy? How complex is the institutional arrangement for policy implementation?
Related element of narrow concept: institutional (implementation) arrangement.

3.3 Criteria for institutional sustainability

The dependent variable in our study is the sustainability of water resource regimes. Since our study had to contribute to the implementation of the European Water Framework Directive, we prefer to stay close to the way in which a sustainable status of water resources (water bodies, water basins) is defined in this directive. Key aims of the directive are the following (EU 2000):

- expanding the scope of water protection to all waters: surface waters and groundwater;
- achieving a 'good status' for all waters by a set deadline;
- water management based on a river basin approach;
- 'combined approach' of emission limit values and quality standards;
- getting the prices right;
- getting the citizen involved more closely;
- streamlining legislation.

Considering these aims, we could distinguish between criteria for ecological sustainability and for sustainable management or institutional sustainability. Ecological sustainability refers to the achievement of a 'good status' for all waters by a set deadline. It addresses the status of water quality and water quantity in terms of its availability and fitness for present and future demands (uses). There are many European directives that set standards for such a good status. The European Water Framework Directive aims to integrate these standards. Ecological sustainability especially aims to protect the way in which water resources are needed for the ecosystem (ecological uses) or for human health (such as the Drinking Water Directive).

In our view, institutional sustainability is a derivative of ecological sustainability. It focuses on the availability and fitness of water resources for all interested users, user groups and use functions that could be identified. Institutional sustainability requires the distribution of a resource among users in a just manner, taking into account the availability and reproductive capacity of a resource for future generations. It requires that water

management recognizes users and use functions and provides them with rights of access to a water resource (property rights). Additionally, the concept of institutional sustainability provides criteria for resource regulation by means of public policies. Such criteria concern how we would design a water policy or management regime to finally improve the ecological sustainability of water use. This refers to water management at basin level, the participation of users in policy making, expanding the policy scope to all aspects of a water resource, streamlining legislation, getting prices right and redistributing access rights among users.

Ecological sustainability depends on institutional sustainability and sustainable management as preconditions. We are especially interested in the interaction between property rights and public policy and how this interaction could contribute to greater ecological sustainability. We look at institutional arrangements or regimes that have been developed through the years to manage conflicting water uses and to guide these uses in a sustainable way. Part of the regimes is that they do establish property rights and use rights over water resources in order to clarify ownership, but also to restrict the owner's water use by allowing others to make use of the same water resources. The possession of titles, the exclusion of uses, and the access of users are organized in this way. Another part of the regime is that supplementary policies are formulated to help these property and use rights work in the targeted directions. Studying the evolution of resource regimes, we focus on the 'extent' of a regime (i.e. the uses and use functions that are regulated by a regime and therefore belong to the regime's domain) and on the 'coherence' of a regime (i.e. the match between the regime's elements, especially the degree of consistency between property rights elements and public policy elements). We are not only interested in the coherence between the property rights subsystem and the public policy subsystem of a regime (which we prefer to label as the 'external coherence' between the property rights structure and the governance structure of a regime), but also in the internal coherence of the property rights structure itself and in the internal coherence of the governance structure. Therefore, we distinguish between the following change variables:

- Extent of a regime.
- External coherence between the property rights structure and the governance structure of a regime.
- Internal coherence of the property rights structure of a regime.
- Internal coherence of the governance structure of a regime.

Extent of a regime

The extent or fullness of a regime refers to the number and the restrictiveness of its rights. We could think of a continuum with on the one

side extreme laissez-faire arrangements under which individual participants are free to use a resource without even the constraints imposed by some system of property and use rights (i.e. the case of 'no regime'). At the opposite extreme we find institutional arrangements featuring central planning combined with extensive structures of rules governing the actions of users. Most real-world regimes lie somewhere between these two polar cases. Since 'extent' reflects the domain of uses and users that are regulated by the regime, it is important to explain what is meant by 'resource use'. The European Water Framework Directive defines the use of water as:

- abstraction, distribution and consumption of surface water or groundwater;
- emission of pollutants into surface water and waste water collection and treatment facilities which subsequently discharge into surface water;
- any other application of surface water or groundwater having the potential to significantly impact the status of water.

Due to the interconnection between water and land, a water resource could also be a river basin, thus including the area of land from which all surface water run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea at a single river mouth, estuary or delta. Therefore, resource use may also refer to river basin use. On the basis of these notions we created for our study a list of specific uses and use functions, which we classified as follows:

- Water for the living environment (plants and animals).
- Water for consumption and drinking water supply (domestic use).
- Water for agricultural use (irrigation or drainage).
- Water for industrial use, which means water used directly or indirectly for the production of economic goods and services (for instance, cooling as an indirect use or production of mineral water as a direct use).
- Water for hydropower production (as a particular form of economic production).
- Water resource as a medium for discharge of pollutants.
- Water resource as infrastructure for tourism, leisure, recreation, sports or medical use (e.g. bathing, swimming, skating, leisure navigation, sports fishing, wind surfing).
- Water resource as an infrastructure for commercial navigation, fishing, gravel extraction, mining, or other commercial uses.
- Water resource as an infrastructure for land use (especially use of flood plains for water storage, landscape development, urban development, etc.).

If a certain use of the water resource (e.g. fishing) is not regulated or considered by any of the regime elements, it does not belong to the extent. Likewise, if only professional fishing is regulated, but not sports fishing, the sportsmen involved do not belong to the extent. A change in extent will often mean that more uses or use functions are incorporated. Typical of many cases is that nature (living environment) gets recognized as a use function and considered by the regime. A larger extent makes the regime more 'meaningful' for the use of the resource. But there is also a danger. If the incorporation of additional uses/users in the regime takes place by means of new, separate property rights and/or public governance aspects, this might lead to a decline of the regime's coherence. This is how simple regimes evolve into complex ones.

External coherence of a regime

The concept of coherence refers to the degree of consistency among the elements of a resource regime. For instance, use rights frequently come into conflict with private ownership rights. Young argues that resource regimes need to be accompanied by administrative organizations and policies, especially to cope with problems of interpretation and dispute settlement. This illustrates the mutual relationship between property rights and public governance:

"As soon as some administrative apparatus is in place, it becomes possible to think about devising techniques of social control (policy instruments) through which to guide the behavior of those subject to a regime towards certain desired ends. Possible policy instruments are changes in bundles of exclusive rights, the promulgation of restrictive regulations, or decisions concerning individual applications for resource exploitation permits. Bundles of exclusive rights could be restructured as a means of solving dilemmas of common property in the realm of natural resources or alleviating problems of air and water pollution. Thus, we might establish licenses or entry permits relating to the use of resources. Alternatively, it would be possible to create pollution rights entitling the holder to emit specified amounts of effluent or use rights entitling the holder to make some designated use of a resource. All such rights would be transferable so that exchanges could occur and re-combinations of the rights would be perfectly feasible." (Young 1982: 61)

The existing property rights structure might trigger public authorities to change the property rights structure. We were able to distinguish between 'hard' and 'soft' changes of the property rights structure. Hard changes are based on some redistribution of property rights, which means that property rights are transferred from one user to another. Redistribution could take

different forms, such as attribution of new property titles to new users at the cost of other users, adoption of new titles for expropriation of ownership, limitation of use rights, and transfer of private property rights to the public domain. Soft changes of the property rights structure are not based on redistribution but on compensation arrangements or on the attribution of liability. The key aim of the European Water Framework Directive, to get prices right, also fits into this category. Each water use will have its price in terms of affecting the status of a water resource. First, the EU wants to change the pattern of water use by making those who pollute pay the costs of the damage they cause. Therefore, the EU adheres to the polluter pays principle: those who pollute need to accept the financial consequences (to include externality costs). Secondly, the EU stresses the integration of the full cost of water uses into the price paid for the water, to ensure that costs are not born downstream by the rest of society and by future generations. The full cost recovery principle should ensure that the price charged to water users contributes to the wise use of this limited resource (also to include externality costs). Thirdly, the EU adheres to the principle of affordability, to ensure that basic services are provided at an affordable price (to guarantee access rights). These three principles should encourage a far more rational, sustainable use pattern. Getting the prices right could be effectuated by changing the property rights structure.

Internal coherence of the property rights structure of a regime
On the one hand, we expect more and more use rights to be established over time with respect to the same water body, and often perhaps at the cost of other existing use rights. This would increase the extent (or scope) of the property rights system. As a result, the property rights would develop into more complex bundles of rights and the need for co-ordination would increase. On the other hand, we expect more and more use rights (including those related to ownership) to be restricted over time so as to protect other use rights and reduce rivalries (redistribution of rights). This would increase co-ordination within the property rights system and enhance the internal coherence of property rights.

Internal coherence of the governance structure of a regime
On the one hand, we expect more and more water uses to be recognized by public policy makers in their policies over time. This will increase the extent (or scope) of the public policy subsystem. We also expect that it will increase the complexity of public policies: more administrative levels and authorities would be involved, more interests of various non-public actors would have to be recognized, various policy perspectives would compete, policy interventions would increasingly present a complex of policy

instruments, and policy implementation would have to rely increasingly on a complex institutional arrangement. On the other hand, we would expect to find an increasing number of co-ordination attempts on the part of policy makers with the aim of reducing fragmentation and improving the co-ordination of policy initiatives. Co-ordination attempts could also have the opposite (unintentional) effect of increasing fragmentation instead of contributing to their purpose of increased integration.

The criteria for 'integral water management' as provided by the European Water Framework Directive mostly refer - in our terms - to a combination of an increased extent and more internal coherence of the governance structure of a regime. Only the criterion of 'getting the prices right' appeals to an improvement of the external coherence between the property rights structure and the governance structure of a regime. It is apparent, therefore, that options for the improvement of the external coherence - in particular the options we suggest for the redistribution of property rights - are not considered by the European Water Framework Directive.

In the previous chapter we explained that a governance system can be analyzed along five dimensions or elements. Therefore, the internal coherence of the governance structure of a regime can be parsed into:
- Coherence of levels and scales of governance;
- Coherence between actors in the policy network;
- Coherence of problem perception and objectives;
- Coherence of strategy and instruments;
- Coherence of responsibilities and resources for implementation.

The options for improving integral water management, as advocated by the European Water Framework Directive, can be linked to these five forms of coherence:
1. Water management based on river basins: administrative co-ordination at the level of a river basin as a whole ("the best model for a single system of water management is management by river basin - the natural and hydrological unit - instead of according to administrative or political boundaries" - EU 2000). This element supports the form of coherence focusing on levels and scales of governance.
2. Getting users involved: involvement of all actors having an interest in water services ("increasing public participation and balancing interest of various groups" - EU 2000). This element supports the form of coherence focusing on actors in policy networks.
3. Expanding the scope: development of a water vision for a river basin ("co-ordination of objectives - good status for all waters by 2010; the

objectives for a river basin must be set out in a river basin management plan, based on analysis of the river basin characteristics, a review of the impact of human activity on the status of waters in the basin, estimation of the effect of existing legislation and the remaining 'gap' to meeting these objectives" - EU 2000). This element supports the form of coherence focusing on problem perception and objectives.

4. Streamlining legislation ("the framework directive will take over operative provisions of several water directives" - EU 2000) and getting the prices right by full cost recovery pricing ("to ensure that the price charged to water users integrates the true costs" - EU, 2000). This element supports the form of coherence focusing on strategy and instruments.
5. Co-ordination of implementation: co-ordination of the application of measures for a river basin ("analyzing whether existing legislation solves the problem once and for all, and if it does not, identifying why and designing whatever additional measures are needed to satisfy all the objectives established" - EU 2000). This element supports the form of coherence focusing on responsibilities and resources for implementation.

An example of inconsistency within the governance structure is when a new problem perspective is accepted, but no new targets are formulated for that problem, or it is not recognized that the new targets are contradictory to the existing ones, or the new targets' objectives are not followed by instruments to attain them. An example of a misfit within the property rights structure is when new users are granted use rights without recognizing that this may harm existing use rights, for instance when water scooters are allowed in a lake where a sports fishing association holds an exclusive fishing right. An example of lack of coherence between property rights and governance occurs when policy instruments address actors other than those that hold relevant use rights. Or, if the extent increases, but the policy makers remain unable to recognize new uses through a redistribution of property rights, the improvement is only partial. This would mean an improvement in terms of extent, but not in terms of coherence.

3.4 Regime evolution

The central postulate of our approach is that the two steering dimensions (property rights subsystem and governance subsystem) are complementary and must both be considered to achieve sustainable resource management. The concept advocates that the management and preservation of a resource should be understood not only in terms of public management (top down),

but also in terms of civil or social action and self-regulation by society on the basis of property rights (bottom up). If we want to focus on sustainable resource management, a comprehensive and integrated approach of all managerial actions is required. The question that arises at this point is how these subsystems interact as a regime, and how this regime develops over time.

As described in the previous section, we want to evaluate a regime in terms of its sustainability performance. We distinguished two dimensions for regime classification: extent and coherence. The extent of a regime concerns its inclusiveness with respect to all uses related to a water resource. The coherence of a regime concerns the recognition of property rights holders as target groups of policy interventions. Whereas the extent counts the different rival uses regulated by public polices, the degree of coherence tells us whether and how the different target groups have been co-ordinated. On the basis of these two dimensions we can construct a typology. Such a typology allows to divide the historical emergence of an institutional resource regime very schematically into different phases (see Table 3.2).

Table 3.2 Extent and coherence as dimensions of regime evolution

Regime dimensions	*Coherence low*	*Coherence high*
Extent low	No regime	Simple regime
Extent high	Complex regime (fragmented)	Complex regime (integrated)

When the central actors observe scarcity in connection with the use of the resource, this gives rise to a simple regime with the new application of property and use rights, or on the policy level with the adoption of general police policies with very simple designs (for instance, a general police clause for protection of use rights or bans and license restrictions).

In the subsequent phase of the complex regime, we can already observe the combination of the (clarified, redefined) property and use rights with a more detailed policy, framed in terms of aims of the corresponding protection and use policies. This is followed by a significant increase in the officially sanctioned uses - which are thus guaranteed in a property-like manner - for the production of specific goods and services. Examples of such rival uses of water resources are fishing, energy production, agriculture, biodiversity, drinking water production, and recreation. The now mainly heterogeneous demands and the sum of the diverse private-use rights lead to a crisis and possibly even the collapse of complex regimes.

The key question now is whether it is possible to establish a water resource regime that can take account of these varied, heterogeneous

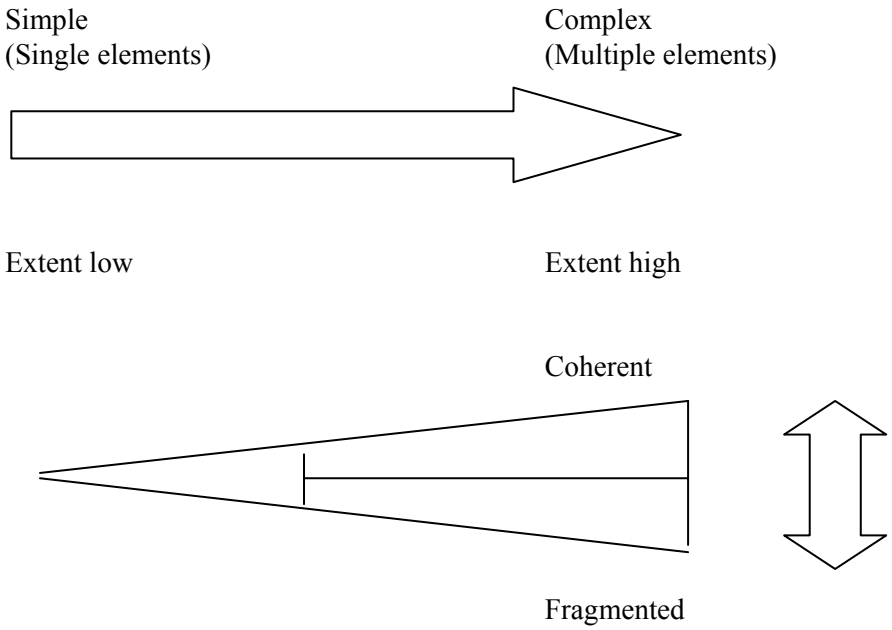
demands. Such regimes would regulate the totality of uses in such a way that it would be possible to sustainably maintain the capacity of the water resource in question to the satisfaction of all these uses and use functions (integrated regime). The development of such a regime would depend on institutional changes in the governance structure and the structure of property and use rights.

In the Euwareness study, we aimed to examine when, under what conditions and in what form integrated water resource regimes are established that can successfully regulate all of the use demands and thus react to the growing scarcity of goods and services provided by a water resource or the depletion of its stocks. A historical screening of water resource regimes in different countries is used to examine whether the emergence of resource regimes corresponds to our theoretical phase model and whether the suggested transitions from complex to integrated regimes can be identified (see chapters 4 and 5). This development of national regimes has been examined for a period extending over more than a hundred years (from the early 19th century until the end of the 20th century). The methodology was descriptive, making as much use as possible of previous studies and publications. The screening concentrated on changes in the central elements of the governance structure and the structure of property and use rights. This diachronic analysis made it possible to pronounce the extent of the regime and changes in the governance structure as well as the structure of property and use rights over time. It is particularly important that the transitions are identified, i.e. those historical moments when the resource regime actually changed from one phase to another. In the Euwareness study we were also particularly interested in the change from complex to integrated regimes, we subsequently studied two cases of water basins in each of the countries involved, to get a better understanding of the specific conditions under which regime transitions towards integration appear (see chapters 6 and 7). The case studies focus on the last three decades of the twentieth century (1970-2000), when many countries developed complex regimes and attempted to integrate water management.

Complexity means that most of the elements of regimes can be characterized by a multiple format. A regime becomes complex when more layers and scales, actors, perceptions of the problem and accompanying goals are involved, more instruments are part of the policy mix and more organizations share responsibilities for policy implementation. While the growth of complexity in water regimes seems to be part of a general development in society, integration in the form of more coherence as a development is not. The central assumption is that coherence will occur

when the relevant actors acknowledge that more coherence is necessary to prevent further deterioration of the resource. This means that the improvement of coherence is not a spontaneous development, but is more deliberate in character. In addition, relatively singular or simple regimes (one level, one governing actor, focusing on one specific use, one instrument, and one implementing agency) will not be in need of coherence. Coherence only becomes a relevant concept after growth involving multiple uses (see Figure 3.2). And yet, it is not a logical consequence. Complex but fragmented regimes are empirically quite common. This comes at a price. Every form of more coherence creates the need for additional interaction and increases transaction costs, at least initially. This means that more coherence typically stems from discernible change agents that demand some form of consistency. Thus, unlike an increase in complexity, developments in the direction of coherence need deliberate effort on the part of motivated actors.

Figure 3.2 Regime evolution



The regime phases can not only be described or characterized, but also identified and qualified in terms of their driving forces. In some phases, the regime evolution may be more property rights driven and more public policy driven in others. If property rights are predominantly changed as a result of policy interventions in a certain phase, this phase would be designated as public policy driven. Phases in which public policies intend to formalize a

practice settled by property rights would be designated as property rights driven. A distinction can also be made between use-driven policies and protection-driven policies. Use-driven policies intend to facilitate the economic uses of a water resource. Protection-driven policies intend to facilitate the ecological uses or functions of a water resource.

Regime change takes place within a context of problem-related and institutional triggers. The first triggers that should be considered are probably those caused by external shocks in the form of calamities or specific events. Example here would be a drought or flood in the aftermath of a particularly low or heavy rainfall. Other examples could include the sudden death of a fish population or the general pollution of drinking water due to an accident in, for example, a chemical plant or a copper mine. However, the problem pressure can also increase slowly and become serious without the advent of a particular calamity. Industries or agriculture may steadily use a water basin as a sink and, thus, increasingly rival other goods and services such as the supply of drinking water or provision of living space for fish.

Institutional triggers also have an important role to play. We think of institutional triggers, first and foremost, based on actors as institutions. A change in regime rules will strongly reflect the political resources of the actors who represent an interest in the use of particular goods of the water basin in question. Actors depend on the resource to varying degrees. Actors who strongly depend on pure water, for example, will be particularly dependent on reaching accommodations with other actors. Thus, the relationship between actors in terms of resource dependencies shapes the possible changes in regime types. However, the relations between actors are also defined independently of the water basin and influenced by political institutions such as federalism or a new level of governance. A higher administrative or political system may enact new rules or standards. EU-legislation or UN-conventions like the Convention on Biodiversity or Agenda 21 can pressurize countries to reform laws on water use. It is also possible for a country to change meta-rules or meta-policies such as economic, social, or infrastructure laws or competencies between levels. These changes concern a much larger policy area than water, but will probably also affect water uses. Finally, the policy style as a way of policy-making in a country can also change. Policy makers may start to increasingly delegate implementation tasks to private actors or increasingly rely on procedural rather than regulative instruments.

3.5 The political context: conditions for regime change

With our research framework we are interested to learn about regime change, conditions for change, and thus conditions for sustainability. For that purpose we have to formulate a theory on regime change. There are many theories on policy change and institutional reform, developed by authors in the field of political science and public administration. For instance, much debated are the 'punctuated equilibrium' theory by Baumgartner & Jones (1993), the 'social learning' theory by Hall (1993), and the 'advocacy coalition' theory by Sabatier & Jenkins-Smith (1993). These three theories consider policy processes as prolonged periods of incrementalism, succeeded by relatively short periods of radical policy changes. These radical policy changes are focused on as dependent variables. The origins of radical changes are mostly identified outside the policy system (Yesilkagit 2001). Several explanations for the occurrence of change can be found in literature. Incremental institutional adaptation is normally considered as the result of gradual social, economic and political developments (North 1990). Besides explanations for gradual adaptations of institutional structures, crises are often considered as an important trigger for more radical change. During a crisis the institutional structure itself becomes highly criticized, which softens institutional resistance to change and opens up a 'window of opportunity' for the introduction of institutional reform (Kingdon 1984). However, not every crisis leads to change. Even if a crisis unfreezes institutional rigidities, key officials cannot take decisions without considering the past of the sector (Boin & 't Hart 2000). In fact, this is a statement that institutional change always will be path dependent.

In this context, Armingeon (1996a, 1996b) states that major reforms rarely occur as a reaction to international pressures. Political institutions in OECD countries tend to persist. Internationalization or globalization has not changed much, contrary to the early hypotheses of the globalization literature predicting major changes and the convergence of politics and institutions in nation states. Of course internationalization can trigger institutional changes, which national systems fail to bring about without external stimuli or pressures. But since the early 1980s he observed few changes in major institutions of democratic systems in OECD nations. Most national political institutions have been left largely intact despite both internal and external challenges and changes. Armingeon assumes that global developments become transformed into domestic causes of reform or persistence in a complex procedure whereby the configuration of institutions and the distribution of political power play a central role. Immergut (1992) identifies 'domestic veto points' as inhibitors to change. Veto points result from the dispersion of otherwise centralized and concentrated political

power. They refer to those institutions and actors who are able and willing to hinder reform. Examples are direct democracy, strong regional governments, and corporatist arenas.

Hypothesis 1
The path dependency argument leads us to the conclusion that the institutional sustainability of water resource regimes - as desired by the EU - will be better and faster adopted by member states the better the required regime changes fit into the existing institutional structure of the national water regime.

This first hypothesis could be used to investigate to what extent member states are able to adopt the institutional requirements of the European Water Framework Directive (the adaptive potential of a state). For instance:

- A river basin approach will be easier to adopt if a decentralized water management structure already exists which based its administrative scale on watershed boundaries. It will also be easier to adopt if a country adopted subsidiarity as a principle for multilevel governance.
- A participatory structure ('getting users involved') will be easier to adopt if some form of user participation in water management already exists.
- An integral water vision for a water basin will be easier to develop if a planning structure for water management exists.
- The streamlining of legislation will be easier if a country has already adopted integral water legislation.
- 'Getting the prices right' by full cost recovery pricing will be easier to adopt if a country is already accustomed to water taxes based on the polluter pays principle and on full cost recovery of water services.
- Coordination of implementation will be more effective if a country is characterized by a strong interplay between central and decentral authorities in the field of water management.

Regimes could be rather stable, without changing much or rather gradual (incremental change). Long periods of stability could be succeeded by short periods of radical change, caused by external factors like a natural or a political crisis. However, not every crisis leads to radical change, and not every change needs to be caused by a crisis. In other words, there could be many triggers for change, but it depends on the conditions if a trigger, or a combination of triggers, results in change. It also depends on the conditions if triggers result in more radical or more incremental change. For a theory on regime change we need to identify such conditions, which determine the effect of triggers.

In search of such conditions, let's have a closer look at the theories by Baumgartner & Jones, Hall, and Sabatier & Jenkins-Smith. The punctuated equilibrium theory (Baumgartner & Jones 1993) argues that stability results from the existence of a policy community with a dominant position (policy monopoly) within the policy sector. The equilibrium will change if a rival policy community succeeds in challenging the legitimacy of the dominant policy program which is in force, by mobilizing individuals or groups with indifferent opinions. The social learning theory (Hall 1993) argues that the political establishment in a policy sector is following a paradigm, which is the basis for their perceptions and argumentations resulting in a policy program. Such a policy program is constantly being adapted on basis of social learning. The basic paradigm remains in force as long as adaptations are a matter of incremental change based on routine learning processes. Radical change, which is the replacement of a paradigm by another one, is based on a process of more fundamental rethinking, motivated by ideological or political-tactical considerations. The advocacy coalition theory (Sabatier & Jenkins-Smith 1993) argues that a policy sector remains stable as long as rival policy coalitions (advocacy coalitions) within the policy sector are competing on the basis of their own set of values and beliefs. This rivalry will only result in incremental changes. Radical change can only result from a crisis or a changed power configuration at the more central collective choice level under which the policy sector operates.

Comparing these three theories we find that they all identify both intellectual based and power configuration based causal mechanisms leading to policy change, which in fact goes back to Heclo's distinction between 'puzzling' and 'powering', meaning that policy processes are about ideas and learning as well as about power and interest constellations (Heclo 1974; Yesilkagit 2001). We also learn from these theories that radical change seems to be a fundamental change of the underlying power configuration or a fundamental rethinking of the underlying intellectual perspective or paradigm, or both.

In search for conditions that, as underlying or intermediate mechanisms, determine the change effects of triggers, Bressers & Kuks (2000; 2001; 2003) identify in their theory on the stability and dynamics of governance systems three causal mechanisms for stability or change. Their main assumption is that stability in a governance system results from mutual adjustment between the five elements of such a system (see chapter 2). Changes within a governance system occur because external change agents affect one or more of these five elements to some extent, which may result in an adjustment by the other elements. Whether a mutual adjustment really takes place depends on three causal mechanisms. The first mechanism is that

adjustment arises from the tendency of actors to act from a set of constant and coherent values (objectives: 'will'; normative component). The second mechanism is that adjustment arises from the tendency of actors to use a common reference frame to interpret cognitions (information: 'knowledge'). The third mechanism is that adjustment arises from the dependence of actors on each other's resources (power: 'ability'). Each of these three mechanisms could be an explanation for stability. On the other hand, each mechanism could be triggered to become a generator of change.

In the case of the first mechanism, there could be a specific arrangement of water rights in a nation, based on some specific set of values. For instance, there could be a strong value placed on keeping water in the public domain, or on water being controlled as common property, or on privatization of water services. It could be assumed that the stronger the value to keep water in the public domain, the better rivalries are managed in terms of taking care of all uses involved, or the better the non-institutionalized users are protected. In this context, the openness of the legal system to 'protective interests' is mentioned as a kind of catalyst to participation (Jänicke & Weidner 1997). Even the influence of a national policy style is mentioned. A cooperative policy style (with participatory values) is good for policy innovation, because innovators are integrated earlier into the decision-making process than is the case in countries with a more confrontational tradition (Jänicke & Weidner 1997; Richardson 1982; Vogel 1986). However, Arentsen, Bressers and O'Toole (2000) warned that closed forms of neo-corporatism might hamper policy learning, due to the screening of strong incentives from the outside. Furthermore, one could think of adherence to specific water principles like the polluter pays principle, the principle of affordability of water prices, or the principle of full cost recovery, as examples of values adopted by a nation. It could be assumed that rivalries are better managed when these principles are adhered to because they are based on public values, like incorporating the costs of externalities and guaranteeing access to all interested users in the society on the basis of equity. Also social mechanisms for dispute settlement should be regarded as based on values. Young (1982) mentions a few types of social choice mechanisms which are most relevant to the allocation of resource harvests (for instance in the fisheries, or oil and gas extracts). One of the simplest solutions is to rely on the principle of 'first come, first served' or the law of capture. The basic idea here is to honor the claims of those actors getting the resources first. Alternatively, these allocations can be made through some process of administrative decision making. Under this option, interested parties could submit proposals pertaining to the harvesting or the exploitation of resources, designated administrators make selections among

these proposals, and permits or licenses are issued to successful applicants. A third method of allocating limited resource supplies is to rely on explicit bargaining. The essential idea here is to create a competitive auction for permits, licenses, or leases granting exclusive rights to portions of the total possible harvest. Young emphasizes that resource regimes have few mechanisms that are unique to themselves. Instead, they may share these mechanisms with other regimes or rely heavily on the institutional arrangements of society as a whole in coming to terms with specific problems of social choice.

In the case of the second mechanism, the common reference frame to interpret cognitions could be the way in which water resources and water issues are perceived in a nation. The national orientation is probably determined by the appearance of water resources in a country. Arid countries in the Mediterranean area will have a different perception of resources and availability than the more humid countries in Northern Europe. Countries that are dependent on transboundary inflows (like the Netherlands) might have a different view than countries that do not (like France). In policy science literature it has been recognized that such an 'image' of natural resources will influence the national policy style (Eberg 1997; see also literature on cultural theory). Also Jänicke and Weidner (1997) recognize the societal interpretation of the environmental situation as what he calls a 'cognitive-informational framework condition' (a condition, under which environmental knowledge is produced, distributed, interpreted and applied). Knowledge about environmental dangers is the necessary condition for public awareness. But it is not only the scope of knowledge that matters. The leading paradigm of policy actors or 'the structure of available knowledge and thinking' is seen as increasingly important in policy research. The leading paradigm of environmental protection has crucial influence on the strategy.

An additional way to understand the meaning of a cognitive reference frame of a nation is to consider the way in which the boundaries of a resource regime are formulated. Young (1982) differentiates among three distinct dimensions in thinking about boundaries of resource regimes. First, there is the dimension of functional scope or issue area. For instance, issues of water quantity and quality could be dealt with quite separately in a country, which could mean that separate regimes are functioning for the same water resource. A second, spatial dimension involves the geographical coverage or catchment area of a regime. For instance, this is the way the European Union would like to think of water resources, advocating a river basin or water catchment approach, which might require an expansion of the geographical scope of a resource regime. A third dimension focuses on the

membership or beneficiary group associated with any given regime. For instance, a use-driven development of a resource regime may lead to over-exploitation and certain blindness for ecological aspects and non-economic values of the resource. Young recognizes that these three distinct dimensions, although helpful for analytical purposes, are apt to be highly interdependent under real-world conditions. Speaking of the size of resource regimes, he prefers to consider an increasing size as the extent that its functional scope expands, its catchment area widens, or its membership grows.

Instead of national leading paradigms, water institutions or networks also could have a dominant cognitive reference frame. As examples of such networks, we could think of the existence in the water sector of policy communities (Rhodes 1985; Jordan 1990), iron triangles (Jordan 1981), advocacy coalitions (Sabatier & Jenkins-Smith 1993), and expert communities (Jasanoff 1990) or epistemic communities (Haas, 1992). Such policy networks could be rather closed and difficult to enter for new actors with an interest in water management. For instance, the developed level of expertise in civil engineering or flood risk management could have built an expert community having problems with the entrance of other disciplines in water management. On the other hand, new water issues could help to develop issue networks resulting in the opening of policy communities which have been rather closed before (Heclo 1978; Bressers, O'Toole & Richardson 1995). In that context, epistemic communities have also been considered as a condition for successful water management (Jänicke & Weidner 1997). The openness of the scientific community to new problems and paradigms as well as the openness of the media to new issues are important for the development of new policy directions. We should understand openness also as adaptive and innovative capacity.

In case of the third mechanism, the dependence of actors on each other's resources should be understood as the power configuration reflected in the structure of the water sector in a nation. Such dependence is not only expressed in the demarcation of powers between administrative levels and authorities (centralism/decentralism) and in the power positions of specific public actors. It is also expressed in institutional links (networks) between public authorities and non-public actors or the civil society. Jänicke and Weidner (1997) mention two 'political-institutional conditions' which seem to be important indicators for our power configuration based mechanism: the 'participative capacity' and the 'integrative capacity' of a nation. The participative capacity refers to the input structures of the policy process, on which it depends if all water uses have an equal opportunity to become expressed and recognized. Decentralization and strong local communities are

seen as a favorable condition for participation, which is especially the case in countries which have adopted subsidiarity, a multilevel governance structure (Switzerland, Germany, Belgium, Netherlands, Nordic countries). The integrative capacity refers to intrapolicy coordination (i.e. the internal integration of the policy field), to interpolicy coordination (i.e. the cross-sectoral integration of conflicting policies), and to external integration of environmental policy institutions and non-governmental actors, including consultations with target groups. Integrative capacities together with participative ones offer possibilities for describing types of political systems. Examples might be the open, but fragmented American system, or the closed and highly integrated French system, or the relatively open and integrated systems of smaller democracies such as the Netherlands, or Norway.

Depending on the outlook of the three underlying mechanisms in a country, it will be easier (a matter of incremental change) or more difficult (a matter of radical change) for a state to develop towards an integrated water resource regime (with a high coherence and a high extent). In other words, to follow up our first hypothesis on path dependency and the adaptive potential of a state, it depends on the adaptive potential of the underlying mechanisms if and how triggers will effect the development of a resource regime. If these mechanisms have a low adaptive potential for change towards integration, triggers are needed that could bring about radical change. If these mechanisms have a high adaptive potential, it is sufficient to have triggers that bring about incremental change.

Hypothesis 2
The more the dominant set of values in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction.

As values and value-based institutions that are in favor of an integrated water resource regime could be considered:
- a strong value placed on community spirit, including willingness to restrict individual autonomy to achieve equitable distribution of water access rights;
- a cooperative policy style (with participatory values), including openness of the water policy community to rival interests;
- a strong environmental awareness in society, including a protective orientation and openness of the legal system to ‘protective interests’;
- common adherence to the polluter pays principle and the principle of full cost recovery.

Hypothesis 3
The more the dominant cognitive reference frame in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction.

As paradigms and cognition-based institutions that are in favor of an integrated water resource regime could be considered:
- a common understanding of water problems in terms of resource sustainability and not in terms of isolated problems that can be resolved with curative solutions (treatment of the symptoms);
- a water planning tradition and the presence of a supportive learning system (in the sense of national statistics, science and research);
- the ability to adapt existing water institutions to an expanding extent (to innovate within existing water institutions and broaden their scope).

Hypothesis 4
The more the power configuration of the water sector in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction.

As indicators of a power configuration that is supportive to an integrated water resource regime could be considered:
- a tradition of effective co-governance between central and decentral authorities (in which central authorities take responsibility for integration and decentral authorities are equipped with sufficient resources for the implementation and the differentiation to specific circumstances);
- a tradition of citizen participation and public debate on water issues (in which participation is not restricted to general elections, but in which participation rights are instituted regarding water policy making and planning);
- a strong environmental policy sector (with environmental divisions at all administrative levels and environmental subdivisions in all relevant ministries and water administrations);
- a strong position of ‘green’ NGOs.

3.6 Conclusion

While chapter 2 focused on water governance from a public policy point of view, we added in this chapter a property rights perspective, based on the notion that property rights determine the accessibility of water systems as a natural resource for various users and use functions. Both perspectives are combined as steering dimensions into a comprising concept of resource regimes. Resource regimes are considered as social institutions in which the public and private domains interact with each other. We developed a regime theory on this interaction, introducing regime extent and regime coherence as criteria for the evaluation of regimes on their contribution to resource sustainability. Thus, different types of resource regimes (or phases in the evolution of a regime) can be distinguished.

In general, water resource regimes will show a development from simple into complex regimes. A regime becomes more complex when more layers and scales, actors, perceptions of the problem and accompanying goals are involved, more instruments are part of the policy mix and more organizations share responsibilities for policy implementation. The central assumption is that coherence will occur when the relevant actors acknowledge that more coherence is necessary to prevent further deterioration of the resource. This means that the improvement of coherence is not a spontaneous development, but is more deliberate in character. Coherence only becomes a relevant concept after growth involving multiple uses. Every form of coherence creates the need for additional interaction and increases transaction costs.

In this chapter we also dealt with the political context in which regimes exist and develop. We focused on conditions that determine - as intermediate mechanisms - the effects of triggers on regime change, and formulated hypotheses on the institutional dynamics of water resource regimes. The first hypothesis, based on the path dependency, argues that the institutional sustainability of water resource regimes - as desired by the EU - will be better and faster adopted by member states the better the required regime changes fit into the existing institutional structure of the national water regime. The other hypotheses are built on the three mechanisms which are identified in chapter 2.

The second hypothesis, based on the tendency of actors to act from a set of constant and coherent values, argues that the more the dominant set of values in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction. The third hypothesis, based on the tendency of actors to use a common reference

frame to interpret cognitions, argues that the more the dominant cognitive reference frame in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction. The fourth hypothesis, based on the dependence of actors on each other's resources, argues that the more the power configuration of the water sector in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction.

The formulated hypotheses are statements about the dynamics of resource regimes as well as their stability (restraints to change). In the following chapters of this dissertation we will investigate the conditions of regime change (chapters 4 to 7) and governance change (chapters 8 to 10) as identified in chapter 2 and chapter 3. In chapter 12 we will revisit the last three hypotheses to formulate conclusions on the institutional dynamics of resource regimes and water governance.

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Part two

Institutional dynamics of water regimes

Chapter 4

Evolution of the national water regime in the Netherlands

4.1 Introduction: the context of the Dutch regime

In this study of the Netherlands national regime, we describe the long-term evolution of water rights (property rights) and public policies in the country over a period of almost 200 years (1800-2000), with an emphasis on the post-World War II period. In fact, water management has a much longer history in the Netherlands. As early as the 11th and 12th century, local communities started to organize themselves to manage water systems. Dykes were built to protect against flooding from the sea and the rivers. At that time, removal of peat (used as fuel) and clay (building material) was already causing land subsidence, demanding additional measures. The first democratic district water boards were established in the 13th century. The rulers of the Netherlands soon recognized them as competent water authorities. They were democratic stakeholder organizations consisting of elected representatives from local farming communities. For a long time (until the 19th century), they remained independent of national developments. In the 15th century, land subsidence was so great that agricultural fields remained water-logged for a large part of the year. More drastic measures were needed, and windmills were introduced to pump the extra water from the land. In the 16th century, windmills started to be used to drain the lakes resulting from peat-extraction, in order to create new land. In the 18th and 19th century more windmills were built to pump water out of local collection canals ('boezems') into open waters. The need for central coordination led in 1798 to the establishment of a state water authority 'Rijkswaterstaat'. This state department became the leading agency for the large-scale construction of a flood protection infrastructure consisting of dykes along the shores and main rivers, as well as for large land reclamation projects. In fact, our analysis of the Dutch national regime starts around the period 1798-1814, since in that period the first attempts at a centralized approach of water

management started. In 1814, the Netherlands became a monarchy and received a new constitution after a period of French domination (the Batavian Republic 1795-1806 and the Napoleonic era 1806-1814).

In this study we analyze how the scope or extent of both water rights and public policies has increased over time, taking into account the ever-increasing use of water resources. The more resource uses evolve, the more use conflicts or rivalries arise around a resource. A resource regime is understood as the combination of water rights (both ownership and use rights) established on a water resource, and the public policy attempts to intervene in the uses of a water resource. Our assumption is that, to solve rivalries between resource uses, a more coherent regime (i.e. a regime of public policies redistributing property rights) will be more effective and therefore lead to more sustainable resource use. This hypothesis is examined, while simultaneously investigating the triggers that have resulted in regime transitions. In section 4.1 we briefly explain the administrative-political structure of the Netherlands as well as the actual physical context of this country (water resources and rivalries), to create a framework for better understanding the sections that follow. In section 4.2 we describe the evolution of water rights in the Netherlands and in section 4.3 we do the same for the evolution of water policies. Both evolutions will be considered together in section 4.4, which identifies the main phases of regime evolution and the way in which both subsystems (property rights and public policies) interact over time, based on the dimensions 'extent' and 'coherence'. In section 4.55 we analyze and explain the regime evolution in concluding terms, while considering the conditions that have impulsed the regime evolution towards more integration.

4.1.1 The administrative-political structure of the Netherlands

4.1.1.1 Central and decentral levels of administration

The Kingdom of the Netherlands consists of 12 provinces, each divided into municipalities. There are about 500 municipalities (in the year 2000). Another administrative division within the provinces are the water boards, which are responsible for surface water management. There are about 55 water boards (in the year 2000). Water policy is drawn up and implemented at both the national level and at the level of provinces and water boards. From a historical perspective, provinces, water boards and municipalities have a quite autonomous jurisdiction. However, since World War II their autonomy has been increasingly framed in terms of a model of close co-operation with central government, in which the central government takes the initiative in policy making, and decentral authorities co-operate by

additional policy making and implementation within the national policy framework. Provinces and municipalities even depend on subsidies from the national budget. Water boards, on the other hand, cannot rely on such subsidies, and have to fully recover the costs of their activities by their own taxation.

Water boards are an old and special level of administration. They were primarily responsible, from the Middle Ages until the middle of the 20th century, for protection against flooding and for management of water in the polders in the low-lying regions. After the Second World War, and particularly since around 1970, water boards have acquired wider powers to combat water pollution (including the responsibility for the construction and operation of waste water treatment facilities). Water boards have a democratic structure, based on a profit-payment-participation principle (those having an interest in water management may participate and have to pay for water services in proportion to their interest). The general council of a water board comprises representatives of farmers, landowners, owners of buildings, industries and inhabitants. A water board has regulatory and taxation authority, raising its own taxes separately for quality and quantity management (based on the principles of full cost recovery and polluter pays). Municipalities are responsible for planning, building and operating sewerage networks in their areas. Besides the water boards, they are also the authority that licenses industrial discharges into the networks. Further, there are about 20 water supply companies for about 16 million inhabitants in the country, which means on average 800,000 inhabitants or 250,000 households per water supply company connected. These are public enterprises, often at provincial scale, with municipalities and provinces as shareholders, but operating under civil law.

At the level of central government, water policies are coordinated by the Ministry of Transport, Public Works and Water Management (V&W). This is the leading ministry that also supervises the 200-years-old 'Rijkswaterstaat', the water-engineering department taking care of all state waters and the state water infrastructure. The main (navigable) rivers and canals, all coastal waters and estuaries, the territorial seas, and the inland IJsselmeer fall under the jurisdiction of this ministry. The other (regional) waters fall under the jurisdiction of the water boards, with an exemption for regional navigable waters, which come under the jurisdiction of the provinces, and an exemption for local waters (like harbors, city canal systems), which fall under the jurisdiction of the municipalities. While water quantity management at the national level is completely supervised by V&W, water quality management is in the hands of the Ministry of Housing, Spatial Planning and the Environment (VROM), although it is still coordinated by V&W. A separate ministry for environmental affairs was

established in the Netherlands in 1971. This ministry also oversees drinking water quality. As far as water management has a recognized relationship with agriculture and nature conservation, which started to be recognized in the 1980s, the Ministry of Agriculture, Nature Management and Fisheries is also involved in national water policy making. The involvement of this ministry with fisheries has a longer history, of course.

4.1.1.2 Consensus-based and planning-based decision making

The Netherlands may be described as a highly consensus-based community with a planning tradition covering a wide range of aspects of society. In 1989 the Netherlands was the first country to present an integrated national environmental policy plan. In the field of water policy, the Netherlands started a planning tradition as early as 1968 with a First National Water Policy Document, followed by a second one in 1984, a third one (the first integral water policy plan) in 1989, and a fourth one in 1998. The Dutch system of integrated water management, adopted in 1985, takes account of all the many functions fulfilled by water systems in the Netherlands. It is internationally recognized as a very good example of integrated water management.

Another typical Dutch feature is the long tradition of government consultation of various groups in society. This tradition has its origins in the division of society on religious and political grounds from 1917 until 1967, known as the pacification-democracy. During this period, Dutch society was organized pluralistically according to four separate compartments (catholic, protestant, socialist and liberal), each having a strongly corporatistic structure. Compartmentalization could also be found in the media, education, sports and social clubs. The co-existence in political and social life of organizations with similar goals, but different ideological bases, resulted in mutual consultations and pacification among the political leaders of these compartments. Related to this, many consultation bodies have been established for consensus-based policy decision making (like the Socio-Economic Council, 'SER') (Lijphart 1968; Daalder 1974; Van Putten 1982). Although this compartmentalization went into a steep decline after 1967, it experienced a powerful revival in socio-economic politics in the early 1980s. Known as the 'polder model', it is believed to have generated high economic growth for the Netherlands. Nowadays, it is still current practice in the way water boards always have operated, and in the way environmental policies are implemented by means of covenants since the late 1980s. Around 1985, the Dutch environment department has adopted 'consensual steering' as one of its main policy strategies, which means that policy target groups are consulted and committed to environmental policy goals and to policy implementation by means of policy agreements (covenants). Other

departments, like those for economic affairs, agriculture, and water management, have followed this approach (Bressers, Huitema & Kuks 1995; Bressers & Plettenburg 1997).

4.1.1.3 International commitments

The Netherlands was one of the founding members of the European Community in the 1950s. The country always had a strong interest in pushing the community towards sound directives for water quality protection, since three international rivers (Rhine, Meuse and Scheldt), which drain a large and densely populated part of western Europe, cut across the Netherlands to join the sea. With respect to its water availability, the country depends heavily on transboundary inflows, especially from the Rhine and the Meuse. On the other hand, since the early 1990s, the country has started to experience severe problems in meeting EU standards for groundwater quality protection. So, we also see that EU policy is pushing the Netherlands to speed up with the implementation of water quality standards. Further, the international Rhine and North Sea Action Plans play a central role in setting water quality standards for Dutch water and environmental policies.

4.1.2 Physical conditions and main water bodies in the Netherlands

The Netherlands is situated at the downstream end of three European river basins (Rhine, Meuse and Scheldt). The inflows of the Rhine and Meuse are the country's main freshwater resources. Compared to other European countries, the Netherlands depends a lot on external water resources, with over 75% of its total resources coming from abroad rivers. About 30% of the total surface area of the Netherlands lies below sea level, protected in the west and north from the sea by barriers of dunes and dykes. The need to protect the land from high water from rivers and sea, and the tradition of artificially draining low-lying areas, have combined to give the country a complex hydraulic infrastructure. The country practices highly intensive agriculture and has developed water-based transport for passengers, products and raw materials to and from the European hinterland. The combination of physical circumstances and human pressures has led to a technically unique system of water management: the flow and level of almost every water body in the country is under human control.

The main water bodies in the country are:

– *The major rivers (Rhine/Meuse/Scheldt/Eems)*. These transboundary European rivers have their deltas in the Netherlands. Such reliance on transboundary rivers leads to cross-border tensions; the Netherlands has

always faced serious deterioration of surface water quality due to pollution sources in upstream countries (Germany, Switzerland, France, Belgium).

- *The southern delta (Province of Zeeland and Rotterdam region)*. In 1953, a huge flood disaster around the Zeeland estuaries led to dyke breaches and a large part of the province came to lie under water. This was the start of a Delta program, constructing a system of storm barriers, completed in the 1980s. Rotterdam is the world largest harbor and the main entrance for water transportation of goods to the European hinterland.
- *Coastal and marine waters (North Sea / Wadden Sea)*. The North Sea's continental waters are an important source for fisheries and for oil drilling. The Wadden Sea has an important underground gas reserve. However, it is also considered to be a very important area for nature conservation, and therefore gas drilling in this area is very controversial. The Wadden Sea is a shallow salt-water sea (a wetland during low tide) between the northern coastline and a strip of key islands. It has an interesting bird life and seal population.
- *The Blue Heart (IJsselmeer)*. This is a former inland sea, which has been closed by a storm barrier and turned into a very large freshwater lake after a serious flood disaster in 1916. The construction of the storm barrier ('afsluitdijk') was the start of huge land reclamation projects in the newly created IJsselmeer, resulting in various new polders from the 1920s until the 1970s (1930 Wieringermeer; 1942 Noordoostpolder; 1957 Oostelijk Flevoland; 1968 Zuidelijk Flevoland; 1975 unfinished land reclamation of the Markerwaard, with only a surrounding dyke completed). From the 1970s on, the IJsselmeer has been rediscovered as an important nature reserve. The IJsselmeer gets most of its water from the river IJssel, coming from the Rhine and entering the lake from the east.

Almost every water body in the Netherlands is under human control and managed through a sophisticated system. The physical infrastructure is now in place. Apart from upgrading of sewage reticulation and wastewater treatment, there is no need for further large-scale works of the type built in recent decades. An appropriate legislative and policy framework for integrated water management is also in place. Attention has shifted to policy implementation. Remarkable results have been or will likely be achieved: industrial discharges meet most of the targets; municipal discharges meet the targets for oxygen demanding substances and phosphates. However, inadequate results must be noted concerning the issues of water depletion,

too limited space for water, diffuse pollution, and toxic substances (OECD 1995). These issues will be discussed below.

4.1.3 Actual problem pressures in the Netherlands

Water depletion and desiccation

The good average rainfall (769 mm a year) in the Netherlands does not prevent water deficit during summer. In all, 10% of the total area of the country is affected by a permanent lowering of groundwater tables, making desiccation (water depletion) a major concern for nature protection as well as agriculture. The situation is due to drainage of agricultural land and increased abstraction of groundwater for drinking and irrigation. Drainage of farmland alone has caused the area of wetlands to dwindle by perhaps as much as 25% since 1950. A region is regarded as being affected by desiccation if it is designated as having a nature conservation function and the water table is too low to guarantee protection of groundwater-dependent ecological characteristics. While this issue is important enough to be one of the eight main environmental issues in the Netherlands, so far most activity has been confined to studying and defining the problem. Since measures to solve this problem will take time to be implemented, it is unlikely that the target for 2000 - a 25% reduction of the area affected - will be reached. Solutions involve partially switching from ground to surface sources for water supplies, preventing the discharge of rainwater run-off into the sewer, and various water management measures. Progress with the latter is complicated by the conflict of interest between agriculture and nature protection. This renders decision making difficult, especially at the level of the water boards, where farming interests always have had a large say. The intensity of socio-economic development in the Netherlands is such that the supply of water of adequate quality has become an important issue, and further increases in groundwater abstraction are constrained by nature conservation considerations. The Dutch authorities have recognized the need to promote more efficient use of water (OECD 1995).

Flooding and limited space for water

Two-thirds of the population lives in floodable areas: land below sea level requires permanent protection, and further large areas need protection from temporary inundation by the sea and the rivers. During the 1990s the Netherlands experienced serious river floods in 1992, 1995 and 1998, causing evacuations of people and extensive material damage. The Netherlands thus faces not only a potential shortage of usable water, but also an increasing scarcity of space. Space around the rivers is needed not only for safety reasons (to allow rivers to rise and fall without risk to human life

or harm to economic interests), but also for the ecological and navigational development of the river. Increasingly, water will have to compete with other interests for the limited remaining space in the Netherlands. An important new objective of Dutch water policy will therefore be to make water and its natural movements a key-determining factor in spatial planning. This renders decision making difficult, especially at the level of the water boards and municipalities, where the former have an interest in considering water as a guiding principle in physical planning and to leave areas unbuilt if a risk of inundation exists, while the latter have a final say in physical planning and have an interest in economic and urban expansion. Submitting their plans to a 'water risk assessment', before adopting them, will be a huge challenge to regional and local authorities in the next decades (OECD 1995).

Surface water pollution

Samples taken from state waters to test compliance with EU Directives on surface water quality (for drinking water, bathing, fish and shellfish) generally show good results. More than 97% of the Dutch population is connected to a sewerage system, and via that to a wastewater treatment plant. On average 93% of biochemical oxygen demand is removed. As a consequence, oxygen depletion of surface waters has become a rare phenomenon, although the Meuse and the Scheldt can still pose problems during summer periods of low flow. Reduction of discharges of nutrients (phosphorus and nitrogen) has shown significant progress in terms of industrial and municipal point sources and continues to do so (with rates of 75% phosphates removal and 70% nitrogen removal, due to tertiary treatment; see: Kuks 2001). However, eutrophication of surface waters remains a major problem because the surface water quality performance is not matched for diffuse discharges. The main problems are with diffuse flows of nutrients and pesticides, mainly from agriculture, as well as heavy metals, mainly from communal wastewater treatment. The reduction of point discharges of heavy metals is being tackled through the permit system and negotiation of covenants with industries (e.g. chemical, graphics). However, transboundary flows, via water and air, represent the dominant share of the total load of heavy metals. Disposal of sewage sludge has been tackled since the beginning of the 1990s. The practice of spreading sludge on agricultural land has almost ceased (OECD 1995).

Contaminated water soils

The accumulation of pollutants in soil and bottom sediments is such that surface waters and suspended sediments, in terms of nutrients, heavy metals and micro-pollutants, do not meet water quality standards and will not do so

for a considerable time in many watercourses. The contamination of bottom sediments in many Dutch watercourses is the result of long years of poor water quality, and will not disappear at the same rate as pollution loads are being reduced. The situation has become a hazard for human health and impairs the functioning of ecosystems. Remediation is expensive (OECD 1995).

Groundwater pollution
The quality of groundwater depends on land use, soil type and the contaminant considered. Target values for groundwater contamination are frequently exceeded in the upper meter of groundwater, particularly for copper but also for some other heavy metals. In 1990, nitrate concentrations in the upper meter of groundwater were still in excess of the drinking water standards (50 mg of nitrate/l), in 41% of the total area of the country, contrary to the EU Nitrate Directive. With respect to pesticides, it has been estimated that 1 to 2% of the 27 millions kilograms (active ingredients) of pesticides sold annually ends up in the soil and groundwater. Out of 50 pesticide compounds being monitored, 35 have been detected in groundwater, 33 of them at concentrations exceeding the drinking water standard of 0.1 µg/l (OECD 1995).

Coastal water pollution
Eutrophication is also a major concern in coastal waters. While phosphate concentrations have generally declined since the mid-1980s as a result of reduced inputs, there has been no clear trend for nitrogen inputs and concentrations. Although the load of almost all heavy metals into coastal waters was considerably reduced from 1980 to 1990, there are still problems with heavy metals in the coastal areas of the North Sea and the Wadden Sea, harming the ecosystem health. In the Wadden Sea there is a continuing problem with releases of oil from ships' bunkers and their effects on sea birds (OECD 1995).

4.1.4 Human pressures (water uses) and main rivalries in the Netherlands

Uses which affect water quantity and water levels
In the Netherlands, where a large part of the country is below sea level, a typical water use has always been the interventions for flood protection, in order to achieve water security and to protect land uses. Construction of dykes, storm barriers, and even land reclamation are intended to keep the water at bay. A related and very old use in the Netherlands, concerns the use of drainage systems to develop agricultural land, as well as for urban

development areas. Land reclaimed from the sea even requires the permanent pumped extraction of water. At the present time, these uses are still important for the country, and are even on the increase due to an increase of land uses for urban expansion and new infrastructure (like roads). In rural areas more than half of the drainage capacity is needed to get the water out of developed areas. Urban areas and roads occupy 14% of the territory, and water covers 9%. Nowadays, there is a heavy rivalry between urban expansion and leaving floodplains unbuilt for water storage in times of severe rainfall, because of inundation risks and resultant damage to property. As a reaction to growing urban development and land reclamation, compensation in the form of space for water storage is requested, although space is increasing in value due to a growing scarcity in the Netherlands. Another rivalry exists between drainage and overexploitation of groundwater (for drinking and industrial water supply) versus the water demanded by ecosystems, natural areas and wetlands, which suffer from water depletion. The demand for drainage in wet periods results in desiccation in dry periods (summertime). For that reason too, more space for water storage is requested.

Uses which affect water quality

Although the Netherlands succeeded rather well in controlling point source pollution, surface water pollution from transboundary sources and diffuse pollution from agricultural sources are still major problems. Both sources are not only detrimental to the improvements of effluent from waste water treatment facilities, they also do harm to water which is needed for drinking water, which requires large investments in the purification of raw surface and groundwater. In the Netherlands, about one-third of drinking water is produced from surface water, and two-thirds from groundwater. So, there is still a strong rivalry between intensive agricultural operations and drinking water companies, as well as a rivalry between polluters and the demand for a certain environmental quality, like that requested by the EU Nitrate Directive concerning groundwater (Kuks 1998).

Intermediate uses of water systems

In the Netherlands, very old and important intermediate uses of water systems are their use for navigation and fisheries. The strategic interest in navigation resulted in state control over the navigable rivers, after rivalries between the state and appropriate landowners along the rivers that were important for navigation. In case of fisheries, overexploitation of fish populations (as common property) has resulted in state interventions to redistribute fishing rights. In the twentieth century, other intermediate uses became important, like sand and gravel extraction from riverbeds, or the use

of water soils for oil and gas drilling, especially in the continental seas, the IJsselmeer and the Wadden Sea. In the latter areas, this has resulted in important rivalries with those having an interest in nature protection, supported by the EU Bird and Habitat Directives. Another intermediate use, which is often at rivalry with nature protection, concerns the recreational use of water systems, like recreational navigation. This rivalry is especially manifest on the lakes, in the IJsselmeer area and in wetland areas.

4.2 The evolution of water rights in the Netherlands[1]

4.2.1 Constitution of the public domain (1814-1841)

In 1814 a period of French domination ended for the Netherlands. In the same year, property rights on water started to be redefined in a new Constitution, followed by a new Civil Code in 1838 (which replaced the civil code from the French era, going back to 1804). The Constitution of 1814 and the Civil Code of 1838 both reflected the political liberalism, proclaimed by the French revolution, and the upcoming economic liberalism in the early 19th century. The French revolution proclaimed individual freedom, the liberation of property, and the abolition of privileges for the upper class. This resulted in a clear distinction between public law and private law (civil law) with three intentions: 1) to detach political rights from ownership of land; 2) to prevent public authority falling into private hands and being traded as private property rights; 3) to prevent arbitrary public interventions in private property. The economic liberalism movement, which came alive later on with a different focus from political liberalism, proclaimed that the public government should not intervene in the free play of economic forces. The economic order would perform best with every individual pleading his own interests. The French 'Code Civil' of 1804 did not yet reflect this economic liberalism. It still adhered to the idea that property could be restricted in many ways. The Dutch Constitution of 1814 stated that no right on property could exist, but also that expropriation would only be possible on the basis of public interest and on the condition of compensation for property loss. In other words, if someone enjoys a property that harms the public interest, he could be forced to surrender it in exchange for compensation. However, the Dutch Civil Code of 1838 declared that property is the right to freely enjoy a matter as well as the right to completely dispose over it and to use it. Only two limitations are listed:

[1] The following references have been used as general background for writing this section: Van den Berg & Van Hall 1995; Van Hall 1997, 1999; Van der Heide 1992; Perdok & Wessel 1998.

limitations by written public law or unwritten public rules, and civil law based limitations by other property right holders. These limitations place severe restrictions on the extent of private property, especially in the case of flowing water (Van den Bergh 1979).

In the case of water, the Dutch Civil Code of 1838 specifies that the State owns the territorial seas and coastal waters, including the Wadden Sea and the beaches. The State also owns the public navigable rivers, unless another public body owns these. Like the sun and the atmosphere, the territorial seas are considered as matters that could not be handled by individuals. Therefore they are not subject to private law. The same argument has been applied to other public water bodies in the country (like transboundary rivers, other navigable rivers and canals, natural harbors, beaches and dune barriers, lakes, and so on). As far as private ownership of water resources is concerned, the Civil Code states that property of land could include the property of the underground water, but only after it has been extracted. Aquifers cannot therefore be the subject of private property. A watercourse, or a part of it, could be privately owned, but this has always been interpreted as meaning that the underground of the watercourse (the waterbed) is owned, not the water itself in as much as it is flowing. Only non-flowing water on one's land, if not in conjunction with the water on someone else's property, could be privately owned by the owner of the land. Private property of land and water is limited according to the Civil Code in two ways: 1) water run-off from one's property should not hinder neighbors; 2) one should not hinder neighbors in the natural run-off of water from their property (Asser 1990).

In 1841 a new Expropriation Act was passed by the Dutch legislature, to replace a previous one from the French era, going back to 1810. This act elaborated further on the expropriation title in the Constitution of 1814. First, it listed the general public interest titles under which expropriation would be allowed. Secondly, it required a careful, law-based procedure for expropriation. In fact, a separate act was required to create a title for expropriation in the public interest. Third, it provided arrangements for compensation, on the basis of the principle that the government could take away a right on property, but not the value of property. During its more than 150 years of existence (this Expropriation Act still exists in the Netherlands), it has been amended over 55 times, each time enlarging the extent by adding one or more new titles for expropriation. In practice, the expropriation instrument operates as the big stick, but in only 3 to 5% of cases does it result in involuntary expropriation of land. In the other cases it leads to negotiations on selling one's property, using the instruments' procedure for determining the property's value (Van Zundert 1980; 1991).

Throughout most of the 19th century, there was a struggle between the central government and the Dutch water boards over the autonomy of the boards. In fact, these water boards operated as common property structures, even before the period of French domination. They were bottom-up organizations of owners of land and adjacent water courses, having an interest in common decision making on the water bodies in their area in terms of flood protection and water drainage. The water boards agitated against the centralization tendency during the French domination and the continuing centralization afterwards by the Dutch government, which adopted the French approach. Although the central state succeeded in acquiring the control over navigable rivers and other main water bodies (as early as the Constitution of 1814), it also had to recognize the autonomous jurisdiction by the water boards over the non-state waters. However, the Competences Act [Bevoegdhedenwet] of 1841 deprived the water boards of their administration of justice, since this was no longer considered to be compatible with the general administration of justice. In 1848, a new Constitution was adopted, which recognized the autonomous position of the water boards within the general administrative structure of the Netherlands. It also proclaimed the need for separate constitutional legislation for each of the lower administrations, which in the second half of the 19th century resulted in a Provinces Act and a Municipalities Act for provinces and municipalities, but which did not result in a separate Water Boards Act. The central state and the provinces on the one hand and the water boards on the other could not agree on interventions by the state and the provinces in cases where water boards would fail, according to the view of the other parties (Brainich von Brainich-Felth 1993).

4.2.2 Expropriation and compensation for national water works (1891-1908)

In 1895 the dispute of the central state and provinces versus the water boards came to a preliminary end by the adoption of the so-called By-Laws Act [Keurenwet], which allowed the water boards to have their own regulatory authority (by ordinance, called a 'Keur'), supervised by the central and provincial governments. So, since 1895 the common property structure of the water boards is supervised and backed by the state.

The first state legislation on water management was passed a few years earlier, in 1891. The so-called 'Act of 1891' was the first one in a series of classical water legislation passed between 1891 and 1908 on institutionalization of state and regional water management. This legislation had to empower the State for the construction and operation of state water works with a national interest. The Act of 1891 allowed the State to set up

regulations that are necessary for State water management. In fact, as early as 1887 an amendment of the Constitution recognized the State as main supervisor of the nation's water management. Next to it, the so-called 'Water State Act 1900' [Waterstaatswet 1900] introduced various far-reaching competences for the State and the provinces, allowing them to take over water works from the lower administrative levels (provinces or water boards), or to supervise these works. The Act on Reclamation and Embankment [Wet op de droogmakerijen en indijkingen] of 1904 entitled the State to reclaim land and created a concession system for land reclamation by others. The Rivers Act of 1908 made the State responsible for the various functions of rivers. It entitled the State to start up water works serving these river functions, taking into account procedural and material conditions. Serious river floods at the end of the 19th century (1876, 1880) had already forced the State to invest huge amounts of money in dyke fortifications. Because of the dynamic movements of the rivers and because river management would have an impact on large parts of the country, state control was considered to be of crucial importance.

During this period, important titles were added to the Expropriation Act to allow expropriation for navigation, flood protection and land reclamation (1891, 1900, 1908). These have been important for the construction and improvement of water works by the State, like dykes, roads, bridges, harbor works, as well as for the improvement and widening of rivers and canals. In addition, the Water State Act 1900 and the Rivers Act of 1908 allowed the State to use someone's land property for the maintenance of water works and rivers (to have access through maintenance roads) without expropriating the underground needed for this, on the condition of compensation for the negative effects of public water works on private property. These legal compensation provisions are very early examples of what has become known in the Netherlands as compensation for citizens who have to suffer lawful public action. Starting from the early 20th century, the Netherlands developed an extensive jurisprudence on how to recover damages to private property due to public water works. Not only financial compensation is being considered, but also other forms of compensation, like displacement of a firm, house or building, or economic investments in a region to compensate loss of employability. This so-called 'disadvantage compensation' [nadeelcompensatie] results from civil law-based compensation rights between a private and a public neighbor (as a variation on private neighbor rights) (Van der Schaaf 1971; Van Wijk 1999).

4.2.3 Controlled use expansion, deliberation of interests, and redistribution of rights (1954-1967)

Industrialization, urbanization and population growth in the first half of the 20th century increased the demand for better housing, water supply and sanitation. After World War II and during the period of economic recovery, this tendency continued strongly, which in the 1950s raised concerns about how to meet the demands for natural resources needed by a growing economy and a growing population, which was also demanding a higher living standard. The increased density of living, economic activities and public services on the one hand required that property rights and neighbor rights had to be protected. For that purpose a Nuisance Act was adopted in the first half of the 20th century. On the other hand, the increasing density required that private property owners suffer lawful public action affecting their property rights in the interest of public services. As a result, the 1950s and 1960s are characterized by controlled use expansion, deliberation of public versus private interests, and redistribution of property rights (Van Hall 1992). In this context, a clear demarcation point is the Groundwater Act for Water Supply Companies, which was passed in 1954 to better guarantee a constant and undisturbed water supply. Landowners had to permit extractions from aquifers under their property in the interest of an increased demand by the public water supply, even if these withdrawals would negatively affect the harvest from their property. An appeal under the Nuisance Act, which had been very commonly practiced before, would no longer work. Again, a provision for disadvantage compensation was included. The Groundwater Act of 1954 created a concession system for water suppliers, which was the start of a process of institutionalization of the public water supply. A following step in that process was the adoption of the Water Supply Act in 1957, introducing delivery and quality standards for drinking water.

Other demarcation points with respect to the deliberation of public versus private interests were the adoption of a Physical Planning Act in 1962, a Fisheries Act in 1963, a Clearances Act [Ontgrondingwet] in 1965, and a Nature Conservation Act in 1967. The Physical Planning Act allowed expropriation to the benefit of water drainage as a public service, and introduced disadvantage compensation for private property effects of public planning. Through the 1960s and 1970s this resulted in a huge expansion of water drainage infrastructure by a restructuring and canalization of many watercourses which had been quite natural before. Natural curves (meanders) were cut off in the context of parceling out of agricultural land, to improve agricultural productivity. The regional water boards, until the 1980s dominated by farmers, had a powerful hand in the restructuring of

rural areas. The Fisheries Act of 1963 was introduced to prevent overfishing and to generate a more efficient fisheries branch. The Act is interesting, because it could be considered as an attempt to prevent exhaustion of natural resources as well as an attempt to protect certain species and water related biodiversity. The Act is also interesting since it redistributed informal fishery rights and formalized a practice of self-regulation. Fishery rights were transformed into exclusive rights and tied to the ownership of a water body. Since the main water bodies were in public hands, fishers had to get permission form the State to acquire use rights for fishery. Both the Clearances Act [Ontgrondingwet] of 1965 and the Nature Conservation Act of 1967 have been the start for the protection of nature and landscape resources against rival water and land uses. The Clearance Act requires an assessment of the impact of clearances on landscape, natural resources or on private properties, before a clearance could be started. The result of such an assessment could be to cancel the clearance, or a decision to recover or compensate the externality. The Nature Conservation Act of 1967 allows the State to establish nature reserves on private or state-owned land, to protect specific flora and fauna or biodiversity. This act provides an extra title for expropriation, because the impact of a preserved area could also be a restriction of use rights on natural resources in such an area. For example, in 1980 the Dutch State applied the Nature Conservation Act to delineate the Wadden Sea as a preserved area, which restricted fishery rights in the coastal waters of that area (Van der Schaaf 1971; Warburg 1992).

4.2.4 Limitation of discharge rights to prevent water pollution (1969-1975)

In the 1950s restrictions on discharge rights were enacted with respect to pollution of seawater. The 1958 Act on Oil Pollution of Seawater implemented the London Treaty of 1954 with respect to seawater pollution by oil. The extensive legislation on seawater protection was expanded with the adoption of a Seawater Pollution Act in 1975, which also restricted discharge rights with respect to other pollutants from ships and aircraft on the continental waters (dumping of waste produced on land). This Act was an implementation of the Oslo Treaty of 1972. In general, prevention of surface water pollution became an important issue in the 1950s and 1960s, especially in northwestern European countries. At the local and regional level, preliminary initiatives were already developed for wastewater treatment in the Netherlands, with some initiatives going back to the 1920s in urbanized areas. In some case, cities were forced to treat urban sewage water, because downstream private estate owners who complained that the upstream urban source was polluting the part of the watercourse they owned

challenged them in court. These challenges were based on civil law (neighbor rights) or on the public Nuisance Act. In 1969 the Netherlands adopted a Surface Water Pollution Act, which became the main legislation to control surface water quality, setting up a permit and funding system to regulate discharges. The permit system of this Act implies a limitation of wastewater discharge rights to protect surface water. Moreover, from the beginning when the Act was adopted, the Netherlands implemented a funding system based on full cost recovery of wastewater treatment by retribution. According to the polluter pays principle, all waste water is charged for the amount of pollution units that are discharged. This pollution charge is the only budget source for the construction, operation and maintenance of wastewater treatment facilities. No subsidies or contributions from the general budget are involved. Together with the adoption of the Surface Water Pollution Act, a new title has been added to the Expropriation Act of 1841, to allow expropriation of private property to the benefit of sewage collection and wastewater treatment facilities, and again on the condition of disadvantage compensation.

4.2.5 Towards integrated public control over water use rights (1981-1992)

After the expansion of the public domain into the restriction of use rights with respect to surface water, the 1980s reveal a further increase of extent with respect to groundwater. In 1981 water supply companies, like the previous Groundwater Act of 1954, adopted a Groundwater Act to further regulate extractions of groundwater and not only extractions. While the Act of 1954 aimed to better serve public supplies, the Act of 1981 intended more to redistribute extraction rights among all users with extractions above 100,000 m^3, by creating a concession system. A provision was also added, to have the extractors compensate those who bear the negative effects of water extraction and lower groundwater tables as an effect. As a result, farmers especially could profit from compensation payments by water supply companies, since lower groundwater tables in some areas have led to a loss of harvest compared to the average possible yield. An important change with the Groundwater Act of 1981 is that it proclaimed that the interest of public supply could no longer dominate the deliberation of interests. All interests should be treated in an equal way, which indicated that not all demands nor any specific demand could be met any longer to an unlimited degree (De Loor 1992). The Act also allowed having groundwater extractions charged by the provinces. The charge revenues have to be used for anti-desiccation measures.

The Groundwater Act of 1981 should be considered as an act dealing with water distribution, and not as an act dealing with water level management to prevent water depletion (Teeuwen 1992). For that goal, another act was adopted in 1989, called the Water Management Act. This Act signified a real transition towards integrated water management, since it considered the entire water system and the interconnectedness between surface and groundwater, which is a necessary step towards a water basin approach. The Water Management Act provided instruments for the level control of surface and groundwater, which could restrict all use rights affecting water tables, not only to prevent water depletion, but also to protect ecosystems. So another reason why this Act forms a transition towards integrated water management is that it allowed a deliberation of interests that also takes ecological aspects of the water system into account. The Water Management Act has been the vehicle for the regional water boards on the basis of which they could pass ordinances for the regulation of water uses, in order to protect the natural and ecological values of water systems (IJff 1993).

With respect to groundwater, not only its quantity aspects started to be regulated in the 1980s, but also its quality. In 1986, a Soil Protection Act was adopted for the prevention, limitation, and remediation of changes in soil properties, especially as applied to preventing agricultural pollution of ground- and surface water. It resulted in the limitation of farming practice rights to protect groundwater, by means of standards for the application of animal and artificial fertilizers on soils. Since 1989, more stringent standards have been applied to groundwater protection zones, to be preserved for the protection of public drinking water sources. During the 1990s, the restriction of farming practicing rights has gradually become more stringent, importantly induced by the EU Nitrate Directive for Groundwater (Kuks 1998).

In the 1980s, another important change for the public domain was the Constitutional revision of 1983, which proclaimed that the public domain should be dedicated to the protection and sustainable improvement of the living environment, including the natural water system. The newly added Article 21 of the Constitution provided a fundamental title for expropriation of all property rights that could harm the protection of the living environment. To underline the importance of water resources for the country, the revised Constitution of 1983 also established (with Article 133) a right of competence for the regional water boards, providing them a fully recognized position within the Dutch administrative model, equal to the regional and local competence of provinces and municipalities, but restricted

to so-called functional administration in the field of water management (Heringa & Zwart 1991).

In 1992, the Dutch Civil Code of 1838 was fundamentally revised, with an important consequence for water rights. The new Civil Code changed ownership of water into ownership of the water bed, which was already practice, but which formally made (surface and underground) water become a 'res nullius' (no property). Water cannot be owned, not even by the State, because it is considered to belong to the public, or in fact to the entire society ('res omnium communis' or 'une chose commune' according to French law). In this context, it is important to look at the meaning of public property (state property, common property) and no property (water as a 'res nullius') on the one hand versus private property on the other. Even in the early 19th century, water resources and the benefits they could generate were never completely subject to private property. There have always been restrictions on private ownership and private use rights by the legal definition of some public domain. During the 20th century, an increasing nationalization or communalization of water resources could be perceived, in spite of the ownership arrangement. The State is increasingly controlling the access to water resources and is allowing more and more users to claim some form of access. Ownership and publicity are two separate sides of a water resource, which could conflict with each other. While the ownership definition is subject to private law, the publicity definition is a matter of public law. The publicity of water could be guaranteed by means of state or common ownership. Private ownership by the public could then serve as a guarantee for access by all interested users. However, what is important for the access of non-public users is the question if these public ownership rights operate as a 'dominium serviens' or as a 'dominium eminens'. In case of a 'dominium eminens', the public owner might use its rights to exclude other users in order to protect the public domain. In case of a 'dominium serviens' the public owner is using its rights to make the resource subservient to every user in order to protect the public domain. Of course, both conceptions could work together quite well, since restricting uses can only protect free use. However, to prevent the state or the common from being too exclusive and too arbitrary, in the Netherlands the ownership of water has been changed into a 'no property', which forces the state to protect the public domain only by public law. In the Netherlands, this is known as the 'two ways doctrine' [tweewegenleer], requiring the State to intervene preferably on the basis of public law, in the case that intervention by means of private law is also a possibility (Hennekens 1993; 1999).

To conclude, the Netherlands has been moving to a model in which it has become more and more irrelevant for the State to acquire ownership as a mean to gain resource control for the public interest. During the 20th century,

the evolution of the property rights structure has shown for the Netherlands that the State increasingly requires allowance of public use as a limitation on private property (Van der Hoeven 1989).

4.2.6 Considering limitation of land use rights to prevent flooding (after 1992)

During the 1990s river floods in 1993 and 1995 as well as high rainfall pressure in 1998 resulted in a rediscovery of flood protection and the need to anticipate climate change, combined with a chance for natural and ecological restoration of water systems. A preference has grown for natural protection by developing retention areas for water storage in periods of high rainfall, instead of artificial protection by means of dyke fortifications along the infrastructure of rivers and watercourses for drainage. These retention areas could also help replenish groundwater stocks in order to prevent water depletion in dry periods. Extra space for water storage is required in a country with a high population density and where spatial claims for water have to compete with many other claims on the limited remaining space. In terms of a change of property rights structure, the Dutch legislator is considering expanding the public domain of water management into the public domain of land use decision making, by creating titles for expropriation of flood plains and for limitation of land use rights in flood plains, as well as by means of attribution of liability for flood damage to water boards and land owners (Commissie WB21). Since these are considerations, not enacted yet as legal rights, we cannot say that the property rights structure already has changed to support these policy goals.

4.3 The evolution of water policies in the Netherlands

4.3.1 Centralization of water governance from 1798 until the 1950s

Centralization as a French legacy

As described in the previous sections, the history of public water management started as early as in the 13th century with the recognition of water boards as public authorities by the rulers of the Netherlands at that time. As bottom-up organizations of farmers and landowners with an interest in flood protection and water drainage, they operated on a rather small scale. Water boards were powerful local organizations, often labeled ‘farmer republics’. They combined legislative, executive and jurisdictional powers. For many centuries they have been able to resist pressure from the central state. In the 17th and 18th century water management was still under the

jurisdiction of these local authorities. The central government could not intervene in the jurisdiction of decentral authorities, except when the interests of military defense were at stake. However, throughout the 18th century various flood disasters in Dutch river basins demonstrated that the rather small-scale approach of water boards lacked central coordination and a broader scope. At that time many people were concerned about the devastating impact of these flood disasters, which even threatened the safety and survival of large parts of Dutch territory. It was evident that the rather fragmented water governance system, ruled by provinces and water boards, was losing its grip on the situation. Despite incidental cases of inter-provincial coordination in river domains, the water policies of provinces and water boards became increasingly criticized. However, in the political culture of that time, the autonomy and mutual independence of public bodies was regarded as an important acquisition. Decentral authorities were not willing to give up even the smallest part of their jurisdiction. Another obstacle was that private landowners in the flood plains could assert their rights by obstructing public intervention. Nevertheless, by the end of the 18th century the criticism of water managers gave an impetus to a movement of state reformists to politicize water management and to plead for a more centrally governed unitary state. In 1795 the reformist ideas got a chance when the French invaded the Netherlands, wiped out the existing 'Republic of the Seven United Provinces', and allowed the reformists to establish a Batavian Republic (1795-1806). In 1798 the new republic adopted legislation which allowed the central government to exercise supervision over all decentral public authorities with a water governance task. Related to this, a state water authority ('Rijkswaterstaat') was established to take the lead in a nationally coordinated approach to water governance. In practice, this appeared to be a form of extreme centralization resulting in great tensions between the state and provincial authorities. During the following Napoleonic era (1806-1813) the French rulers vigorously pursued their centralization of water governance (Bosch 2001). In fact, the establishment of Rijkswaterstaat in 1798 marks the transition from a solely local, uncoordinated approach to tackling water problems in the main water systems based on a nationwide overview.

Rivalry between state, provinces and water boards during the 19th century

In 1813 the Netherlands became sovereign again and changed into a constitutional monarchy. Although the rather conservative rulers of the water boards agitated strongly against centralization as 'a French habit' and regarded the centralization legislation from the French period as an arrangement of an occupying power, the centralized system of water governance remained in place. Several arrangements from the French period

were continued, like the Dyke Act of 1806, which attributed all property rights in the river domains up to the river dykes to the central state. Those who were deprived of their property rights had to be compensated on a fair basis. This act has always been regarded as the first water management legislation in the Netherlands. The Constitution of 1814 even incorporated the supervisory role of the monarch and the central government with respect to water governance. According to this constitution, the water boards could only retain their own jurisdiction insofar as no jurisdiction was defined by the central state. In practice, however, the monarch was aware that successful water governance had to rely on broad support in society and on cooperation with water boards and provinces. During the period 1814-1848 he partially restored the jurisdiction of provinces and water boards as it existed before the period of French domination. He even repealed substantial parts of the controversial Dyke Act of 1806. Another reason was that the central government did not have the financial means required for the effectuation of an all-embracing supervisory role. While the Competences Act (Bevoegdhedenwet) of 1841 deprived the water boards of their administration of justice, which was considered to be no longer compatible with the general administration of justice, the water boards remained strong thanks to their legislative and executive powers. A revision of the constitution in 1848 put an end to the personal influence of the monarch on water governance (Bosch 2001). It placed the government under parliamentary control and incorporated changed ideas about the form of governance. The new constitution recognized the autonomous position of the water boards within the general administrative structure of the Netherlands. It also proclaimed the need for separate constitutional legislation for each of the lower administrations, which in the second half of the 19th century resulted for provinces and municipalities in a Provinces Act and a Municipalities Act, but which did not result in a separate Water Boards Act. The central state and the provinces on the one hand and the water boards on the other hand could not agree on interventions by the state and the provinces in cases where water boards would fail, according to their view. In 1895 the dispute of the central state and provinces with the water boards came to a preliminary end by the adoption of the so-called By-Laws Act (Keurenwet), which allowed the water boards to have their own regulatory authority (by ordinance, called a 'Keur'), supervised by the central and provincial governments. In general, the evolution of water governance in the 19th century shows an ongoing rivalry between the central government, the provinces and the water boards. Although the divide between central, provincial and local jurisdictions was stabilized in formal terms, the practice of water governance demonstrated a lot of unclarity on how this divide should be understood. Besides the continuation of a centralized system for

water governance, this system developed further into one of co-governance between the central and decentral levels of administration (Brainich von Brainich-Felth 1993).

The adoption of a basic pattern for co-governance around 1900

Disastrous river floods in 1876 and 1880 strengthened the central government in its endeavor to centralize flood protection and river management. The central government wanted to have more control over the main water systems, and was willing to invest much larger amounts of money than the decentral authorities ever could do on their own. During the period 1887-1916 several important items of legislation were adopted to institutionalize the division of responsibilities among the state water authority and the regional water authorities. The classical design of 'the water state' in the Netherlands goes back to that period. In 1887, an amendment of the Constitution recognized the State as main supervisor of the nation's water management. The so-called 'Act of 1891' provided that the State could construct and operate state water works with a national interest, allowing the State to set up regulations necessary for state water management. The 'By-Laws Act' (Keurenwet) of 1895 allowed the water boards to have their own regulatory authority (by ordinance, called a 'Keur'), but required the central and provincial governments to supervise such ordinances. The 'Water State Act 1900' (Waterstaatswet 1900) introduced various far-reaching competences for the State and the provinces, allowing them to take over water works from the lower administrative levels (provinces or water boards), or to supervise these works. On the other hand, the same act made it possible to transfer the responsibility for dyke fortification programs from the state to provinces and water boards. The 'Act on Reclamation and Embankment' (Wet op de droogmakerijen en indijkingen) of 1904 entitled the State to reclaim land and created a concession system for land reclamation by others. The 'Rivers Act' of 1908 made the State responsible for the various functions of rivers. It allowed the State to start up water works serving these river functions, taking into account procedural and material conditions. Because of the dynamic movements of the rivers and because river management would have an impact on large parts of the country, state control was considered to be of crucial importance.

More planning and centralization after flood disasters in 1916 and 1953

In 1916, a flood disaster along the coast of the 'Zuiderzee', an inland sea in the heart of the country and with an open end at the north side, strongly impelled the state water authority to develop a large-scale plan for flood control in that area. The disaster occurred due to the poor state of specific

dykes and locks along the coast. The state supervision of the many small water boards in the area was disputed, and one of the effects of the disaster had been a concentration and scale enlargement of water boards in the flooded area. Another consequence was a state plan for the construction of a series of dyke fortifications along the coast and a huge storm barrier ('Afsluitdijk') closing off this inland sea at the north side and turning it into one of Europe's largest freshwater lakes, called the 'IJsselmeer'. Drafts of such a plan were in circulation before the disaster, but the disaster itself directly settled the matter, which is typical of the way water management in the Netherlands reacts to calamities: plans circulate for a long time, until a calamity tilts the scale and evokes immediate and radical action. The construction of the Afsluitdijk was followed by a series of land reclamation projects in the IJsselmeer area, creating new land ('polders') for agricultural purposes to meet the food demands of a growing population and to make the country more or less self-sufficient. The first polder was created in 1930, followed by new polders in 1942, 1957, 1968, and an unfinished one in 1975, with only a surrounding dyke completed. From the 1970s on, the IJsselmeer has been rediscovered as an important natural reserve, where it counts to have open water instead of land. From 1916 on, the dyke fortifications, the storm barrier construction, and the land reclamation projects have provided the state water authority 'Rijkswaterstaat' enormous power and prestige and made it dominant in all issues of national water management. Until the 1970s Rijkswaterstaat has predominantly been an organization of civil engineers approaching issues of water management as issues of safety, security, flood protection and technocratic design. The debate on water management was hardly politicized until that time. Water management projects were considered as univocal, one-dimensional projects. There was hardly any debate about conflicting values that could be involved.

In 1953, another flood disaster in the southeast of the country (the province of Zeeland) reinforced and continued this image. Many people lost their life due to severe flooding of an entire province with a rather well developed standard of living. The nation was shocked, and strongly demanded a final solution to prevent future flooding. A modern, post-World War II state should no longer allow this kind of risk. Since then, risk prevention and risk exclusion strongly influenced and dominated the water management approach adopted by the state water authority. Like earlier disasters, that of 1953 resulted in two typical reactions. First, immediate, drastic action was initiated, resulting in a so-called 'Delta Plan' for the construction of dyke fortifications and storm barriers along the entire North Sea coast of the Netherlands, with an accent on the Zeeland coast. Secondly, the water boards in the flooded area, which in the first half of the 20th century strongly resisted institutional change, had to fundamentally change

their closed and internal-oriented attitude. The resistance of the many small 'farmer republics' was broken. They merged into larger, better equipped organizations (Brainich von Brainich-Felth 1993).

4.3.2 Integration attempts around 1968 and 1969

Until the 1950s the Dutch national water regime had low complexity. Water management was mainly a matter of flood prevention, water level control, and sanitation (developing systems for drinking water supply and sewerage). During the 1950s and 1960s the complexity increased, and at the end of the 1960s first attempts towards integrated water management could be perceived. These attempts are the adoption of a first national water policy plan in 1968 and the adoption of a Surface Water Pollution Act in 1969. The water quantity oriented policy plan not only focused on flood protection and drainage (water security), but also on water scarcity and the competing demands of water supply, agriculture and navigation. The Surface Water Pollution Act involved the quantity-oriented water managers in active and passive water quality management. This means that they not only had to construct and to operate wastewater treatment plants (active quality management), but also to work on the prevention of surface water pollution by permitting and charging for wastewater discharges (passive quality management). Water demand control and water quality protection thus became an additional focus of water managers (Grijns & Wisserhof 1992).

The 1968 transition with respect to water demand control has been part of a transformation process, which started as early as in the 1950s. As we described in the previous section on the evolution of water rights, the period after World War II developed as a period of use expansion and increasing rivalry between public and private interests. Concerns were raised about how to meet the demands for natural resources (water, space, nature), needed by a growing economy and a growing population that also demanded a higher living standard. A Groundwater Act for Water Supply Companies was passed in 1954 to better guarantee a constant and undisturbed water supply. Landowners had to allow extractions from aquifers under their property in the interest of an increased demand by the public water supply. In 1962 a Physical Planning Act was adopted, allowing expropriation of land to the benefit of water drainage as a public service, and introducing disadvantage compensation for the private property effects of public planning. In 1963 a Fisheries Act was introduced to prevent over-catching and to generate a more efficient fisheries branch. The Act is an early attempt to prevent exhaustion of natural resources and to protect certain species and water-related biodiversity. In addition, the Clearances Act (Ontgrondingwet) of 1965 and the Nature Conservation Act of 1967 formed the start for the

protection of nature and landscape resources against rival water and land uses. As a result, the 1950s and 1960s are characterized by controlled use expansion, deliberation of public versus private interests, and redistribution of property rights (Van Hall 1992). This finds reflection in the first national water plan of 1968, since it mainly focused on how to meet future demands of an increasing population and how to prevent rivalries related to water resources. The plan clearly recognized problems of groundwater scarcity and the need for demand-side management (Snijdelaar 1993).

While water management became more integrated in terms of extent during the 1960s, the improvement of integration in terms of coherence appeared to be mixed. In particular the Physical Planning Act of 1962, allowing expropriation to the benefit of water drainage as a public service, was initially responsible for increased fragmentation rather than more integration. During the 1960s and 1970s, this act enabled a huge expansion of water drainage infrastructure by a restructuring and canalization of many watercourses, which had previously been quite natural. Natural curves (meanders) were cut off in the context of parceling out agricultural land, to improve agricultural productivity. The regional water boards, which at least until the 1980s were dominated by farmers, had a strong hand in the restructuring of rural areas, at the cost of their biodiversity. On the other hand, in 1974 the Physical Planning Act was extended with a set of participatory instruments for large scale infrastructural works, which allowed other use considerations than solely flood protection and land reclamation to enter decision making on water infrastructure. In fact, these new instruments require consultation of interest groups in decision making on large scale infrastructural water works, to better account for rival water values and ecological effects. The extension of the Physical Planning Act was triggered by the democratization and participative tendency of the 1960s and 1970s, and especially by broad opposition in society to the traditional way of water management, which paid no heed to other water values.

The 1969 transition with respect to water quality protection can also be seen as part of a transformation process, which started in the 1950s. It represents a transformation from sanitation to quality protection. Sanitation had already been a focus of water management since the early 20th century, when sewage and supply systems started to be constructed as public services, mainly at municipal scale. After World War II the infrastructure for sewage and water supply has gradually been extended to rural areas. In the 1950s the Dutch water supply became institutionalized by national legislation to guarantee a supply of good quality, in sufficient amounts and with affordable prices for all Dutch citizens. To achieve sanitation in terms of drinking water quality, the Water Supply Act of 1957 was adopted, introducing quality standards for drinking water. In the meantime, there has

been a growing awareness that sanitation measures would not be enough, and that something should be done about the increasing pollution of water resources which is related to the expansion of economic activities after World War II. Triggered by international treaties on protection of the seas, the Dutch adopted their first legislation to prevent seawater pollution in 1958, followed by more extended legislation on this topic in 1975. With respect to inland surface water pollution, as early as in the 1950s and early 1960s, many water boards and municipalities became active in the preliminary construction of wastewater treatment plants, to prevent direct discharges of untreated sewage into surface waters. However, water boards and municipalities were insufficiently equipped to handle this in a systematic way. Initiatives were mostly restricted to areas with a high concentration of inhabitants and industrial activities. This changed when, around 1970, many European countries, on the basis of international agreements, adopted legislation to protect surface water quality. So did the Netherlands in 1969. The contents of such legislation varied greatly among European countries at that time. The Dutch Surface Water Pollution Act includes a permitting system to regulate industrial wastewater discharges and a charge system with strong incentives based on the polluter-pays principle as well as the principle of full cost recovery. The costs of construction, operation and maintenance of waste water treatment plants should be fully recovered from the polluters, equivalent to their emitted amount of pollution. The charge system applies to both industrial and domestic polluters (Leemhuis-Stout 1992).

The 1969 transition not only resulted in more integration in terms of increased extent, it also contributed to an increased coherence of Dutch water management. The question which governance level should be responsible for the operational water quality management was resolved by allowing the provinces to delegate this responsibility to the regional water boards, which is what most provinces did. Only three provinces (Utrecht, Friesland and Groningen) carried out these tasks themselves, while two cities (Amsterdam and Tilburg) refused to relinquish their active role in sewage treatment. In 1992, however, a constitutional act on water boards finally determined that water boards should have the primacy over regional water management, which means that provinces and municipalities had to transfer their operational water management tasks to the water boards. The new responsibility for water quality protection completely changed the ‘water board world’ as it existed before 1969. In fact, the 1969 transition formed a crucial step towards the creation of so-called ‘all-in water authorities’ at water basin scale, because the water boards were already involved in water quantity management at basin scale (IJff 1993; Schorer 1993). Water boards could expand their personnel and their expertise in water management. Small water boards merged into larger scale water boards, since the construction

and operation of wastewater treatment plants especially required a certain economy of scale. The participatory structure of water boards, already allowing farmers and landowners to be represented on the board as parties with an interest in water quantity management, also admitted participation by industrial and domestic polluters as users of the water basin. Their involvement is based on the fact that the Surface Water Pollution Act requires that they be fully charged for all costs of water quality management (both the costs of active and passive quality management). To facilitate an effective implementation of the Surface Water Pollution Act, the water boards were granted the taxation authority to charge polluters, in order to acquire the resources they need for their water quality tasks. The implementation is also facilitated by water quality planning at the national level, prescribing water quality objectives for the water boards in terms of reduction levels for nitrogen and phosphates as main surface water contaminants. The Dutch pollution charge appeared to be very successful in achieving water quality objectives and also cost effective considering the social costs and technological innovations involved (Bressers 1983; Andersen 1999).

Although the institutionalization of water quality management has been an important step towards integrated water management, it did not mean a direct integration between water quality and quantity management. Initially, water quality management was settled as a sectoral water policy, including its own separate water planning. In 1975, 1980 and 1985 the Dutch environmental department introduced sectoral plans for water quality protection, while in 1968 and 1984 sectoral policy documents for water quantity issues were presented by the water department (Snijdelaar 1993). While the Ministry for the Environment coordinated water quality issues, other water issues were controlled by the Ministry of Transport, Public Works and Water Management. So the period from 1969 until at least 1985 could also be characterized as a period of increasing complexity and fragmentation. Other indicators of fragmentation in that period are the fact that not all provinces delegated water quality management to water boards (a situation which lasted until 1992), the fact that groundwater management and surface water management were still handled completely separately, and the still existing fact nowadays that the responsibility for the construction and operation of sewage systems is completely in the hands of municipalities. Municipalities even have a regulatory instrument (a permit system) to control wastewater discharges into the sewerage, which means that water boards and municipalities have to cooperate in wastewater management.

4.3.3 Integration attempts around 1985

A second important transition occurred around 1985. In that year the Dutch national water ministry launched a policy view on 'integrated water management' as a new approach for water managers. It advocated considering water as a system in which surface water and groundwater are interconnected. This new approach should not only integrate quantity and quality aspects of the water system, but should also take the system's ecology into account. Policy makers were of the opinion that the natural life in river banks and river soils had been too much neglected by water managers and should be respected much more. The policy view on 'integrated water management' also advocated improving the decision making process on water management. The so-called external functional relations of water systems should be recognized, which means that water managers should consider the complete variety of use functions of a water system, including the interests of nature, landscape and the environment. In fact, the second transition has been a crucial step to implementing a water basin approach which allows ecological considerations to enter water management decision making (Grijns & Wisserhof 1992). The policy vision of 1985 became formalized in the Third Integral Water Policy Plan of 1989, and it was preluded by the Second Sectoral Water Policy Plan of 1984. The second policy plan recognized water depletion due to over-drainage as a major problem for water management. It also advocated integration between surface water and groundwater quantity management, but did not include quality aspects (Snijdelaar 1993). Generally speaking, the 1985 transition had been triggered by a general growing environmental and ecological awareness in society, as well as by a trend towards deregulation and integration in politics in the early 1980s, resulting in a political demand for more coordination by means of policy planning. The same developments are clearly visible in Dutch environmental politics of the 1980s, culminating in the National Environmental Policy Plan of 1988, was been the first Dutch policy plan intending to coordinate all sectoral environmental policies at the national level. Another important change in the 1980s was the Constitutional revision of 1983, which proclaimed that the public domain should be dedicated to the protection and sustainable improvement of the living environment, including the natural water system. The newly added Article 21 of the Constitution provided a fundamental title for expropriation of all property rights which could harm the protection of the living environment. Besides these more general triggers, there are several more specific contexts in the water policy field in which the 1985 transition is embedded and which we shall explain further now.

First, the 'ecological' transition of 1985 should be considered in the context of an evolutionary change in the water management approach of 'Rijkswaterstaat' (the state water authority). In terms of policy learning at the national level, the experiences with two long-term national water-engineering projects have been important. The first long-term project was the construction of a huge storm barrier ('Afsluitdijk') in combination with large-scale land reclamation in the heart of the country ('IJsselmeer') during the period 1918-1975, as a reaction to very serious flooding in 1916. This project turned a former inland sea into one of the largest freshwater lakes in Europe, while gradually creating areas of new land ('polders') in this lake by means of surrounding dykes and permanent protection by water pumping. The second project concerns a sophisticated system of storm barriers in the southwest of the country (to protect the entire province of Zeeland), constructed during the period 1956-1986 as a reaction to a huge flood disaster in 1953. These storm barriers have closed off several estuaries in this region, which again has changed former salt water into brackish and freshwater. Although these have been very prestigious projects for Rijkswaterstaat, they also elicited criticism from various groups in society on the predominant civil engineering orientation of this organization. In fact these criticisms, which started to find expression in the 1960s and 1970s, changed the approach of Rijkswaterstaat by politicalizing water management and initiating a debate in society on water values. The critics placed a greater value on the meaning of 'open' water for recreation, nature conservation, water storage, and the experience of unspoiled space in an already crowded and highly planned country. For the land reclamation project this resulted in the canceling of the last polder that was scheduled, the Markerwaard. In the beginning of the 1980s, the societal debate on water values and the politicalization of water management continued, resulting in the introduction of an ecosystem approach. This approach has changed the design of the last storm barrier that had to be constructed in the Zeeland area. This became a permeable barrier, allowing salt water to enter the estuary behind the barrier and leaving the ecosystem of that estuary untouched. The confrontations in the 1970s and 1980s threatened the authority and autonomy of the water engineers and water managers in the Netherlands. Recognizing other use functions of water systems and developing an ecosystem approach has been their way to survive and to get along with their critics. The same kind of evolution, however delayed, happened at the decentral level of water boards, where the farmers' dominance of regional water management could no longer be maintained, and where rival user groups claimed participation rights to have their say in water management (Snijdelaar 1993; Disco 1998).

Secondly, the 'ecological' transition of 1985 should be considered in the context of an increasing attention for groundwater aspects of water systems.

After the extension of Dutch water management into the field of quality protection of surface water in the 1960s and 1970s, the 1980s were important years for the institutionalization of groundwater management in the Netherlands. In 1981, as we described in the previous section on water rights, a Groundwater Act was adopted to redistribute extraction rights among groundwater users. A provision was also added to have the extractors compensate those who are bearing the negative effects of water extraction and lower groundwater tables. The importance of this act is that it proclaimed that the interest of public supply could no longer dominate the deliberation of interests. All interests should be treated equally, which indicated that not all demands nor any specific demand could be met any longer in an unlimited amount. The act also allowed the provinces to charge for groundwater extractions. The charge revenues should be used for policy measures to prevent water depletion. While the Groundwater Act of 1981 mainly deals with water distribution and only in a limited way with water depletion, a so-called Water Management Act was being developed throughout the 1980s (and adopted in 1989) to create more regulatory instruments for water level control of surface and groundwater. These instruments may be applied to restrict all use rights affecting water tables, not only to prevent water depletion, but also to protect ecosystems. In fact, the Water Management Act has been the vehicle for the regional water boards the basis of which they could have ordinances for the regulation of water uses, in order to protect the natural and ecological values of water systems. Ecological considerations may be included in decision making on water basins, according to a so-called 'broad water system approach' (IJff 1993; Teeuwen et al. 1993). It has been decided that ecological considerations are in the interest of the general public, and therefore the general public should have seats on and be represented on the water boards. Since the charging system administered by the water boards is based on a 'profit-payment -participation-principle', the extended approach also implies that citizens should bear a certain share in the total costs of water management. In other words, since the early 1990s Dutch citizens are identified as 'ecological users' of water resources, for which use they are charged.

With respect to groundwater, not only its quantity aspects started to be regulated in the 1980s, but also its quality aspects. In 1986, as we described in the previous section on water rights, a Soil Protection Act was adopted, which resulted in the limitation of agricultural practice rights to protect groundwater in general and more specifically public drinking water sources by means of standards for the application of fertilizers on soils. During the 1990s, the restriction of agricultural practice has gradually become more stringent, thanks in no small part to the EU Nitrate Directive for

Groundwater. In 2002 this resulted in a greatly strengthened control of nitrate applications on agricultural grounds by means of tradable emissions rights to meet EU nitrate standards and to tackle diffuse water pollution from agricultural sources. Since 2002 the Netherlands is believed to have finally solved its obstinate manure problems, which started to be recognized even in the 1960s. A very cold-blooded intervention in the agricultural sector was needed to achieve that goal, and in that context a system of tradable emission rights has been introduced.

The rising influence of ecological and environmental considerations in Dutch water management during the 1980s is an indicator that the need for interpolicy cooperation between water policy, environmental policy, nature conservation and agricultural policy increased strongly during that period. The groundwater protection policy, with restrictions on fertilizer applications for instance, has been the result of an active involvement in the early 1980s by the Dutch environmental ministry in other policy sectors, attempting to consult directly with target groups and to break through existing iron triangles (like the one between the agricultural ministry, farming interest groups, and their representatives in parliament). Although these are attempts towards more integration, or at least interpolicy coordination, they started to result in more complexity and even fragmentation. While sectoral policy plans for water, environment, nature and land use have individually become more integrated during the 1980s, the integration between these policy sectors appeared to be very difficult. For instance, this has been very visible in the case of groundwater protection plans which are formally dealt with as part of environmental policy planning instead of water management planning, from which they are excluded for reasons of demarcating competencies. Together with an increasing complexity at the national level, the complexity also increased at decentral levels of administration where the strategic national plans need to be implemented as operational plans.

4.3.4 Integration attempts around 1995

In 1995 the Dutch authorities fundamentally changed their traditional approach to river management and flood protection based on the construction of dyke fortifications along the riverbanks. Triggered by serious river floods in 1993 and 1995, ascribed to climate change, a new policy document (entitled ‘Space for Water’) was presented in 1995, which stressed the need to integrate water management with land use planning. The document advocated a better anticipation of climate change by creating more space along riverbanks for water retention as a means of natural flood protection, in contrast to artificial protection by means of dyke fortifications. The Netherlands should be regarded as a delta area in a European context.

This new approach could be combined with the water basin approach of 1985, since retention areas are a chance for natural and ecological restoration of water systems. Moreover, retention areas could help to replenish groundwater stocks in order to prevent water depletion in dry periods. So in fact, the 1995 transition has not only been triggered by river floods in the early 1990s, but also by the international alarm over climate change, the problem pressure of water depletion, as well as the preference to restore the natural flow of rivers and valuable ecosystems along the river banks. Like the 1985 transition, the policy document of 1995 has been formalized as a Fourth Integral Water Policy Plan in 1998. Compared to the previous policy plan of 1988, this plan focuses especially on climate change and on the restoration of the natural dynamics of water systems. It advocates regarding water and its natural movements as key determining factors in land use decision making. It also emphasizes the value of water in terms of open, unspoiled landscape. In fact, the 1995 and 1998 documents are attempts to get a principle adopted for the integration between land use decision making and water management: 'where natural water is competing with other claims on the limited remaining space in the Netherlands, space for water should prevail' (Hofstra 1999).

To better understand the 1995 transition, it should be considered in the evolutionary context of river management in the Netherlands going back to the 1950s. The huge flood disaster of 1953 in the province of Zeeland resulted in the adoption of a national program (the 'Delta Plan') for flood prevention, not only along the coasts but also along the main rivers. As usual it was based on normalization of rivers and fortification of river dykes, being the traditional Dutch approach as practiced by the national water authority Rijkswaterstaat since it was established in 1798. While the Delta Plan started to be implemented in the 1960s, the extensive and irreversible landscape interventions along the rivers attracted increasing criticism from inhabitants of the river areas. To remove some unrest among the inhabitants, a state commission concluded in 1975 that procedures for getting support from citizens and citizen participation should be better incorporated in the process of decision making on dyke fortifications. During the 1980s, however, the recommendations of the state commission remained unimplemented and ongoing dyke fortifications were often debated in court. Valuable pieces of landscape and authentic cultivation along the rivers disappeared, due to the size dimensions applied by the state water authority for fortification of river dykes. In 1993, triggered by political pressure to reconsider the dyke fortification program, another state commission recommended incorporating values on landscape, nature and cultural heritage into decision making on dyke fortifications, in addition to safety aspects. Such a broader deliberation of interests is in line with the integral water system approach adopted in

1985. This state commission was asked again to advise on how to continue dyke fortification along the river Meuse, when this became a question after heavy flooding in 1993. One year later, the commission recommended to enlarge and to deepen the river basin in combination with the natural development of river flood plains and restoration of the river dynamics. In fact, this advice has been the basis for a fundamental rethinking of river management at a national scale (Heegstra 1999).

The threat of dyke bursting in December 1993 and again in January 1995, due to unexpected high water flows in the main river basins, resulting in the evacuation of more than 200,000 people, drew a response at the national level by a Main Rivers Delta Plan in 1995, in addition to the policy document 'Space for Water'. At first, this Delta Plan aimed to speed up the fortification of the remaining weak spots in the dyke infrastructure along the main rivers, by means of an emergency act ('Deltawet Grote Rivieren'). This approach has been successful, because within two years all dyke improvement works were completed. Secondly, the Delta Plan aimed to speed up the adoption of the Act on Flood Protection ('Wet op de Waterkering'), which had been delayed since the 1980s due to a political debate on values that should prevail in dyke fortification projects. In 1996 the act was adopted, by which parliament agreed to a system of better founded safety norms and improved participation rights for citizens. Thirdly, the Main Rivers Delta Plan aimed to introduce a new approach to river management, which has been effectuated by the presentation of the policy document 'Space for the River' in 1996. The new approach advocates protection against high water flows in rivers by developing sustainable river basins, which means that the flood plains should be reserved for the dynamic flows of the river combined with natural development. Dyke fortifications should only be used at places where flood plains are no longer available. The policy document strongly appeals to the use of space for the river as a guiding principle in land use planning along the river banks: construction of housing and other economic activities in flood plains should be avoided in principle (Heegstra 1999; Hofstra 1999).

In the fall of 1998 the Netherlands had to resist high rainfall pressure. Polders had to be inundated to prevent dyke bursts close to cities and villages. High water levels in the IJsselmeer and other estuaries hampered the clearance capacity of the Dutch drainage infrastructure. This situation, which is typical of a delta area like the Netherlands, triggered the powerful awareness that a rising sea level in combination with extreme rainfall pressure, both due to climate change, creates dangerous inundation risks. It has been the basis for broad political consensus that 'integral river management' (integral in the sense of sustainable flood protection) should have high political priority, which has been a definite breakthrough in

political terms. The state decided to amend the River Management Act, in order to broaden its jurisdiction with respect to the expropriation of flood plain grounds. The state also decided to amend the Physical Planning Decree (art. 10) in order to require that local land use plans must always be assessed by the regional water board on water risks, before the plan can be adopted. Further, a state commission on Water Management 21st Century was asked how to institutionalize integral river management. When this commission reported in 2000, one of the recommendations was to create extra titles for expropriation of flood plains and for limitation of land use rights in flood plains. Another recommendation was to divide the liability for flood damage among the national water authority, regional water authorities and private property owners. Water boards could avoid such liability by developing sufficient areas for water retention, based on a system of safety norms which determines what the storage capacity in a region should be (Commissie WB21).

Although we can see many attempts towards integral river management and development of sustainable river basins in the 1990s, we need to be aware that the policy sectors of water management and physical planning are still rather separated. So, despite the many integration attempts, high complexity and fragmentation still dominate. This renders decision making rather difficult, especially at the level of the water boards and municipalities, where the former have an interest in considering water as a guiding principle in spatial planning and to leave areas unbuilt if a risk of inundation exists, while the latter have a final say in spatial planning and have an interest in economic and urban expansion within their geographical boundaries. The coherence between water management and land use planning might increase as soon as the intended titles for expropriation of flood plains and for limitation of land use rights in flood plains will go into effect.

4.4 Main regime phases and transitions in the Netherlands

Phases 1 and 2	**Property rights**	**Public Policies**	**Institutional regime**
1814-1891 Centralization of dyke construction and river management (the state versus the water boards).	Public domain constituted by Constitution (1814), Civil Code (1838) and Expropriation Act (1841). Common property of regional waters in the hands of water boards.	Policy focus of the state: centralization of flood protection and river management for navigation (river floods in 1876, 1880). Policy focus of the water boards: building infrastructure for water pumping and drainage to develop land and agriculture.	Simple regime: low extent medium coherence
1891-1954 Institutionalization of state water management (for flood protection and land reclamation) and institutionalization of regional water management. Large-scale development of systems for drinking water supply and sewage discharge (sanitation).	Expropriation for navigation, flood protection and land reclamation (1891, 1900, 1908). Creation of a concession system for land reclamation (1904). Common property of water boards supervised by the state (1895). Compensation for negative effects of public water works on private property (1900, 1908, 1925).	Centralization and institutionalization of water management by the state (constituting 'the water state': 1891, 1900). River management (1908) and construction of canals for navigation. Zuiderzee Plan for flood protection and land reclamation (development IJsselmeer and polders after flood disaster 1916). Large-scale development of systems for drinking water supply (organized by separate companies) and sewage to discharge urban waste water to surface water. Delta Plan for construction of storm barriers (after flood disaster 1953 in Zeeland province).	Simple regime: low extent high coherence

Phases 3 and 4	**Property rights**	**Public Policies**	**Institutional regime**
1954-1969 Institutionalization of water supply. Awareness of exhaustion of water resources and water dependencies. Attempts at systematic seawater and surface water protection.	Creation of a concession system for water supply (1954). Expropriation at the benefit of water supply (1954) and water drainage (1962). Limitation of discharge rights on seawater (1958). Redistribution of fishery rights, which get connected to water ownership (1963). Protection of nature property against rival water and land uses (1965, 1967). Compensation for negative effects of public water works on private property (1954, 1958, 1962, 1965, 1966).	Institutionalization of water supply to guarantee supply of good quality, sufficient amounts and affordable prices (1954, 1957, 1960). Prevention of seawater pollution (1958). Preliminary construction of waste water treatment plants by water boards and municipalities (early 1960s). Prevention of resource exhaustion by regulation of fisheries (1963), regulation of clearances (1965), regulation of mining in sea bottoms (1965), and nature conservation (1967). First sectoral water policy plan, not only focusing on flood protection and drainage, but also on water scarcity and demands by water supply, agriculture and navigation (1968).	Complex regime: medium extent medium coherence
1969-1985 Environmental protection of surface waters. Large-scale development of waste water treatment plants. Planning of water quantity and quality policies. Water use regulation to prevent water depletion.	Limitation of waste water discharge rights to protect surface water (1969). Full cost recovery of waste water treatment by retribution (1969). Expropriation at the benefit of waste water treatment (1969). Creation of a concession system for all groundwater extractions above 100,000 m3 (1981). Compensation for negative effects of public water works on private property (1971, 1981).	Prevention of surface water pollution by means of permitting and charging waste water discharges (1969). Large-scale construction of waste water treatment plants by water boards (since 1970). Controlled distribution of groundwater use rights, by permitting and charging for groundwater extractions (1981, 1984). Second sectoral water policy plan, recognizing water depletion and advocating integration between surface water and groundwater quantity management (1984). Separate planning for water quality management, taking care of the progress of surface water quality protection (1975, 1980, 1985).	Complex/Integrated regime: high extent medium coherence

Phases 5 and 6	**Property rights**	**Public Policies**	**Institutional regime**
1985-1995 Groundwater protection. Integrated water management (integrating quantity and quality aspects of the water system, and including ecology).	Limitation of farming practicing rights to protect groundwater (1986). Limitation of all use rights affecting water tables (1989). Limitation of drainage rights to protect ecosystems (1989). Water becoming a res nullius and being separated from property on land and water beds (1992). Compensation for negative effects of public water works on private property (1986, 1989, 1995).	Prevention of groundwater pollution from diffuse sources, by means of regulating and charging the application of manure (1986). Delineation of groundwater protection areas with more stringent standards, drinking water quality based (1989). Integral vision of water management, based on a regional water system approach, also taking into account ecological aspects (1985). This resulted in the Third integral water policy plan, integrating quantity and quality management (1989). Integral water management legislation to organize water policy planning, to complete the system of 'water state' legislation, and to allow ecological protection of water systems (1989). Concentration of all local and regional water management in the hands of the water boards, underling the primacy of a water basin approach (1992).	Integrated regime: high extent high coherence
After 1995 Rediscovery of flood protection combined with ecological restoration of water systems: natural protection instead of artificial protection. Anticipation of climate change: attempts at water management through land use decision making (water competing with other claims on the limited remaining space).	Consideration of: expropriation of flood plains; limitation of land use rights in flood plains; attribution of liability for flood damage to water boards and land owners.	Integral vision of connection between water management and land use planning: more space around rivers needed; water and its natural movements as key determining factor in land use planning (1995, after river floods in 1993 and 1995). Fourth integral water policy plan, focusing on climate change and restoration of the natural dynamics of water systems (1998). Long term vision of water management 21st century: water will become a strong claim in physical planning; physical plans have to be assessed for water risks, before adoption (2000, after high-water problems in 1998).	Integrated/Complex regime: very high extent medium coherence

4.5 Concluding analysis of regime transitions in the Netherlands

In the previous section we identified six phases in the evolution of the Dutch national water regime. Using the two dimensions of regime evolution (extent and coherence), we identified the period 1814-1954 (phases one and two) as a simple regime, the period 1954-1985 (phases three and four) as a complex regime, and the period after 1985 (phases five and six) as an integrated regime. We also noticed that the first indications of a movement towards integration already appeared around 1969 (at the start of phase four). In this section we summarize the regime evolution in terms of extent and coherence. The coherence of a regime distinguishes between the internal coherence of property rights, the internal coherence of public governance and the external coherence between public governance and property rights. At the end of this section we consider what conditions have triggered regime transitions towards more integration.

4.5.1 Evolution of extent

The extent of a regime refers to the extent to which relevant uses of a water basin are recognized by the regime. It is an indicator of the completeness of the domain or scope of the regime. Compared to the broad variety of use functions that we recognize nowadays, the Dutch water regime had a relatively low extent during the 19th century and the 20th century until the 1950s. The traditional concerns of the national regime in dealing with water management were protection against flooding and the development of rivers for navigation for transport and military defense. Building an infrastructure for water security has constantly been high on the national agenda. At the regional level water managers for a long time dealt predominantly with water drainage to develop land for agriculture and urban expansion. From the 1950s on the extent gradually increased. In the 1950s water supply gets attention as a problem of how to meet future demands of an increasing population. In the 1960s, physical planning and nature conservation become important issues on the national agenda. There is a growing awareness that water management should be based on a deliberation of interests. Water infrastructural works become subject of a public debate. Other values than water security jump into the discussion, like the natural value, the recreational value and the spatial value of water. At the end of the 1960s water management planning starts to be used as an attempt to control overuse of water resources and to prevent water depletion. This should be considered an important transition towards integral water management. Another important transition in that period is the active start of surface water

quality protection and the related recognition of environmental concerns. During the 1970s and 1980s further attempts are made to complete the extent of water management. Groundwater issues, like over-use, over-drainage, water depletion and the degrading quality of groundwater, gain recognition and become the subject of water rights and water policies. Attempts are also made to develop a more integral perspective on water systems, in which surface water, groundwater, quantity issues and quality issues are considered in terms of their mutual linkages. A resulting shift in thinking is that a water resource not only includes the water itself, but also the immediate surrounding ecosystem. Therefore, we consider 1985 as another important marking point in the regime's evolution, since in that year the ecosystem approach of integral water systems was widely introduced. It was the start of a period in which national and regional water management authorities gradually adopted and incorporated a so-called 'broadened perspective on water management'. Around 1995 the extent broadens further when, due to river floods and expectations of climate change, a strong need is felt to integrate water management and spatial planning in order to prevent flooding and create a more resilient, effective water management in the catchment areas. Creating space for water by means of retention areas becomes a paradigm shift in thinking about flood protection, while being a logical consequence of the ecosystem approach adopted earlier.

4.5.2 Evolution of the internal coherence of property rights

The internal coherence of property rights refers to the degree to which the interdependencies in the water system and its management are reflected in the distribution of property rights among the users which are involved. The internal coherence of property rights improves when newly recognized uses, identified as extent, become supported by property rights. Speaking about property rights, we distinguish between private property, common property, and public domain (which could be state property or 'no property' in the sense of 'res nullius'). Private use of water resources has never been unlimited in the Netherlands. Even in the early 19th century, there were always restrictions on private ownership and private use rights by the legal definition of some public domain. During the 19th century, the public domain was mainly reserved for expropriation of private and common property in the interest of flood protection and navigation. From the beginning, compensation provisions have been available for cases of expropriation of private property. Even more, titles were increasingly created to compensate for the negative effects of expropriation on neighboring private properties (so-called disadvantage compensation). Expropriation of common property, which had been in the hands of water boards, happened in cases where the

state judged that water boards were not able to guarantee water security for the public. In fact, the state expropriating common property has been a matter of centralization. During the 20th century, an increasing communalization of water resources took place, in spite of the ownership arrangement. The state increasingly controlled the access to water resources and allowed more and more users to claim some form of access. In the early 20th century, getting the ownership of water resources into public hands (as privately owned state property) has been a way for the state to guarantee access to the public. Private ownership by the public could serve then as a guarantee for access by all interested users. Later on, especially after World War II, the state gave preference to the protection of public interests by means of public law. Even more important than public ownership should be the public control of water uses and use rights. Between the 1950s and 1990s a whole series of water acts were adopted to guarantee a more coherent use of water resources. Since 1992 and due to a revision of the Civil Code of 1838, natural water resources can no longer be owned in the Netherlands, not even by the State, because it is considered to belong to the public, or in fact to the entire society. To eliminate the option that public ownership operates as a 'dominium eminens', and thus to prevent the state or the commons from being too exclusive and too arbitrary, the ownership of water has been changed into a 'no property', which forces the state to protect the public domain only by public law. In the Netherlands, this is known as the 'two ways doctrine' ('tweewegenleer'), requiring the State to intervene for preference on the basis of public law, in case intervention by means of private law is also an opportunity. So the Netherlands has been moving to a water rights structure in which it has become almost irrelevant for the State to acquire ownership as a mean to gain resource control for the public interest.

4.5.3 Evolution of the internal coherence of water policies

We interpret the internal coherence of water policies as the degree to which the interdependencies in the water system and its management are reflected in the elements of public governance. In this book we distinguish five elements of public governance: (1) levels and scales; (2) actors and networks; (3) perspectives and objectives; (4) strategies and instruments; (5) responsibilities and resources for implementation (Bressers & Kuks 2001).

Levels and scales

With respect to the coherence of levels and scales, the question is how administrative scales of water management fit with the natural scale of water basins, and how this developed over time. We have seen that the Netherlands

has a very old form of functional democracy for water management. In fact, water boards are a specific form of government at regional scale. Until the 19th century, water boards were the only organizations for water management. As bottom up organizations of landowners, they mostly operated at a small local scale. Around 1800 the Netherlands started to centralize water management, with the argument that state involvement in flood protection along the coasts and the main rivers is needed to safeguard a national water security. The water board organizations were considered to be too small and fragmented for this task. Due to strong resistance from the still powerful and autonomous water boards, it lasted until the end of the 19th century before a clear demarcation of central and regional powers was settled in the field of water management. Since then, central and regional water management authorities operate on the basis of co-governance in a decentralized unitary state. The central authorities are responsible for the main waters with national importance, while the water boards take care of the smaller water bodies with regional importance. In the 20th century the number of water boards has been cut back from 2700 in 1900 to about 55 in 2000. Especially the flood disasters of 1916 and 1953 provided a powerful impetus for small water boards to merge into larger organizations, like several river floods did in the 19th century. The professionalization of regional water management, strongly encouraged by the central state from the 1960s on, also resulted in mergers. Especially the transitions of 1968 (introducing water planning), 1969 (introducing water quality management) and 1985 (introducing the ecology-based water system approach) have professionalized the water boards and strengthened their position in water management. As a result, the Constitutional revision of 1983 and the Water Board Act of 1992 have moved the primacy in regional water management from the provinces and municipalities to the water boards. Since the 1990s the water boards have been searching for a further increase of scale which better fits with the scale of river basin management as advocated by the European Water Framework Directive. A complication that increasingly emerges for regional water boards is that they depend on provinces and municipalities as physical planning authorities. In order to get water visions adopted as a guiding principle for physical planning, a complicated process of mutual consultation and cooperation is required. In other words, incoherence between the administrative organizations of water management and physical planning is complicating water governance.

Actors and networks

With respect to the coherence of actors and networks, the question is to what extent actors with an interest in water resource use acquired opportunities to participate in water management, and how this developed over time. We

noticed that initially farmers and other landowners organized themselves in water boards to get water management (drainage and flood protection) in their area under control. Since the beginning of the 19th century the central government has become a player in water management, trying to articulate the interests of all citizens with respect to flood protection, as well as the interests of navigation on rivers. This articulation became stronger and more effective after each flood disaster during the 19th and 20th century. After World War II the national government increasingly arranged opportunities for 'new' uses to be represented or 'new user groups' to participate in water management, proportionate to the increase of extent.

We could distinguish between four types of participatory arrangements. First, property rights have been attributed to specific uses and user groups. Examples are the Fisheries Act of 1963 redistributing fishery rights, the Nature Conservation Act of 1967, the Surface Water Pollution Act of 1969 protecting the quality of surface water and its use functions, the Groundwater Act of 1981 and Water Management Act of 1989 both protecting nature by preventing water depletion, the Soil Protection Act of 1986 protecting the quality of groundwater and its use functions. However, in case of ecological use functions there are no specific user groups identified to which use rights could be attributed. So, use rights aiming to protect ecological functions of water resources remain in public hands and could only be claimed by the public authorities involved.

Secondly, policy planning has been used as a forum to account for new uses and user groups. Since 1968 water management has been based on policy planning, especially considering traditional water uses in a broader, resource-based context. Physical planning has also been important to give a voice to new uses, especially if they rival traditional uses. In 1974 a participatory approach to physical planning was adopted, which allowed other use considerations than solely flood protection and land reclamation to enter decision making on water infrastructural projects. This new approach was triggered by broad opposition in society to the traditional type of 'water engineering', which had no eye for rival uses, like the recreational value, the natural value or the spatial value of water (Disco 1998). It was also triggered by a more general democratization and participation tendency in society in the 1970s.

A third type of participatory arrangements has been the representation of interest groups in the regional water boards. Representation on the water boards has always been based on a 'profit-payment-participation-principle', meaning that those having an interest in water management should pay for it according to their interest share, in exchange for participatory seats on the water board's council. Until the 1970s, farmers and real estate owners (in rural and urban areas) have been the most important contributors to the water

boards. They have been paying a property value tax in order to keep their feet dry in otherwise wet areas needing drainage and flood protection. Although real estate owners were important contributors, they were not equally represented in the councils of the water boards, in which farmers continued to have a dominant position until the 1970s. This happened despite the fact that provinces had a task in supervising the water boards and guaranteeing an equal representation for all tax paying interest groups. Although real estate owners in urban areas were paying for the burden of water discharge from urbanized into rural areas, water management at that time was primarily considered as a living condition for rural areas. In the early 1970s the central government appealed to the water boards to allow more seats in their councils to real estate representatives. The central government was pressured by a national debate on extending the scope of land use planning, including in land use planning for rural areas those interests which could be rival to agriculture, like traffic infrastructure, nature conservation or recreation. Around that time the representation on water boards also extended due to the water quality tasks which officially were delegated to the water boards from 1969 on. As a result, industrial and domestic surface water polluters acquired a percentage of the seats, since they had to pay a pollution tax on wastewater discharges. Especially the representation of urban real estate owners and domestic surface water polluters settled a certain influence of urban people and their interests within the water boards, in opposition to the traditional dominance by farmers' interests. This created a basis for more deliberation of interests and the adoption of a more environmental and nature oriented approach to water management. As a result, the visibility of water boards and their work increased, taking into consideration that water boards had a very low profile among the general population until the 1970s. During the 1980s the debate on representation in water boards continued. The central government decided that water boards should have a constitutional position in the Dutch administrative model (formalized by the Constitutional revision of 1983 and the adoption of an institutional Water Board Act in 1992). The central government also decided that water boards should not only recognize the specific interests of specific user groups, but should also act on behalf of the general interest. Therefore, the Water Board Act of 1992 introduced a general water board taxation for all citizens (additional to the already existing taxations for specific user groups), while allowing general citizens to acquire a proportion of water board seats equivalent to the share of their contribution. The seats for general citizens are attributed on the basis of general elections, which increases the democratic legitimacy of water boards. While water boards since the 1980s became more important as a forum for deliberating rivalries in water management, another important

forum evolved during the 1990s on which the water boards as representatives of water interests are encountering provinces and municipalities as physical planning authorities. This is a forum where institutions for functional democracy (water boards) meet with institutions for general democracy (provinces and municipalities) which consider water interests as a limited facet on a broad spectrum of land use interests. Nowadays, water boards have problems finding adequate channels for participation in physical planning, in order to be able to advocate the need for space for water.

This relates to a fourth type of participatory arrangements. Since the early 1970s water boards have become increasingly aware that representation of interest groups within the water board council is not sufficient. Additional consultations of interest groups are needed. Therefore, they increasingly involve intermediate organizations, to have especial representation of the interests of agriculture, nature conservation, the environment, and recreation in consultation rounds during the policy making process.

Perspectives and objectives

With respect to the coherence of perspectives and objectives, the question is to what extent official policy visions and policy objectives administer justice to existing rivalries between different water uses. We noticed - while writing about the evolution of the regime's extent - that at the national level subsequent policy documents on water policy have been constantly progressive in recognizing new water uses and rivalries. However, since the implementation of such policy documents needs to be importantly financed by regional authorities, the question is to what extent such national policy documents have legitimacy at the regional level. Especially at the level of water boards the dependency on the agricultural sector (both in terms of powerful representation and in terms of their land ownership in rural areas) often limits the ability to restore water systems in a natural way. For instance, prevention of water depletion is complicated by the rivalry between agriculture and nature protection. This renders decision making difficult at the level of the water boards, where farming interests have always had a large say. In other words, implementation mechanisms are slowing down the ambition of national policy documents.

Besides the complexity of vertical coordination between central and decentral water policies, there is also a complexity of horizontal coordination between water policy planning and the planning systems for water related policies (especially environmental policy planning, nature policy planning, and physical planning). We perceived an evolution in which these policy sectors developed separate policy planning systems since about the end of the 1960s. While these separate systems took a high flight during the 1970s

and 1980, first attempts towards interpolicy co-operation and fine-tuning between sectoral plans started around the mid-1980s. Since then, a lot of fragmentation has disappeared due to various mechanisms introduced for integration of perspectives and objectives. Around the mid-1990s, when the national government shed a spotlight on the rivalry between space for water and other land use interests, it became a challenge to intensify the coordination between water policy planning and physical planning. Especially at the regional and local level, where decision making on space for water and leaving flood plains unbuilt is a matter of policy co-operation between water boards (having a strong water interest) and municipalities (having a strong interest in urban expansion and a final say in local land use planning), it still appears to be difficult to coordinate the perspectives and objectives of both policy sectors. Submission of local spatial plans to a 'water risk assessment', before adopting them, has become a mandatory instrument and a first attempt at an integrating mechanism at the end of the 1990s.

Strategies and instruments

With respect to the coherence of strategies and instruments, the question is to what extent there are tools available for water managers to redistribute use rights in order to better account for the broad variety of relevant uses. While writing about the evolution of water rights and water policies, we perceived an evolution in which at the national level tools have been increasingly arranged for public intervention in private use rights, especially to better account for the ecological functions of water resources. Important legislative steps, introducing new policy instruments for the redistribution of water rights, have been: the 1969 legislation for the control of surface water pollution by adoption of a waste water charging system, based on full cost recovery and the polluter pays principle; the 1981 legislation for the control of groundwater abstractions by permitting and charging for groundwater abstractions over 100,000 m^3 a year; the 1986 legislation for the control of surface and groundwater pollution from agricultural sources by means of manure application standards and a manure charge based on full cost recovery and polluter pays; the 1989 legislation for the control of drainage by means of 'water level ordinances' to prevent water depletion and to protect ecosystems. As we noticed before, adequate instruments are still missing to get more grip on physical planning from a perspective of sustainable water resource management.

During this evolution of the Dutch water legislation, mechanisms have been adopted for getting the prices right to ensure that the price charged to water users integrates the true costs. Especially at the regional level of water boards, the principle of full cost recovery of water services has been closely

adhered to. The taxation instruments of the water boards (one taxation for water quantity measures and one for water quality measures including waste water treatment) are based on a profit-payment-participation-principle. This means that the costs of all water services from the water boards are borne by those who profit from these services. Proportional to their payments, user groups are represented in the water board's council. Especially after the transition of 1985 towards more ecology-based water management, the costs of ecology-based water measures have gradually shifted more and more from farmers and rural land owners to the citizens in urban areas. Nowadays, urban citizens are the major contributors to the water boards, and as a consequence they have the majority of the seats on the water board councils.

Responsibilities and resources for implementation

With respect to the coherence of responsibilities and resources for implementation, the question is to what extent the policy implementation process is sufficiently equipped and concerted. There are several kinds of resources one could think of, like authority, legitimacy, finance, time, human capacity, information, etcetera. In terms of authority we noticed that water management depends on the co-governance between the national and regional water authorities. The national government has been rather progressive in providing policy visions, and creating policy tools for the realization of those visions. Only in case of the most recent vision on the linkage between water management and physical planning they have not yet been able to create adequate water policy tools. This is more a problem of horizontal policy co-operation, since it needs co-operation between two countervailing powers (water management authorities and physical planning authorities).

In terms of legitimacy as a necessary implementation resource, we observed that various participatory arrangements have been created to facilitate the acceptance of policy measures. We also noticed that it is hard to identify user groups which represent the interests of ecological water functions. Although citizens in general bear the costs of ecologically based water measures, it is rather unclear to what extent they share the objectives on which such measures are based. Since only a minority group of citizens strongly advocates ecology-based water management, it is easier for rival user groups like farmers to oppose such management (not only because they still think they pay for those measures, but also for reasons that agricultural activities have to step aside along watercourses due to such measures). As a consequence, direct consultations with farmers often slow down the implementation process.

This relates to three other, more physical resources which are necessary for the implementation. One is the so-called mobility of ground, which is a

spatial resource. A policy based on the idea of more space for rivers and flood plains enters into rivalry with other spatial claims and ownership rights, like the spatial claim on open areas by urban planners or the strong presence of agricultural ownership in rural areas. Another physical resource is time, which is needed for consultations as part of the implementation process. Consultations to acquire legitimacy and ground resources are rather time consuming during the implementation phase. A third important physical resource is money, needed for the acquisition of land, for the physical realization of water and ground works, and for the employment of human capacity. As we noticed, the legitimacy of national policy visions often depends on the willingness of regional water board councils to adopt them and to vote money for implementation measures. An important trigger, which often improves such willingness, is the availability of provincial, national or European subsidy programs to which water boards may apply for co-funding.

Another important resource concerns the human capacity available for implementation. Not only does its quantity matter, which is especially money-based, but also the quality of personnel matters, which also relates to the availability of information as an implementation resource. We have seen that Dutch water management authorities, both national and regional, have expanded their expertise into the environmental field since the early 1970s as well as into the ecological field since the mid 1980s. Not only due the expansion of scope and expertise, but also due to the many water board mergers during the 20th century, regional water management importantly professionalised and achieved equality with the expertise of Rijkswaterstaat, the national water authority (IJff 1993; Bressers, Huitema & Kuks 1995; Kuks 1998).

4.5.4 Evolution of the regime in general and conditions for regime change

Now we have analyzed the internal coherence of water rights and water policies separately, we are able to consider the external coherence between both, in order to understand the evolution of the Dutch national regime in general. We interpret the external coherence between water rights and water policies as the degree to which changes in public governance are reflected in changes of the property rights. In section 4 of this chapter we identified six phases in the evolution of the Dutch national water regime. Using the two dimensions of regime evolution (extent and coherence), we identified the period 1814-1954 (phases one and two) as a simple regime, the period 1954-1985 (phases three and four) as a complex regime, and the period after 1985 (phases five and six) as an integrated regime. We also noticed that the first

indications of a movement towards integration already appeared around 1969 (at the start of phase four). A remarkable development during the sixth phase is that the national regime turns back from an integrated into a complex regime due to a further increase of extent and a decrease of coherence. The reason for this is that in the early 1990s policy makers started to link water resources with spatial resources. This brought along the need for an extra integration effort in order to bridge the gap between water management and spatial planning.

Let us finally consider the conditions that have generated the successive regime transitions in Dutch water management. We already mentioned in this chapter that the regime transition in the early 1950s from a simple to a complex regime had been triggered by the economic recovery after World War II. In that period concerns were raised about the growing demand for natural resources (water space, nature) by a growing population which tried to achieve a higher living standard. The national regime answered to this growing use demand by allowing use expansion based on a deliberation of individual versus general interests and a redistribution of private rights. The regime change was not only 'use driven', but also 'protection driven' in the sense that exhaustion of natural resources had to be prevented in the public interest. This created a climate for water use planning, resulting in the first national water policy plan in 1968 (being the next regime transition).

The regime transition of 1969 resulted from a growing awareness during the 1960s that economic expansion involves environmental pollution. The state of the environment in general, and the poor surface water quality in particular, came high on the political agenda, not only in the Netherlands but also in other western democratic countries. The regime change in 1969 (adoption of the Surface Water Pollution Act) was fully 'protection driven'. Not only international agreements on the quality protection of seawaters and surface waters triggered this transition, but also the various regional and local initiatives to built waste water treatment plants. The water boards, predominantly on water quantity issues, had a strong interest in expanding in the field of surface water quality protection. The idea of financing surface water quality protection on the basis of the polluter pays principle fitted quite well with the water boards' tradition of having water management funded by charges based on full cost recovery.

During the 1970s the trend to democratization and participation in society resulted in broad opposition to the traditional manner of water management, which did not have an eye to rival uses. At the national level this resulted in the adoption of a participatory approach in land use decision making. This approach allowed other use considerations than solely flood protection and land reclamation to enter decision making on water infrastructure. In the end,

this tendency has been the prelude to an ecologisation of Dutch water management with its culminating point in the regime transition of 1985. In that year an integrated water system approach was adopted, integrating quantity and quality management and allowing ecological considerations in water policy making. The 'protection driven' 1985 transition was also triggered by a strongly developing environmental policy in the Netherlands during the early 1980s, and by a growing awareness of the interrelatedness between surface and groundwater. Other triggers were the deregulation and integration tendency in politics in the early 1980s (functioning as a 'meta policy'), and the ongoing debate on the position of water boards, implying the political wish to merge them into all-in water boards at water basin scale.

In the early 1990s problem pressure from serious river floods triggered the development of a new policy approach. We marked the adoption of the 'space for water' approach in 1995 as the most recent transition in Dutch water management. This transition was not only impelled by incidental river floods, but also by the international alarm over climate change, including the expectation that river floods will happen more often and more intensively in the future. The 'space for water' approach also followed up on the water system approach of 1985 and the growing preference to restore ecosystems and the natural flow of rivers. The 1995 transition definitely changed the classical 'dyke and drainage approach' in Dutch water management.

If one surveys the evolution of the Dutch national water regime, one can see three major conditions playing a role all the time. First, there has been a constant problem pressure for the Netherlands related to its position at the sea edge in a low lying area, with large parts of the country below sea level and being the delta for three European rivers (Rhine, Meuse and Scheldt). The need to protect the land from high water from rivers and sea, and the tradition of artificially draining low-lying areas, have triggered the country to develop a complex hydraulic infrastructure. Through the ages the flow and level of almost every water body in the country have been subject to human control. Most flood disasters also resulted in a further centralization of water management. River floods in the 1990s fundamentally changed the classical approach of flood protection and given the regional water boards a more prominent role (a form of decentralization as a counter-movement). Besides problem pressure from flooding, there has also been pressure from water quality deterioration. The position of the Netherlands at the edge of the North sea and in the delta of some important European rivers has given the country not only the advantages of developing the world's largest sea harbor as a main port to Europe, but also the disadvantages of being an end-of-pipe country with a lot of transboundary pollution. The country developed a strong environmental attitude based on a strong interest in protecting the

potential of surface water for fishing, drinking water production, and water related ecosystems. On the international stage the Netherlands have been in the forefront of preparing international agreements on the environmental protection of sea and surface waters. Another kind of problem pressure is related to economic and demographic circumstances (strong economic development after World War II and a high population density) which have made the country aware of its scarcity of space while being confronted with many, often rival spatial claims. This has given a powerful impetus to the development of spatial planning as an instrument to deal with rivalries. Since the 1970s, spatial planning has increasingly been used to revaluate nature and water related ecosystems. Economic and demographic circumstances have also contributed to problem pressure in the field of groundwater. Excessive manure applications by a severely intensified agricultural sector have caused serious air, surface water and groundwater pollution. Overuse of groundwater sources by households, industries and agriculture has caused groundwater depletion. These groundwater problems led to groundwater regulations in the 1980s.

A second condition that has been important throughout the evolution of the Dutch national water regime concerns the water board tradition in the Netherlands. Since 1798 a form of co-governance between national and regional water authorities has developed. Despite a constant centralization tendency, the water boards succeeded in maintaining a position in regional water management. Meanwhile, water management not only professionalized at the national level, but also at the regional level where water boards changed from very small-scale water boards for drainage and flood protection into 'all-in' water boards at the size of tributary water basins. Water boards appeared to be effective organizations for the implementation of national water policies, while also being successful in taking responsibility for regional water management. Since the 1980s the co-governing position of water boards in the Dutch administrative structure has been recognized by the revised Constitution of 1983 and the Water Boards Act of 1992. They both approve that water boards are of essential interest to a country that is living with flood risks for large parts of its area. The taxation system of water boards has given the Netherlands a tradition of water services based on full cost recovery charges, which corresponds with the idea of the EU Water Framework Directive 'to get the prices of water services right'. The democratic and participatory structure of water boards corresponds with the idea of the EU Water Framework Directive 'to get all users involved'.

A third major condition in the evolution of the Dutch national regime has been the public debate on the effects of large water works and the need to take rival interests into account. Already in the 19th century provisions were

created to compensate citizens not only in cases of expropriation but also in cases where private properties are disadvantaged by public water works. During the 20th century more and more titles for compensation were added. In the 1960s some legal provisions were adopted for a better deliberation of interests in order to prevent the exhaustion of specific types of natural resources. In the 1970s public protests against the classical water engineering approach by Rijkswaterstaat politicized water management and initiated a debate in society on various water values. Since the 1970s spatial planning has been used as an instrument to deal with rival interests in case of large infrastructural water works. Not only spatial planning was important. The water management sector also developed its own planning instruments. Since 1968 the Netherlands has a tradition of national water policy plans, which started out being sectoral plans mainly focusing on water quantity issues (1968, 1984), but which later became integral plans (1989, 1998). Planning is used as an instrument for policy coordination between the higher and lower administrative levels (vertical integration) as well as between policy sectors at the same administrative level (horizontal integration between water policy, environmental policy, nature policy, spatial planning). The functioning of the Netherlands as a decentralized unitary state is to a great degree based on coordination by planning.

With respect to the question if European water policy should also be considered as a major condition in the evolution of the Dutch water regime, the answer is mixed. The Dutch have always had a strong European orientation. The Netherlands is one of the founding fathers of the European unification process. International agreements on water quality protection are important for the country, due to its transboundary water dependence. Until the 1980s the Netherlands was among the foremost member states with respect to the initiation and implementation of European water directives. However, in the 1990s the Netherlands started to delay implementation, especially in case of the EU Nitrate Directive for Groundwater and the EU Directive on Urban Waste Water. The country is also struggling with how to implement the EU Bird and Habitat Directives in water areas where other spatial claims (like recreation or navigation) are also at stake. The problem is that it is difficult to integrate European Directives in fields where the country has already developed its own national policy (for instance, like the Dutch did in case of groundwater protection and nature conservation). This is often mentioned as a reason why European Directives are easier to implement in countries which had not previously developed a national policy in those fields (Bennett & Verhoeve 1994). The expectation is that European water policy will increasingly be a condition for the further evolution of the Dutch water regime (Bressers, Kuks & Schrama 2001). The EU Water Framework Directive, in particular, will influence the institutional structure of Dutch

water policy organization. Again, the challenge will be how to integrate the European ideas about institutional organization of water management at water basin scale with the typically Dutch structure of co-governance between regional water boards and a national water authority. The Netherlands might have a lead of this structure, although the existing structure might also be a brake on institutional change.

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Chapter 5

Comparing the evolution of national water regimes in Europe

5.1 Introduction

In this chapter we present a comparative survey of regime development in six European countries: the Netherlands, Belgium, France, Spain, Italy, and Switzerland. The survey focuses on the main regime transitions in each country and explains what has actually changed in terms of water rights and water policies. We also summarize the most important triggers that have generated the various transitions in a country. Before we review the regime transitions and change triggers per country in sections 3 to 8, we describe in section 2 the common pattern of regime evolution that we found in the country descriptions, which have been produced for the Euwareness-project (see: Kissling-Näf & Kuks 2004)

The idea behind screening the evolution of the national water regime in various countries has been to determine whether we find an evolution from simple to complex to integrated regimes and to explore in particular the transitions from one regime phase to another. Although we find a common evolution pattern in all our selected countries, from simple to complex to integrated, the transition moments appear to vary in time. It is interesting to see when and how a regime changes in a country, and to identify the triggers and circumstances that have generated or allowed change. Especially the transition from a complex regime to an integrated regime appears to be a complicated one. While all countries are showing attempts towards integration, they vary in the degree to which these attempts have improved the institutional sustainability of the national water resource regime. The Netherlands, France and Switzerland were relatively early in their attempts at integration, while Belgium, Spain and Italy are lagging behind in very different ways. In the concluding section of this chapter we summarize in

greater detail the ways in which these six countries vary on their way towards an integrated regime.

5.2 General comparison of countries in terms of regime development

For a screening of the historical evolution of national water regimes we had to go back in time more than at least a hundred years. For the countries selected it even made sense to go back to the early 19th century, because many countries adopted a new constitution and civil code around that time, which formed the start of a simple water regime in those countries. We can see a common pattern in our selected countries in which the period 1800-1900 could be identified more or less as a simple regime. During the period 1900-1950 these regimes develop into a regime with low complexity. In the period 1950-1985 the complexity increases and the period can be divided into one of medium complexity (1950-1970) and one of high complexity (1970-1985). From 1985 onwards we see many attempts at integration in the various countries. Therefore we mark the period 1985-2000 as a period characterized by attempts at integration, although this period remains a period of high complexity for most countries.

Simple regimes (1800-1900)
In the selected countries the development of a simple regime starts with the definition of a public domain in the early 19th century. In the first half of that century, most countries adopted a new constitution and a civil code as the Napoleonic era came to an end around 1815 as well as due to the adoption of civil rights and the restructuring of Europe around 1840. For many countries this civil code was a French legacy. The definition of a public domain in general implied that the ownership of continental waters and navigable waters, and the responsibility for flood protection were placed in the public domain. In fact, the extent of the public domain was restricted during this period to the ownership and use of continental waters, the ownership and use of navigable waters (for navigation), and flood protection. The definition of a public domain was accompanied by the definition of principles for expropriation and compensation. In many countries forms of expropriation were allowed for reasons of flood protection (in case of dyke construction, for instance) and to improve the navigability of rivers. The extent of the private domain or the common property domain also embraced the right to drainage for agriculture, the right to irrigation for agriculture, and the right to use water for domestic, agricultural or industrial purposes. The reason for

considering this period as a simple regime phase is that scarcity first became apparent, which was the reason for the constitution of a public domain.

Regime changes towards low complexity (1900-1950)
In the first half of the 20th century we see in most countries a concern for public health and sanitation. This was a driving force for most countries to add sanitation (by the construction of sewage and supply systems) to the extent of the public domain. This means that public authorities (mostly local authorities) started initiatives to develop an infrastructure for sanitation, mostly in urbanized areas at first. In the first half of the 20th century, too, public authorities took initiatives to develop an infrastructure for resource exploitation, especially for industrial uses. This was necessary to facilitate the industrial expansion due to the industrial revolution in the second half of the 19th century. The low complexity refers to the fact that various users, relatively few in number, were claiming the use of the same resource, resulting in rivalries. To a very limited extent some deliberation between these various users was necessary, often co-ordinated by public authorities.

Regime changes towards medium complexity (1950-1970)
After World War II and the growing expansion of national populations and national economies, the complexity of water regimes increased due to increasing demands for water resource use, which were more often in mutual rivalry. In many countries we find that the concern about public health and sanitation was on the increase, due to urban expansions, resulting in the development of more systems for public water supply and wastewater treatment. Although more initiatives for wastewater treatment can be perceived, systematic surface water protection was still not common in this period. The intention was still to satisfy as many water demands as possible, without imposing restrictions. However, this had to go along with some forms of redistribution. For that reason we choose to mark this period as one of medium complexity. Redistribution is even more necessary because of the growing concern about degradation of natural areas, resulting in first attempts at systematic nature conservation. Some countries adopted a nature conservation act in this period. Regarding the extent of the public domain in this period, we could say that public service to water demands, attempts to protect surface water and attempts to conserve nature have been added to the extent of the public domain. This period is also characterized by the start of a communalization of water use rights, which means that the private domain becomes increasingly restricted in its water use rights and that water uses are increasingly regulated from the public domain. The public domain takes responsibility for guaranteeing access to water resources by all users, for a reasonable distribution and redistribution of use rights, and for the protection

of water values or functions that are not directly represented by specific users.

Regime changes towards high complexity (1970-1985)
Around 1970 many European countries adopted some form of a surface water protection act, impelled by international agreements on the reduction of surface water pollution. From 1976 onwards the European Community started to force its Member States to develop protective policies for bathing water and drinking water which had to comply with European quality standards. From that time on the European Community becomes an important player in harmonizing water sanitation policies across Europe. Especially the countries that were lagging behind in the field of sanitation, compared to frontrunning Member States, were forced to speed up the development and implementation of sanitation policies. As a result, the expanding domestic and industrial uses of water resources, which were permanently facilitated since the 1950s, started to be confronted with restrictive regulations concerning their effluent discharges. Besides systematic sanitation and systematic surface water protection, attempts to control water overuse were also added to the extent of the public domain in this period. Water demands could no longer be met in an unrestricted way, and the awareness rose, partly also due to a growing environmental movement, that the limits of growth would be reached. Water depletion came onto the agenda as a policy problem, but still no systematic prevention policy was adopted in this period.

Regimes changes towards integration (1985-2000)
Around and after 1985 several countries became aware of the crisis around water resources in terms of problems with both water quality and water quantity due to heterogeneous overuse. A wide scale of rivalries demanded new, innovative solutions. In many countries this resulted in the development of integrated policy approaches in which quantity and quality issues of both surface and groundwater were combined into one coherent policy perspective. The linkages between quantity and quality issues, as well as between surface and groundwater, required a water system perspective that allowed countries also to incorporate ecosystem aspects of water systems. This new perspective was accompanied by the expansion of the extent of the public domain. In many countries groundwater quality protection and diffuse pollution control, water use and irrigation control, water drainage control and ecosystem protection were added to the extent of the public domain during this period. Several national authorities adopted policies and legislation for groundwater protection and overuse control. After flood incidents in the 1990s attempts were also made to add to the

extent of the public domain a better control of flood plains and a better anticipation of water risks due to climate change. While both ecosystem protection and floodplain control were attempted during this period, they did not result in systematic policies and legislation. Also remarkable for this period is that several countries had a debate on a redefinition of the public and the private domain. States like the Netherlands, France, Spain and Italy made explicit legislative statements that water belongs to the state or the public, and that use concessions (as private or common property) need public control.[1] However, in the same period there was a debate in many countries, induced by the introduction of an open European market in 1992, that water services should be liberalized and that more market forces should be permitted. There are obvious contradictions with respect to opinions on the demarcation between the public and the private domain of water resources. Although we perceive several highly complex regimes suffering from fragmentation after 1985, we also find clear attempts at integration in most countries. Evident attempts are the adoption of water policy planning[2], the institutionalization of some form of a water basin approach[3], the adoption of integrated management[4] and legislation[5], and the allowance of more and extended user participation with respect to water management in the public domain during this period. Table 5.1 is showing a comparative survey of selective institutional milestones in the six European countries we studied.

1 In 1992, the Netherlands revised its civil code, formally proclaiming that water cannot be owned, not even by the State, because it is considered to belong to the public. In the same year, France formally proclaimed water an object of national heritage, which could be interpreted as proclaiming that it is 'state property'. In 1994, Italy formally proclaimed that all waters are public and belong to the public domain. Spain did the same in 1985, but it has not been able to eliminate pre-existing private property rights over water.

2 Water policy planning was started in the Netherlands in 1968, but the first integrated water policy plan was adopted in 1989. Belgium started water policy planning in 1995, France in 1992, Italy in 1990. Spain presented a draft water distribution plan in 1993, but it was not adopted before 2001. Switzerland has not developed water policy planning.

3 In the Netherlands these are water boards, already existing before 1985, but allocated primacy in regional water management in 1992. In Belgium these informal basin committees in Flanders and river contracts in Wallonia were both adopted around 1995. In France these are river basin committees, created in 1992. In Spain these are drainage basin authorities, which already existed before 1985. In Italy these are river basin authorities, created in 1989. In Switzerland no water basin approach has been adopted.

4 The Netherlands adopted integrated management in 1985, Belgium in 1995, France in 1992 and Italy in 1989. Spain and Switzerland have not developed integrated water management. Adoption of integrated water management means co-ordination between quantity and quality management.

5 The Netherlands adopted integrated legislation in 1989 and France in 1992. Switzerland and Italy show attempts that have an integral outlook but are based on an incomplete integral approach. In Spain, the 1985 Water Act and the 1999 Water Act take care of environmental and ecological effects of water use, but not of pollution.

The milestones related to changes in property rights and public policies represent attempts towards regime integration. The selective milestones related to institutional context seem to have been important background determinants for a country's regime evolution towards integration.

Table 5.1 Comparative survey of selective institutional milestones in six European countries

	Nether-lands	**Belgium**	**France**	**Spain**	**Italy**	**Switzer-land**
Property rights						
Redefinition of public domain	1992		1992	1985	1994	
Public policies						
Adoption of water policy planning	1968	1995	1992	2001	1990	
Adoption of integral water legislation	1989		1992			
Institutional context						
State reform		1970-93		1978	ongoing	
EU membership	early member	early member	early member	since 1985	early member	no member
Establishment of environment ministry	around 1970	around 1970	around 1970	1996	1986	around 1970

Table 5.2 Comparative survey of regime phases in six European countries

General regime-evolution	**1800-1900**	**1900-1950**	**1950-1970**	**1970-2000**
Netherlands	1814-1891	1891-1954	1954-1969	1969-1985 1985-1995 1995 >
Belgium	1804-1893	1893-1950	1950-1971	1971-1980 1980-1990 1990 >
France	1789-1898	1898-1945	1945-1964	1964-1992 1992 >
Spain	1879-1953		1953-1978	1978-1985 1985-1999 1999 >
Italy	1865-1933	1933-1976		1976-1989 1989-1994 1994-1999 1999 >
Switzerland		1912-1953	1953-1975	1975-1991 1991-1997 1997 >

Table 5.2 shows how the specific regime-evolution of the various countries is positioned in the context of the general regime-evolution we just described. In the following sections of this chapter we will summarize the regime phases for each of these countries separately.

5.3 Regime transitions and change triggers in the Netherlands

Period 1814-1891
In this period the regime was mainly based on concerns about flood protection and drainage to develop agricultural land. Dyke construction and river management was gradually centralized by the state and taken over from the relatively autonomous water boards. Several expropriation titles were adopted, allowing expropriation (with compensation) for the purpose of flood protection, land reclamation and improvement to the navigability of rivers. In this period, too, a rivalry existed between the state and the water boards. Until the 19th century water boards were the only organizations for water management. They were organized at basin scale and dealt mainly with quantity issues (mainly flood protection and drainage). Induced by a period of French domination, the state started to centralize water management, with the argument that state involvement in flood protection along the coasts and the main rivers is needed to safeguard national water security. The water board organizations were considered to be too small and fragmented for this task. Due to strong resistance from the still powerful and autonomous water boards, it lasted until the end of the 19th century before a clear demarcation of central and regional powers was settled in the field of water management.

Period 1891-1954
Between 1891 and 1908 - important pieces of water legislation were adopted in 1891, 1900 and 1908 - the co-governance between state water management (for flood protection and land reclamation) and regional water management became institutionalized. This is referred to as the establishment of a decentralized unitary state for water management in the Netherlands. The central authorities are responsible for the main waters with national importance, while the regional water boards take care of the smaller water bodies with regional importance. In the period from 1916 on, the state water authority commenced large-scale engineering projects for: river management and the construction of canals for navigation; for flood protection and land reclamation (Zuiderzee Plan), resulting in the development of the IJsselmeer and its surrounding polders after the flood

disaster in that area in 1916; and for the construction of storm barriers after a huge flood disaster in the province of Zeeland in 1953 (Delta Plan). The first half of the 20th century was also a period of large-scale development of systems for drinking water supply (organized by publicly owned companies) and sewage systems to discharge urban wastewater to surface water. These systems focused on sanitation and public health.

Period 1954-1969

Since the 1950s the extent of water management gradually increased. In the 1950s water supply received attention as a problem of how to meet future demands of an increasing population. This resulted in the institutionalization of water supply to guarantee a supply of good quality, in sufficient amounts and at affordable prices. A concession system for water supplies was created. Expropriation is allowed to benefit of water supply and water drainage. In the 1960s physical planning and nature conservation become important issues on the national agenda. There was a rising awareness that water management should be based on a deliberation of interests. Water infrastructural works become the subject of a public debate. Other values than water security enter into the discussion, such as the natural value, the recreational value and the spatial value of water. In 1968 water management planning started to be used as an attempt to control overuse of water resources, to balance demand rivalries and to prevent water depletion. The first sectoral water policy plan not only focused on flood protection and drainage, but also on water scarcity and demands on the water supply, agriculture and navigation.

Period 1969-1985

Together with the 1968 water policy plan, the start of active surface water quality protection and the related recognition of environmental concerns in 1969 mark an important transition in Dutch water management. In 1969 the Pollution of Surface Waters Act was adopted. This resulted in the large-scale construction and exploitation of wastewater treatment plants, as well as the systematic control of surface water pollution by means of a permitting system and a wastewater charging system based on full cost recovery and the polluter pays principle. Since 1970 water boards have been responsible for this water quality protection and wastewater discharge control, besides their water quantity tasks. During the 1970s and 1980s further attempts were made to complete the extent of water management. Groundwater issues like over-use, over-drainage, water depletion and the degrading quality of groundwater became recognized, became the subject of water rights and water policies, resulting in more demand-side management. In 1981 a Groundwater Act was adopted, controlling groundwater abstractions by

permitting and charging for groundwater abstractions over 100,000 m^3 per annum. In 1986 a Soil Protection Act was adopted, controlling surface and groundwater pollution from agricultural sources by means of manure application standards and a manure charge based on full cost recovery and polluter pays. After the adoption of a Nature Conservation Act in 1967, nature conservation started to receive more attention in this period. Several water infrastructural projects were reconsidered, to better account for ecological effects, especially after the adoption in 1974 of a participatory approach in land use decision making, which allowed other use considerations than solely flood protection and land reclamation to enter decision making on water infrastructure.

Period 1985-1995

In 1985 an integrated approach to quantity and quality management was adopted, allowing ecological considerations to enter water management decision making. Since 1985 water boards have been allowed to exercise water management according to a so-called 'broad water system approach'. The integrated approach, introduced in 1985, formed the basis for the Third National Water Policy Plan of 1989, which is the first integrated water policy plan in the Netherlands. Until 1985 separate plans were made for water quality management, taking care of the progress of surface water quality protection, and water quantity management. Just before 1985, in 1984, the Second National Water Policy Plan was adopted. This was still a sectoral water policy plan, recognizing water depletion and advocating integration between surface water and groundwater quantity management. In the field of groundwater management, groundwater quality protection was added. The Soil Protection Act of 1986 aims at the prevention of groundwater pollution from diffuse sources by means of regulating and charging for the application of animal fertilizers. On basis of this act, from 1989 on, groundwater protection zones are delineated with more stringent standards to protect water supply sources and drinking water quality. The Water Management Act adopted in 1989 provided integrative legislation with regard to water management in its entirety. It introduced policy instruments for the control of drainage by means of 'water level ordinances' to prevent water depletion (due to over-drainage) and protect ecosystems.

Period from 1995 onwards

Due to river floods in the early 1990s an integral vision on the connection between water management and land use planning was adopted in 1995. This vision proclaims that more space around rivers is needed, especially in response to flood problems in river flood plains, and to better anticipate climate change. Water and its natural movements should become key

determining factors in land use planning, when water is competing with other spatial claims. This paradigm change in flood protection (recognition of climate change and space for water instead of "dyke and drainage approach") is also a reinforcement of ecological restoration of water systems. Natural protection is preferred to of artificial protection. In 1998 this new policy approach formed the basis for the Fourth National Water Policy Plan, which focuses on climate change and restoration of the natural dynamics of water systems. A remarkable movement during this phase is that the national regime turns back from an integrated regime into a complex regime due to a further increase of extent and a decrease of coherence. The reason for this is that in the early 1990s policy makers started to link up water resources with spatial resources. This introduced the need for an extra integration effort in order to bridge the gap between water management and spatial planning. After high water problems in 1998 a state commission developed a long-term vision on water management in the 21st century. Water will have a strong claim in spatial planning, because spatial plans will have to be assessed for water risks before their adoption. In 2003 it became mandatory to give water boards a say in land use planning to prevent building activities in floodplains. To create space for water and to prevent flooding it is considered to allow expropriation of flood plains, to restrict land use rights in flood plains, and to attribute liability for flood damage to water boards and landowners.

Triggers

The regime transition in the early 1950s from a simple to a complex regime was triggered by the economic recovery after World War II. In that period concerns rose about the *growing demand for natural resources* (water space, nature) by a growing population which was trying to achieve a higher living standard. The national regime answered this growing use demand by allowing use expansion based on a deliberation of individual versus general interests and a redistribution of private rights. The regime change in the 1950s was not only 'use driven' but also 'protection driven' in the sense that exhaustion of natural resources had to be prevented in the public interest. This created a climate for water use planning, resulting in the first water policy plan in 1968 (signaling the next regime transition).

The regime transition of 1969 resulted from the growing awareness during the 1960s that economic expansion involves environmental pollution. The *state of the environment in general and the poor surface water quality in particular*, came high on the political agenda, not only in the Netherlands but also in other West European countries. However, the awareness in the Netherlands was especially triggered by the perception that much of its surface water pollution originated across the country's borders. The regime

change of 1969 was fully 'protection driven'. Not only international agreements on the quality protection of seawaters and surface waters triggered this transition, but also the various regional and local initiatives to built wastewater treatment plants. The water boards, predominantly oriented to water quantity issues, had a strong interest in expanding into the field of surface water quality protection. The idea of financing surface water quality protection on the basis of the polluter pays principle fitted quite well with the water board's tradition of having water management funded by charges based on full cost recovery.

During the 1970s, the style of water management, which had no eye for rival uses, changed. At the national level the *democratization and participation tendency* in society resulted in broad opposition to the traditional management style. This resulted in the adoption of a participatory approach in land use decision making, allowing other use considerations than solely flood protection and land reclamation to enter decision making on water infrastructure. Ultimately, this tendency was the prelude to an ecologization of Dutch water management with its culminating point in the regime transition of 1985.

In 1985 an integrated water system approach was adopted, integrating quantity and quality management and allowing ecological considerations in water policy making. The 'protection driven' 1985 transition was also triggered by a *strongly developing environmental policy* in the Netherlands during the early 1980s, and by a growing awareness of the interrelatedness between surface and groundwater. Other triggers were the *deregulation and integration tendency in politics* in the early 1980s (functioning as a 'meta policy'), and the *ongoing debate on the position of water boards*, implying the political wish to merge them into all-in water boards at water basin scale.

The adoption of a Soil Protection Act in 1986, which was the start of the regulation of agricultural pollution, was triggered by on the one hand *growing problem pressure* on air, surface and groundwater from excessive manure applications, and on the other hand by the *influential position of the environmental ministry in the 1980s*, leaning heavily on consultation with target groups and breaking through the agricultural iron triangle.

In the early 1990s problem pressure from serious river floods triggered the development of a new policy approach. The adoption of the 'space for water' approach in 1995 is considered as the most recent transition in Dutch water management. This transition was not only impelled by incidental *river floods*, but also by the *international alarm over climate change*, including the expectation that river floods will happen more often and will be more severe in the future. The 'space for water' approach also followed up on the water system approach of 1985 and the growing preference to restore ecosystems and the natural flow of rivers. The 1995 transition definitively

changed the classical ‘dyke and drainage’ approach in Dutch water management.

5.4 Regime transitions and change triggers in Belgium

Period 1804-1893
During this period water management mostly focused on stimulating the development of agriculture. Water ownership was included in land ownership. The sole exceptions were navigable rivers and canals, which were State property. This status is justified by the necessity to maintain the rivers for navigation.

Period 1893- 1950
As early as the first half of the 20th century, the low quality of water provisions and its danger to public health became recognized. The regime shifts its focus to the development of water distribution networks, in order to improve public health. So, besides the development of agriculture (promotion of drainage and irrigation), there is a focus on water distribution and the building of water distribution networks.

Period 1950-1971
After World War II Belgium experiences an increasing degradation of surface water quality due to industrialization and urbanization. In 1950 the country adopts an act on the protection of water against surface water pollution, to be supervised by the Ministry of Public Health. The implementation of this act fails, because local communities are not interested to invest in wastewater treatment at the benefit of downstream communities.

Period 1971-1980
In 1971 the national Law on the Protection of Surface Waters against Pollution was adopted. This was an attempt to organize water management at a river basin scale for the three main river basins (Meuse, Scheldt, and the basin of the Coast). The designed basins cross the Regions. The main idea was to limit emissions and to accelerate the flow of water in order to transport wastewater more quickly to the sea. This policy, which focuses on purification, was still driven by a concern about public health. The final aim was to secure water supply. The regime focuses more on water exploitation than on water protection.

Period 1980-1990

From the beginning of the 1970s the former central state started to evolve progressively towards federalization. The Belgian State became a full federal state in 1993. In the field of water, the management of freshwater became a regional responsibility while the Federal Government looks after coastal waters. Most competencies were already transferred to the Regions in 1980 (in 1980 for the quality aspects and in 1990 for the quantity aspects). Each region had to set up its own water administration, which resulted in very different regional water regimes in Flanders and Wallonia. In each region, the water management administration (except the responsibility for navigable waters) has been positioned within the environmental administration. In 1980, *Flanders* and *Brussels* decided to implement the laws of 1971 on the protection of surface water and groundwater and to adopt an environmental permission system for industrial discharges. The picture is quite different in *Wallonia*, where water is more abundant and more related to economic interests, like tourism. The Region hindered the development of an environmental policy. It did not implement the national law of 1971 and waited until 1985 to regulate surface water quality and 1990 for groundwater. As in Flanders, the Region takes the leading role, but leaves a bigger role for the local authorities. Communes are closely involved through the intercommunales for water supply, sewage and wastewater treatment. Wallonia prefers to restart with a new legislation, more suitable to the existing actors in place, the intercommunales.

Period from 1990 onwards

In the 1990s it appears that the complicated process of federalization delayed - compared to other European states - an effective approach to water problems. In the context of federalization the 1971 law failed implementation, despite its ambition. In the 1990s, the country tried to make a determined management effort to make good the neglect of the past. Its activities were partly driven by EU and other international obligations (North Sea Conferences, Oslo-Paris Convention, Scheldt and Meuse rivers). Much work has been done in recent years to create a coherent water management framework of legislation, institutions, policies and plans. New water pricing and wastewater charge and tax systems have been in place since the early 1990s to help finance the investments being made in new sewers and wastewater treatment plants. Industrial pollution discharges have been reduced. With respect to purification, Flanders chose the privatization route, while Wallonia opted for contracting.

In the early 1990s, *Flanders* intensified wastewater purification, regulated discharges through global permission, limited manure spreading and defined absolute protection zones. The goal of the regime is both to

improve the reserves of potential drinking water and to preserve ecosystems and biodiversity. Formal ownership rights to land, including riverbanks, are modified for purposes such as nature conservation and the development of recreation activities along the rivers. Expropriation has been applied as a regulation tool. In the same period, the management of surface water quality was reinforced. As a reaction to the persistent pollution of rivers and to European obligations, Flanders partly privatized its purification activities, extending the regulation of direct and indirect discharges to new target groups, such as the farmers with measures limiting fertilization.

The motivations for regime change in *Wallonia* are the same as in Flanders, i.e. a persistent pollution of water and the need to satisfy European requirements. At the end of the 1990s, Wallonia chose to reinforce water protection measures with a process of contractualization between the regional authority and the industrial water operators. As in Flanders, the major innovation concerns the actors' network. A public company was set up in 1999 to manage, according to a management contract signed with the Region, all financial movements linked with water purification and the protection of wells. The problem is that co-ordination between the water distribution cycle and other uses are not considered, e.g. minimum flows or nature conservation.

In the mid-1990s Belgium took steps to promote more integrated water management. Flanders and Wallonia recognized the need to co-ordinate different water uses at a tributary basin scale and to co-ordinate quantity and quality management. In *Flanders*, informal basin committees were set up for each of the eleven basins in the region. The committees are composed of representatives of regional, provincial and municipal administrations and local environmental organizations. In *Wallonia*, river contracts have been developed in order to integrate stakeholder interests. These are voluntary agreements between stakeholders of a river basin for the purpose of improving the physical and biological qualities of the river. In general, the contract is made between municipalities, but other stakeholders like industry, landowners and local organizations may participate.

With respect to flood protection and nature conservation and riparian restoration, Flanders allows expropriation of formal ownership rights, while Wallonia only allows interventions in use rights (prohibition of building on riverbanks with adverse consequences for fauna and flora). In that context, the Belgian case is interesting for it shows two regions with different types of public domains. Although both sub-states show an expanding public domain, in Flanders the public domain is based on private ownership by the state, while in Wallonia the regulation of use rights on the basis of public law is a way to gain public control. In Flanders water management procedures are more centralized and more subject to central planning, while

in Wallonia the local level is much more autonomous and water management is characterized by bottom-up decision making. Neither regional system is sufficiently integrated. The Flemish system lacks the participation of local actors, while the Walloon system is poor in planning.

Triggers

Above all, the *European Union* puts strong pressure on the Member States. The requirements of the 1991 directive on wastewater led to the reorganization of regional water sectors. The main problem for all Belgian Regions is the financing of the required infrastructure for purification. The Regions thought up new systems to finance the investment, organized the collection of new taxes and opened up the institutional arrangement to the private sector. As a result, Belgium was blamed for delays in implementing most European water directives and has frequently been condemned by the European Court of Justice.

The *pressure of the problem itself* also provokes change. Differences in the levels of internal pressure induce different paces of adaptation. Flanders is in advance because of the strong pressure exerted on its capacity to produce drinking water. Flanders is more integrated and pushes more in the direction of integration because of a greater threat of water shortages.

Environmental groups also play a significant role in regime transitions towards more integration. However, their influence is more indirect. In recent times, environmental groups have become more influential, especially after the accession of the green parties (Ecolo/Agalev) to the government in 1999. The acceptability of their claims also comes from the fact that they are complementary to the interests of water producers.

Regional differences are partly explained by *institutional settings*. The federalization process led to new regimes at the beginning of the 1980s and weaknesses of the new regional structures contributed to the last regime changes. In Flanders, people are keener on concentrating power in broad structures, a position reflected in the 1971 law, while Wallonia favors the development of local competencies. The communes keep their hand on the water purification sector (under the control of the political parties) while they were expropriated in Flanders.

Finally, water regimes are influenced by *inter-policy co-ordination*. Water policies seem to be systematically legitimized by other dominant policies. The dominant policies in question are agriculture, industry and public health. They justify needs for infrastructure. Nowadays, the dominant policy that seems to emerge is the environment. Environment, for instance, is invoked to justify a limitation of industrial emissions (environmental permits), while in the past the justification was based on public health concerns (workers' protection).

5.5 Regime transitions and change triggers in France

Period 1789-1898
This period may be characterized as a simple regime. There are few uses recognized, but the appearance evolves of some new uses (irrigation, industry, water treatment and waste disposal). There are disputes linked to the absence of clear laws concerning non-navigable or floatable water, the status of which was clarified in the law of 1898.

Period 1898-1945
From the 1898 Act up to the middle of the 20th century, a series of particular regulations (navigation, hydroelectricity, agriculture, public health and water supply, etc.) resulted in sectoral management of water. The period is characterized by a diversified and complex regime, with management of different uses weakly co-ordinated.

Period 1945-1964
This period is characterized as a complex regime with increasing and particularly intensification of uses linked to industrialization and urbanization. However, the first attempts to co-ordinate different uses appear. New actors such as EDF and regional development companies start to play a role.

Period 1964-1992
The particularly innovative Water Law of 1964 incorporated the concepts of integrated management by river basin, partnerships, and the combination of regulatory instruments and financial incentives based on the polluter pays principle. The 1964 Act focused mainly on surface water. The main innovation of this law was to set up a dialogue between users (industrialists, farmers, and local authorities) and government representatives on the Basin Committees of the Water Agencies. These were defined in relation to the main river basins. The main objective was to create financial solidarity between the different users in order to control water pollution. It was considered that the growing needs of the consumers could be met by maintaining the quality of waterways. In spite of the creation of basin authorities, the Act of 1964 did not simplify the administrative organization of water management. In fact it allowed different bodies to intervene. The organization at basin level did not lead to the removal of the other administrative levels of management. Instead, these were superimposed on the existing ones, which retained their responsibilities. It thus became necessary to create co-ordinating bodies. The overall supervisory role of the Ministry of the Environment over the activities of the different parties was

insufficient to remedy this problem. This ministry relied on the decentralized departments of the other ministries that it was meant to supervise since it did not have operational staff to supervise different uses at basin level and at the national level. From 1964 on, the regime has departments in the field itself. Overall, this period is characterized by a weakly integrated and highly complex regime, ensuring co-ordination as a basis for surface water quality protection, already applying the polluter pays principle in a preliminary form and making use of regular pollution checks of watercourses. Later on, the regime was extended with limitation of conflicts over ground water between industrial uses and water supply, and application of an 'abstractor-payer' system. From 1981 on, France experimented with river contracts. Since the Fishing Law of 1984, the ecological quality of the water environment has also been taken into consideration.

Period from 1992 onwards

The Water Law of 1992 created a new legislative framework for water resource management by introducing the concept of ecological planning and management. By proclaiming water as an object of national heritage, the legislator recognized, for the first time, the need to protect this resource for itself, both in terms of its quantity and its quality. Therefore this legislative step is considered as the start of an integrated water regime in France. The law provides for a water resource development and management plan for each river basin, together with objectives for the exploitation and protection of water resources, aquatic ecosystems and wetlands. The idea of balanced management (integrated management) was introduced, based on the creation of new planning and negotiation tools (SDAGE and SAGE[6]), as well as on the creation of new institutions at the local level (the Local Water Commission composed of local authorities, state public administrative bodies and user representatives). The fundamental principles of the Water Law of 1992 were based on: simplifying the regulation and policing of water, bringing together the departments responsible for the administration of this resource, creating a united legal framework for water, conserving water on the basis that it should be protected, in general and unlimited terms, against pollution. This last aspect was actually initiated in the Fishing Act of 1984 and its need was implicitly recognized in the context of river contracts from 1981 onwards. It involved a closer co-ordination of administrative bodies at the local level (MISE - Interdepartmental Water Mission) and a local planning policy more closely linked to the SAGE.

[6] SDAGE: Master plans for water development and management (*Schéma Directeur d'Aménagement et de Gestion des Eaux*); SAGE: Local plan for water development and management (*Schéma d'Aménagement et de Gestion des Eaux*).

The financial system administered by the Water Agencies was given a substantial boost by the decision to increase their capacity for intervention by doubling water charges in the 1992-96-programme period. The Water Agencies have enabled local authorities to speed up their investments under the EU wastewater directive and have secured substantial funds for joint operations, including monitoring networks, general studies and restoration of the natural environment. As drinking water and sewerage service providers are obliged to recover their costs through water pricing, widespread volume pricing has helped improve the management of these services from an industrial and commercial standpoint, as well as sending appropriate economic signals.

Triggers

After World War II, the *strengthening of state intervention* and an awareness of water as an important issue in managing *economic development* led to the initiation of a system of global management of water resources (distribution and anti-pollution measures) with the Water Act of 1964. In the 1960s, the *depletion of water stocks* was the main concern of the water authorities, industrialization being a large consumer of water as well as an important factor in water pollution (through discharge of waste products into surface water). With the modernization of agriculture, which increased the need for water, as well as urbanization leading to increased domestic needs, the 1964 Act introduced a water management regime, which took into account the compatibility, and requirements of all the different users.

The gradual emergence of new concerns since the 1970s (*the creation of the Ministry of the Environment, the Nature Protection Act of 1976, the Fishing Act of 1984*) has given a higher profile to the protection of the natural environment in matters of water management. Following the Fishing Act of 1984, water management started evolving towards a greater integration of environmental issues. This development was linked to a growing awareness of the strong interdependence of economic activities, impact management and the resulting quality of the environment. Contractual policies such as that initiated by the Ministry of the Environment from 1987 within the framework of 'river contracts', gradually followed the experiences of integrated water management at basin level. Moreover, *several important water calamities* (successive dry summers in 1989, 1990, 1991; the catastrophic flooding of Nîmes in 1988; the impact of storms on fish mortality in the Seine in 1990 and 1992, etc.) helped to accelerate the change in attitude towards water. The unitary aspect of the water resource became apparent with the impact of drought on the pumping of large quantities of groundwater by farmers. Elsewhere, the accident at the Protex

factory near Tours in 1988 led to the water supply being cut off due to contamination of the Loire and the Vienne.

The Water Law of 1992 was not only the result of a *continuing debate on innovating water management*. It was also influenced by *European legislation*: a large part of this law deals with the integration of the European directive of 1991 on urban wastewater. At the same time, the innovative experience of water management at the river basin level was gradually implemented at the more operational level of the 'sub-basin'. The contractual policies such as the river contracts initiated in 1981 also played a part, since water quality could not just be improved by the policy of installing water treatment plants. At the same time, setting up *environmental protection organizations*, and the *increasing awareness of inhabitants* of the water issue, were contributing factors in the change of the water management regime in France.

5.6 Regime transitions and change triggers in Spain

Period 1879-1953

The 1879 Water Act re-organized institutional arrangements for surface water allocation, as they existed before and were previously introduced under Muslim rule on a national scale. The modernization (in the early 20th century) of agriculture, industrialization and the growth of the cities led to the development of a large-scale water storage and transfer infrastructure. In 1926 the Confederaciones Hidrograficas (Drainage Basin Authorities) were created to group all major water users of each river basin, and to allocate the water resources made available by major hydraulic engineering works.

Period 1953-1978

The 1953 economic reforms and, more particularly the 1959 Stabilization Plan, put an end to a fully autarchic economy. This led to an increase of industrial development, an unprecedented push of tourism, a rise in consumption, an increase of the standard of living and a demographic boom. Water demands increased and became heterogeneous in their uses (agriculture, industry, tourism, population supply, energy production). The state's response consisted of adopting strong supply-oriented policies through the promotion of subsidized large infrastructural works (in the context of an authoritarian and paternalistic political regime).

Period 1978-1985

In 1978 Spain became a democracy and adopted a new constitution. The new constitution is transforming the political and administrative structure. It is a

transition towards decentralization and the creation of autonomies regions. This created a right of autonomy for nationalities and regional identities. Decision making on water resources and the environment shifted from the central state to the 17 autonomous regions. Spain became a 'state of autonomies'. The new constitution gives public authorities at all levels the duty to ensure the rational use of natural resources, to protect and improve the quality of life and restore the environment.

Period 1985-1999

The 1985 Water Act outlines central government responsibilities concerning use of surface and groundwater in the public domain. The general aims are:

1. To best satisfy demands for water. The Water Act establishes that an 'order of preference' for water use must be set in the hydrological plan for each drainage basin.
2. To rationalize water uses in harmony with the environment and other natural resources. The Act includes the respect of a minimum flow, to assure the availability of common uses and ecological and environmental needs. The Act proclaims to incorporate environmental and ecological considerations/values, in order to incorporate earlier EU water directives into Spanish law.
3. To deal with the use and protection of both surface and groundwater, considering water as a unitary resource. It provides for river basin planning. It requires the government to formulate a National Hydrological Plan, to deal with all water resource management issues. The first such plan was completed in 1993, but not approved before 2001.

The 1985 Water Act brings all groundwater resources, as well as the beds of rivers and lakes, into the public domain. Private property rights to water are eliminated by the Act, but pre-existing rights will only expire 50 years after its passage. In the meantime, the authorities can challenge private property rights where the resource is over-exploited. Thus, the Act affects the property rights structure (water becoming state property). While the new constitution had created incoherence with the 1879 Water Act, the 1985 Water Act has restored this incoherence. Under the 1985 Water Act all uses of water (except those consuming less than 7,000 cubic meters of groundwater per year) require a concession. Applications for concessions are made public and are subject to competition. Preference shall be given to the applicants that propose the most rational use and the greatest environmental protection. Concessions are granted by the DBAs for a maximum of 75 years (instead of the previous 99 years). Concessions must conform to the provisions of the local hydrological plan and the order of preference it stipulates. The 1986 General Sanitation Act establishes procedures in the

health system for the development and implementation of the Water Act. It outlines the jurisdiction of the different administrative levels. Since joining the European Community in 1985, Spain has made much progress with development of its infrastructure (including water supply and wastewater treatment), as well as with international co-operation to protect the environment and environmental convergence with the EC (incorporation of environmental considerations into sectoral policies).

The 1995 Urban Waste Water Treatment Act complements the 1985 Water Act and the 1988 Coast Act concerning the protection of water from negative effects of discharge of urban wastewater. In 1996 a new Ministry of the Environment was created, with wide responsibilities for inland and coastal waters, pollution, waste management, nature protection and biodiversity. Before 1996, two ministries were responsible for environmental policies: the Ministry of Public Works, Transport and Environment and the Ministry of Agriculture, Fisheries and Food.

Period from 1999 onwards

The 1999 amendment of the 1985 Water Act introduces legal techniques for promoting efficiency and for increasing available resources in order to satisfy demands. It creates a water market and allows water trading, in the sense that concession holders may sell their surplus to other concession holders, in order to achieve more efficiency (demand management). It also imposes a new restriction to the exploitation system: the ecological flow or environmental demand gets a priority over all other uses, except for population supply.

The National Hydrological Plan adopted in 2001 (after failed attempts to adopt such a plan in 1993 and 1994) contains some promising environmental features, such as a suggestion that maintaining a minimum flow in rivers be accorded second highest priority in times of drought, after population supply. The eco-perspective of the 1985 Water Act has been extended. On the other hand the plan of 2001 projects the building of many more reservoir dams and interbasin transfers. It appears as if demand management aspects have been considered quite separately from supply management issues. Diversion policies (supply management) prevail over water saving policies. The plan has been contested by environmental groups, the scientific community and by some autonomous drainage basin authorities. It seems to follow two different and contradictory directions. Despite the promising environmental perspective, it seems to be a change of strategy: the plan is based on an old-fashioned culture of diversion; it is contradictory to the 1999 Water Act, since it does not want to wait for the results of a demand management policy; it does not follow the prescriptions of the 1996 National

Irrigation Plan; it does not respect the EU Water Framework Directive that proclaims the unity of river basins.

Triggers
Problem pressure from water over-use in the 1960s and 1970s put *water scarcity* higher on the political agenda. The 1985 transition coincided with some periods of severe drought. Extreme droughts in the mid-1990s again had an impact on policy making.

The *democratization process* and the *process of regionalization* of government since the new constitution of 1978 have strengthened the role of the regions.

The Spanish *entry to the European Community* in 1985 resulted in the adoption of the 1985 Water Act, in the large-scale development of infrastructure for water supply and wastewater treatment, and in an active Spanish attitude towards international co-operation to protect the environment and environmental convergence with the EC (incorporation of environmental considerations into sectoral policies).

The *1985 Water Act* itself has been a trigger for water quality protection and for the development of planning with respect to water resource use.

The democratization process in Spain and the *rise of environmental awareness* during the 1980s resulted in the entrance of environmental NGOs in the policy arena. Finally it resulted in the *creation of a new Ministry of the Environment* in 1996. When a plurality of interests enters the policy arena, it openly clashes with the traditional approaches of water policy. We see this happening in the 1990s.

The *failed attempts to adopt a Hydrological Plan* in 1993 and 1994 led to the 1999 amendment of the 1985 Water Act.

5.7 Regime transitions and change triggers in Italy

Period 1865-1933
In 1865 Italy was unified into one national state. The 1865 law on the prevention of disasters from flooding and inundation was the start of a simple regime. The main focus was on land protection.

Period 1933- 1976
The Water Code of 1933 addressed in a very general way the main uses for production and consumption. It stated the need for public permits for water uses. The content of the policy was regulative and distributive, dating back to the unification of the country (1865). After 1933 the simple regime

evolved towards complexity, because of the regulation of more alternative water uses, which occurs through fragmented and separate laws.

Period 1976-1989

The Water Pollution Control Law (Merli Law) of 1976 was a parliamentary initiative, lacking government support. It was a legislative statement to start the regulation of the discharge of industrial and municipal effluent into surface and ground waters. The law deals essentially with water quality, defining maximum standards, thus paving the way to the creation of a network of purification plants both for domestic and industrial uses. After 1976, in the void at the national level, the main regulatory authorities were at the regional level. Only after 1986, with the birth of the Ministry for Environment and the subsequent creation of national and regional environmental agencies, has there been an attempt to create a national dimension in water quality policy. But the EU on the one hand and the regions on the other had already occupied most of the policy space.

Period 1989-1994

The Framework law of 1989 on the creation of Water Basin Authorities is considered as the first legislative effort to develop integrated management of water resources at the level of river basins, taking into consideration both the quantitative an qualitative dimensions and most of the potentially rival uses. The water basin is defined as the most optimum dimension for intervention. This law resulted in the identification of six major national watersheds (covering the most important Italian rivers), each with a special management authority, and 18 inter-regional basin authorities. The remaining bodies of water were entrusted to smaller authorities under the direct control of the concerned region. The principal occupation of the basin authorities with the environmental protection is mostly confined to safeguarding a constant minimum vital flow in watercourses (as required by the 1989 law). This provided the basin authorities a crucial role in water quantity regulation.

Period 1994-1999

The Galli Law of 1994 on the optimum area for water services was a parliamentary initiative, lacking government support. It deals with water services and their management, allowing regions and municipalities to raise finance and set user charges. The main objective is to overcome the fragmentation of the water supply sector. The full implementation of the law will on the one hand force intermunicipal co-ordination and on the other hand it will open up the market for water services under the compulsory open tendering required by European legislation. This in turn should bring about a more rational price of water. The Galli Law also asserts the public

ownership of all water resources and sets a hierarchy between various uses of water, giving priority to human consumption. By this, sustainability was fully incorporated in the water regime. Community rights started to play a more relevant role. Environmental and sustainability considerations were explicitly addressed.

Period from 1999 onwards

The 1999 Law on the quality of water bodies was the first major law pushed by the Ministry for Environment, to implement the 1991 EU directives concerning the treatment of water effluents and the protection of groundwater against nitrates from agricultural sources. The law introduces for the first time the concept of a water quality perspective for a water body, in line with the orientation of the EU Water Framework Directive (draft 1997; adopted in 2000). This is a new perspective, since sanitary laws traditionally regulated water quality. The aim of the new perspective is to integrate environmental, health and economic considerations into an overall policy of water resource management.

Triggers

Since the beginning of the 1970s the water regime started to change, essentially due to *EU pressure* to adopt and implement water quality standards, and due to the *Italian State reform* leading to a transfer of relevant functions from the State to the Regions.

Since 1985 there have been efforts towards a more integrated regime due to a growing awareness of the increasing severity of *water problems* generated by excessive resource use, due *to pressure from the EU*, and due to the *changing structure of the Italian administration* (towards decentralization and eventually federalism).

Since the end of the 1980s attempts to integrate started at different levels. An increasing degree of complexity and a higher degree of decentralization (i.e. an increasing number of actors in the water policy arena) are the main elements characterizing a complex regime. The effort towards integration is conflictual, since it reflects the tensions between the empowerment of the Regions and of the local municipalities, which are intrinsic to the Italian State Reform. *Institutional forces* are essentially represented by the empowerment of the Regions and by the leading role played by the European Union. *Social triggers* can be identified with the increasing awareness concerning the environment, water quality and its impact on human health, and the strengthening of environmental movements although their presence in Italy is still quite weak.

5.8 Regime transitions and change triggers in Switzerland

Swiss water policies have mainly developed along three different water issues, resulting in the development of three rather separate policy communities:

1. After several catastrophic floods in the second half of the 19th century, *flood protection* started to be regulated at the level of the Confederation.
2. At the beginning of the 20th century, this was followed by national *legislation on the use of water for energy production*, responding to technological evolution. After the Civil Code of 1912 a concession system was established for the utilization of water for hydropower production.
3. With the emergence of water quality problems in many parts of the country due to growing population density and industrialization, mainly after World War II, *water quality protection* was introduced as a third issue in water policy in the 1950s.

Period 1912-1953

In 1912 the Swiss Civil Code was introduced, which set a unified regulatory system at national level and introduced state property rights to water. Before then, property rights were only regulated at cantonal level.

Period 1953-1975

In 1953 a new article in the Swiss Federal Constitution on the protection of water bodies against pollution was adopted, followed in 1955 by a Federal Law on the Protection of Waters against Pollution. Water quality protection intensified by limitation of wastewater 'discharge rights' as use rights on water.

Period 1975-1991

In 1975 a new article in the Federal Swiss Constitution was adopted, which added a quantity dimension (mainly involving residual flows) to the existing protection of water quality. New restrictions on water uses were added, especially with respect to hydropower production. The article on water resource management prescribes residual flows in watercourses and streams. The 1975 transition is an important turning point, because of the introduction of a principle on the 'unity of water management', which implies that water management should deal with the three sectors of water policy simultaneously. From that time on, restrictions could be placed on uses in the interest of other uses. For instance, the drawing of large quantities of

water for hydropower production could be restricted for reasons of nature conservation or protection of the hydrological cycle.

Period 1991-1997
In 1991 a new Federal Law on the Protection of Waters was adopted, which finally substantiated the principles defined in the constitutional article of 1975. The law offers a framework for the integration of sectoral policies, which opens up the way for a more integrated regime. Water uses (like irrigation and hydropower production) and farming activities as diffuse pollution sources start to be considered as target groups of Swiss water policy. This new federal law also imposes an obligation to maintain suitable residual flows for water bodies. It establishes a series of water protection targets, which also cover the ecological functions of water bodies. Federal regulations set minimum flows and cantons may then establish more detailed regulations, allowing for economic and ecological factors on a case-by-case basis. These requirements apply when new concessions are granted or existing ones are renewed. For existing concessions (often granted for 99 years) there is no minimum flow requirement, even when this would be necessary to preserve or renew biological life of watercourses downstream of abstraction points. Efforts are being made to persuade those concerned to collaborate voluntarily.

Period from 1997 onwards
The 1991 Federal Law on the Protection of Waters was revised in 1997, formally introducing the 'polluter pays principle' into Swiss water policy. Putting this principle into effect represents a major change in Swiss water protection policy.

Triggers
The main triggers behind regime changes in the late 19th and early 20th centuries were natural hazards, which resulted in a *need for central intervention*, due to the fact that several cantons were generally affected by these events. The Civil Code of 1912 was more promoted by a general political evolution of the Swiss Confederation than by a need that specifically arose from water policy itself. Natural hazards (floods in the 19th century) led to correction and drainage works marked by a *very technology-oriented strategy*. The 'use of water' issue had a similar point of departure in the sense that a new technology (hydropower) was powerfully promoted to achieve promising economic gains. All these economically oriented uses, growing in number and intensity, later resulted in a degradation of the resource and provoked the entrance into the policy arena of 'protection oriented' actors and objectives, and related confrontations and conflicts.

Both problem pressure (new uses, pollution, rivalries) and *institutional elements* (like direct democracy) had an impact on regime development. They forced transitions in each of the policy communities, but they did not force integration.

Problem pressure (new uses, pollution, rivalries). Perceived disfunctionalities of the water system politicized water issues, which accelerated the change process. Moreover, this tendency was accentuated by the popular initiative 'To save our waters' in 1984, and by the emergence of local disputes concerning projects involving the exploitation of water. Such disputes were widely reported in the media. There has been a bottom-up pressure created by several popular initiatives. The rights of initiative had an accelerating impact on the change process, whereas the rights of referendum appear to have been used as means to finding concerted solutions (e.g. consensus regarding residual flows before the adoption of the Federal Law on the Protection of Water of 1991). Environmental NGOs became increasingly involved in the process of finding solutions for water-related problems in the 1980s, resulting in an ecologization of water policies.

Direct democracy. The Swiss political system traditionally awards considerable weight to non-public actors through the right of referendum and popular initiative. In 1983 the Federal Law on the Protection of the Environment even introduced a right of objection in case of specific water works. During the 1960s, 1970s and 1980s there was increasing pressure from groups in society to make progress with water quality protection with the help of further subsidies for the construction of wastewater treatment plants. They acted through their representatives and also by means of a popular initiative.

Environmental policy record. Switzerland has a strong commitment to resource protection. The 1991 adoption of a Law on the Protection of Water was preceded and gradually prepared by various political decisions in the field of environmental protection (e.g. the Law on the Protection of the Environment of 1983, which introduced the polluter pays principle as well as planning and co-ordination instruments, and several attempts to establish a more comprehensive view of water management in the context of the 1975 Constitutional amendment).

Administrative structure and co-governance. The main obstacle to integration efforts seems to lie in the traditional Swiss federalist system, which assigns responsibilities for policy implementation in many areas to the cantons. Hence, integration efforts on water basin level require a bottom-up effort from the different cantons within the water basin area. Disposal rights to public waters are in the hands of the different cantons. Water policies are traditionally organized within the framework of the Swiss federalist political system. Although we observe a strong tendency towards centralization of

water policies in favor of the Confederation, the cantons are still mainly responsible for the implementation of these policies by means of their own cantonal legislation. Cantons are essentially responsible for water protection, nature and landscape conservation. Regional planning involves three main administrative levels (municipal land allocation plans, cantons' framework plans, and federal sectoral designs and plans*)*.

EU directives and economic triggers. EU standards are gradually being adopted due to strong economic and trade relations with the EU. Even if Switzerland has not yet become a member of the EU, as a result of strong economic and trade relations with the EU the country is somehow silently and gradually adapting to EU standards and directives. The Swiss national water regime evolution emerged in the context of a movement in the EU towards the integration and ecologization of water management.

Funding needs for water quality protection. Confederation grants to cantons and municipalities have helped to fund considerable investment in wastewater collection and treatment. Water quality has thereby greatly improved. In the 1990s the Confederation fell behind in payments of grants, and municipal funding was inadequate to cover the necessary renovation of existing wastewater collection and treatment facilities. This and other reasons led the Federal Council to include reference to the PPP ("polluter-pays-principle") in the revision of the Water Protection Act enforced in 1997.

5.9 Conclusions

We have seen that all of the six European water regimes described evolved from simple regimes during the 19th and first half of the 20th century to complex regimes after World War II. From the 1950s on the demands for resource use increase strongly and various new use types and use functions are added to the regime extent. This is due to a rapidly growing population and related economic growth, industrialization and urban expansion. In the 1960s we see that an growing attention for natural aspects of water resources was followed by the incorporation of environmental aspects into water management in the 1970s, and ecological aspects in the 1980s. In the 1980s, besides surface water issues, groundwater issues were also getting into the spotlight. Around 1985 we see first attempts towards integrated water management in most countries. However, this does not imply that an integration attempt directly changes the regime of a country from a complex into an integrated one. In fact, we conclude that only France and the Netherlands have developed towards integrated regimes around 1990. The other countries described still have complex regimes in which integration

attempts are not sufficiently coherent and are struggling with regime fragmentation.

5.9.1 Assessment of regime integration

In case of *France* the Water Act of 1992 was a crucial transition, while water basin management had an early start in that country. As early as 1964 the country adopted water legislation which created water agencies at basin scale, recognizing regional variation and the need for specific solutions. Almost thirty years later, in 1992, France adopted another important water act, based on improved integrative thinking, promoting planning, creating local institutions, better addressing environmental issues, for instance by introducing a better application of cost recovery and the polluter pays principle. The French regime is strong in taking account of regional differences by means of innovations in administrative organization and planning. However, a weak point is still that the regime is very much policy driven and that it is reserved in affecting the property rights structure. This appears clearly in case of regulating the agricultural target group.

In the case of the *Netherlands* the transition of 1985, which became effectuated around 1989, is of crucial importance for achieving an integrated regime. Historically, the need to protect the land from high water from rivers and sea, and the tradition of artificially draining low-lying areas, has given the country a complex hydraulic infrastructure. In the 1960s and the 1970s the traditional water engineering approach started to come under fire, which resulted in the adoption of rival water values and the greening of water engineering. From 1985 on ecological aspects of water systems became incorporated in water management, shifting the regime from a complex to an integrated status. Since the early 1990s the country has been involved in a paradigm change to its flood protection approach, trying to store water in retention areas, while maintaining but not expanding the country's infrastructure of dyke fortifications. Especially in flood plains new rivalries have evolved between water use and other land uses. This requires not only integrated water management, but also integration between water and land use management. This is a new integrative challenge for the country, although it initially decreases the coherence of the water regime until that regime has developed mechanisms for a better control over land use rights to protect floodplains.

In the case of *Switzerland* it is remarkable that this country always has been very pro-active in resource protection and water management and tried to harmonize with European standards for water management, but that it did not build up an integrated regime. Although its regime could be highly qualified in terms of its contribution to ecological sustainability, the regime

is fragmented into three persisting policy communities. Switzerland has a (con)federalist system where cantons often function as laboratories for national solutions. The heterogeneous geographical situation leads to very different solutions to water problems. The strong position of the cantons gives room for highly varying resource regimes at regional level, in which the property rights structure appears to be stronger than in most other European countries (except for Spain). At the level of the confederation, Switzerland is somehow silently and gradually adapting to European standards and directives, due to strong economic and trade relations with the EU. However, the country is not easily adopting the river basin approach as advocated by the EU, since its water regime is fragmented and organized according to rivalries. Three important institutional arrangements for water management are identified, which are separated along three traditional issues: flood protection (recognized by 19th century legislation); utilization of water, mainly for hydropower (recognized by early 20th century legislation); water protection (recognized by water quality legislation in the 1950s, and strengthened by additional legislation in 1975 and 1991, which added a quantitative dimension). These three separate policy communities appear to be very persistent and only tend to open up under very heavy pressure. In the 1990s there was great awareness in Switzerland of how crucial water is to the quality of life and how crucial it is to develop an integrated approach. Numerous projects reflect this integrating function. However, water policy has hitherto benefited little from integrated management that takes account of all functions and resource users (e.g. nature, agriculture, energy, land use planning). Long-term water use concessions for hydropower generation very much obstruct ecosystem protection.

In the case of *Belgium* we see that the country performs good integration attempts in the 1990s, but delays a great deal in its implementation of its water policies, especially the one for surface water protection. Compared to the other European countries we described, Belgium has a very poor performance in wastewater treatment. The complicated, drawn-out process of institutional reform in this country is a significant explanation for the delay. Belgium is a federal state with three regions (Flanders, Wallonia and Brussels) which have been rather autonomous in their water management since 1993, when the Belgian state became a full federal state. The Belgian case is interesting in that it shows two regions with different types of regimes. In Flanders water management procedures are more centralized and more subject to central planning, while in Wallonia the local level is much more autonomous and water management is characterized by bottom-up decision making. Neither regional system is sufficiently integrated. The Flemish system lacks participation of local actors, while the Walloon system

is poor in planning. Since the mid-1990s, in both regions much work has been done to create a coherent water management framework of legislation, institutions, policies and plans. New water pricing and wastewater charge and tax systems have been in place since the early 1990s to help finance the investments being made in new sewers and wastewater treatment plants. Industrial pollution discharges have been reduced since then.

In the case of *Spain* we see that the late start of a democratization process in 1978 and the relatively late entrance to the European Community in 1985 are responsible for a delay in water management performance and a late start to environmental policy. Although the country has been very active since the mid-1980s to harmonize with European standards, its water regime is very much focused on dealing with water scarcity for which reason quantity and quality management are still not well integrated. Water scarcity is dominating the agenda for water management. The strategies to deal with water scarcity seem quite diverse and broadly confront those in favor of a supply approach and those in favor of a demand approach. While policies at the national level seem to favor facilitating water supply by means of the construction of large hydraulic projects, transferring water between river basins, there are few experiences in which this traditional approach has been replaced by a new one in which demand control is a guiding principle. Although the 1985 Water Act and the institutionalization of a new environmental ministry in 1996 are clear attempts at resource protection, private property rights and granted long-term concessions still obstruct policies that aim at ecosystem protection. However, the 1985 Water Act and its amendment in 1999 have been attempts to strengthen the public domain, to impose restrictions to the exploitation system, and to achieve more efficiency (demand management). On the other hand, the failed attempts to adopt a National Hydrological plan in 1993 and 1994, and the opposition surrounding the adoption of that plan in 2001, reveal an absence of regime coherence. The National Hydrological Plan of 2001 is firmly based on huge inter-basin transfers of water as a way of redistributing water on Spanish territory. In this way, the plan does not face the scarcity problem by adopting efficiency criteria based on the rationalization of its use and the modernization of irrigation systems, but by constructing large infrastructural projects having an impact on ecosystems at a large scale.

In the case of *Italy* we see that the country, despite its European membership from the beginning, has been very late in the implementation of European water policies in its national water management. Until 1986, it left most responsibility for water management to regional and local authorities. The delayed integrative thinking at the national level, as well as fragmented integration attempts at the national level, are responsible for a complex and still very fragmented national water regime. Water management in Italy is

incoherent due to the fact that it struggles with three competing integration principles which all have been introduced over a period of 15 years. These principles have a different definition of the problem, they assume different constellations of actors involved, and they have different implementation problems. The first integration principle was adopted in 1989. It promotes integration at the scale of river basins, mostly concerned with the quantitative dimension, and managed by a network of water basin authorities. The second principle, adopted in 1994, advocates integration at the scale of the optimum area for water supply and purification, mostly concerned with the establishment of an integrated water service, and therefore with water as a commodity, and managed by a network in which the regional governments and local authorities play a major role. The third principle, adopted in 1999, introduces integration at the scale of the water body, mostly concerned with the qualitative dimension, and managed by a network in which the regional governments and the environmental administration seem to be the key actors. The implementation structure for these three principles is not only too complicated but also too simple. Especially local authorities have too many roles to play simultaneously, which results in an unstable regime, because they have to choose which role to play. Despite this regime fragmentation, Italy has clearly chosen in 1994 to claim the public ownership of all water resources and to set a hierarchy between various uses of water, giving priority to human consumption. By this, environmental and sustainability considerations were explicitly addressed.

5.9.2 Triggers for regime change

We have seen a very mixed picture of factors that have triggered regime changes and attempts towards integration. In all countries *problem pressure* has had an influence on regime changes. In general, sudden events or calamities, like floods or droughts, have been stronger triggers than the gradual degradation of a resource, like surface or groundwater pollution. It also matters which user or use function is affected by problem pressure. It seems that problem pressure as a trigger is stronger if it affects the general population (like public health) or some economic use or user (like agriculture). If problem pressure is a matter of loss of natural values or deterioration of ecosystems and economically strong rival uses or use functions are at stake (like hydropower generation or agricultural irrigation or drainage), it seems that problem pressure has less effect on regime change. So, problem pressure is related to a specific use or use function of a water resource, and it depends on the balance between countervailing powers within a rivalry to what extent problem pressure affects a regime.

International agreements and *European water policy* also appear to have some effect on regime change in all countries. However, the extent to which it has influence depends on other country specific circumstances. For instance, if we consider the early European directives on surface water quality, we see an enormous variation among countries in terms of implementation performance. Countries like Belgium and Italy, although they are founding fathers of the European Community, are much delayed with respect to wastewater treatment. In this context, it is remarkable that the EU Member States which are performing better on wastewater treatment (France, Netherlands) have much earlier adopted the polluter pays principle and the principle of full cost recovery. This allowed them to generate financial means for the construction and operation of wastewater treatment plants, and thus to fund implementation. The Netherlands has applied the principle of full cost recovery from 1970 on. France raised charges considerably in 1992, which importantly increased the wastewater treatment performance. Switzerland, on the other hand, has lately adopted and applied both principles (in 1997), but from the beginning it has invested a lot in wastewater treatment with contributions from general budgets. Countries like Belgium, Italy and Spain (which entered the EC much later, in 1985), have not done this. The EU Urban Waste Water Directive of 1991 had much more impact on the EU Member States in the sense that it has induced a speed up of investments in wastewater treatment in all countries. The Nitrate Directive on Groundwater (1991) is also an example of an EU directive with considerable impact on the Member States, especially the ones with intensive agriculture and fertilizer applications on agricultural soils (Netherlands and Belgium). It has induced these countries to adopt and speed up the implementation of agricultural pollution regulations.

All country reports mention the importance of political triggers, especially *democratization and participation developments*, and the role played by *environmental and nature conservation NGOs*. In the Netherlands water management started to become politicized in the 1960s, resulting in a paradigm change of the traditional engineering approach adopted by the state water authority and the regional water boards. In Belgium environmental groups became influential in the 1990s, especially after the Declaration of Rio in 1992 and the participation of green parties in the national cabinet in 1999. In the Netherlands, Belgium, and France, planning has been an instrument to allow participation of new users and to deal with rivalries. In the Netherlands and France participation of users is institutionalized in water boards and river basin committees, to which they may elect representatives. The country report on Spain reports the entrance of environmental NGOs in the policy arena in the 1990s, in combination with the creation of a new environmental ministry in 1996. When a plurality of interests enters the

policy arena, it openly clashes with the traditional approaches of water policy. This is especially a clash between the traditional approach of supply management and interbasin transfers versus the approach stressing the importance of demand management. In the country report on Italy, an increasing importance of environmentalists is reported, although their role in Italy is still quite minor. In Switzerland, the political system traditionally affords considerable weight to non-public actors through the right of referendum and popular initiative (direct democracy). During the 1960s, 1970s and 1980s there has been increasing pressure from groups in society to make progress with water quality protection with the help of further subsidies for the construction of wastewater treatment plants.

The country reports also mention the importance of institutional triggers, especially the *role of an environmental ministry*, and the *dedication of the national government to environmental issues and protective interests*. The Netherlands, Belgium, France and Switzerland all established an environmental ministry around 1970, while Italy established one in 1986 and Spain in 1996. In the case of Belgium, however, environmental policy was delegated to the regions in 1980. Institutional reform has delayed the effective operation of environmental departments in the Belgian regions. In case of Spain, it also had a kind of environmental department before 1996, albeit a rather fragmented one. For the Netherlands, France and Switzerland it seems that the active role of a national environmental ministry has been important for the dedication of the national government to environmental issues and protective interests. In case of Belgium, Italy and Spain the country reports mention that the entrance of an environmental ministry into the water policy arena has triggered regime change in terms of the recognition of environmental and ecological aspects of water systems.

Related to the role of an environmental ministry is the extent to which a country has developed *integrative capacity at the national level* for water management. In the cases of the Netherlands and France we have seen that they have centralized water management to a large extent and created an influential role for the national level. In the case of Belgium we have seen a lack of co-ordination at the national level, and gridlock in water management due to institutional reform. Since the process of regionalization was completed in 1993, the regions started to develop integrative capacity on their own. In the case of Spain we see incoherence in the national water regime due to intervention of the national authorities in the water regimes of the autonomous regions. While the regionalization process, started in 1978, allowed regions to develop their own integrative capacity to deal with water management, the National Hydrological Plan of 2001 allows interbasin transfers between regions, thereby resisting sustainability arguments of some affected autonomous regions. In Italy we noticed that due to a void at the

national level, which existed until 1986, water management as well as the implementation of European water policy was left to regional and local authorities. Only after 1986, with the birth of the Ministry for Environment and the subsequent creation of national and regional environmental agencies, there has been an attempt to create a national dimension in water quality policy. But the EU on the one hand and the regions on the other had already occupied most of the policy space. The national attempts towards integration (1989, 1994, 1999) are incoherent, since they reflect the tensions between the empowerment of the regions and of the local municipalities which are intrinsic to the Italian state reform. Also in Switzerland, the main obstacle to integration efforts seems to lie in the traditional Swiss federalist system which assigns responsibilities for policy implementation in many areas to the cantons. To conclude, it seems that the Netherlands and France have developed a more coherent institutional structure for *co-governance between central and regional authorities* in dealing with water management, in the sense that a strong integrative capacity is organized at the central level while setting the frame for water management at the regional level. It seems to be crucial that national authorities do make strategic use of decentral organizations at water basin level (like the Water Boards in the Netherlands and the River basin Committees and Water Agencies in France), which deal with all aspects of water management and not only with quantity or quality issues (like the Drainage Basin Authorities in Spain, which are only dealing with water distribution, or the separate decentral institutions which Italy created for quantity management in 1989 and quality management in 1999).

5.9.3 Restraints on regime change

We also find triggers in the various countries which have a negative impact on regime change. In fact these are restraints on regime change. In the Belgian and Italian reports, *institutional reform* has been identified as such a restraint. In Belgium the process of federalization has importantly restrained regime developments during the period from 1970 until 1993. In Italy a process of decentralization started with the creation of regions in 1972. Since then the regions as well as local authorities have been gradually empowered. However, until now, there have been continuously tensions between the empowerment of the regions and of the local authorities, which seems to be intrinsic to the Italian State Reform.

Another restraint on regime change, which has been mentioned in the country reports on Spain and Switzerland, are *private property rights and long-term water use concessions*. In case of Spain, there have been several attempts (especially by means of the 1985 Water Act) to eliminate private property rights on water resources and to advance the expiration date of such

rights and of water use concessions. Since these attempts had a limited effect, the 1999 amendment of the 1985 Water Act introduced a water market in the sense that concession holders may sell their surplus to other concession holders in order to achieve more efficiency. In Switzerland, too, the property rights structure is very strong and a source of resistance to regime change. Water use concessions for hydropower generation have been granted for very long periods of up to 99 years. Many of them can only be amended voluntarily. By contrast, we see in countries with a stronger developed public domain (Netherlands, Belgium, France, and Italy since 1994) that private property rights and concessions are much less a restraint.

Finally, there is a restraint mentioned in all country reports. This is the restraint of a *traditional engineering approach* in water management, resulting in artificial solutions for water resource problems and, by that, generating other resource problems. For instance, engineered systems for irrigation and drainage lead to improvement for specific purposes, but they also cause water depletion and disrupted ecosystems of watercourses. In Spain we see that the very uneven seasonal and geographical distribution of water supply and demand has led to the construction of an extensive water storage and redistribution infrastructure. In the Netherlands, we see that the need to protect the land from high water and the tradition of artificially draining low-lying areas have given the country a complex hydraulic infrastructure. The flow and level of almost every water system in the country is artificially controlled. In many countries we see that the traditional approach to providing flood protection has been strongly biased in favor of providing engineered measures (embankments, canalization, and so on) to keep floodwaters away from human settlements.

5.9.4 Highly complex institutional regimes struggling with fragmentation

We have considered institutional sustainability in terms of the extent and coherence of resource regimes. A combination of high extent and high coherence indicates an integrated resource regime. We concluded that all the national resource regimes we considered have been evolving towards an integrated regime from the 1980s on. France and the Netherlands have established the most integrated regimes. The regimes of the other countries should be typified as complex regimes (high extent but low or medium coherence). However, all these countries (including France and the Netherlands) struggle with complexity and all suffer to various degrees from fragmentation. So we might better conclude that the French and Dutch

regimes are less fragmented than the others[7]. With respect to coherence, we distinguish between the external coherence of public policies and property rights, and the internal coherence of the property rights subsystem and the public policy subsystem - each considered separately. The French and Dutch regimes in particular are integrated in terms of a high internal coherence of the public policy subsystem. They are still struggling to improve the external coherence between their public policies and existing property rights. Although both countries have developed a strong public domain (in 1992 water became a 'res nullius' in the Netherlands and France proclaimed water an object of national heritage, which could be interpreted as proclaiming that it is 'state property'), they still have problems with effectuating use rights that interfere with the policy objectives of water management (for instance, land use rights in floodplains in the Netherlands, and agricultural water use rights in France). Countries like Italy and Spain have formally proclaimed that waters are public and belong to the public domain (Italy in 1994; Spain in 1985), but Italy suffers from a low internal coherence of its public policy subsystem, while Spain has not been able to eliminate pre-existing private property rights over water. Furthermore, the long term character of Spanish water use concessions and the way inter-basin transfers are allowed are detrimental to the public good claim on water resources. The Spanish regime therefore suffers from external incoherence between property rights and public policies, as well as incoherence within the property rights subsystem. In the case of Switzerland, the country also has developed a strong public domain, but the national regime suffers from internal incoherence of the public policy subsystem (based on three separated policy communities) and from external incoherence between federal policies and the rigid property rights structure which is strongly in favor of protecting disposition rights by the cantons and existing concessions for hydropower generation. In Belgium the picture is mixed due to the autonomy that the regions possess to develop their own water regime. The regime in Wallonia seems to be more public policy driven, while the regime in Flanders is more property rights driven. Belgium especially suffers from a relatively slow development of extent, which appears especially from the late recognition that surface water protection policies had to be effectively implemented. This is especially due to the process of institutional reform (federalization) which enforced a severe delay on the evolution of the Belgian water regimes.

[7] Young (1982) advocates "not to promote coherence as a normative criterion for the evaluation of resource regimes. But the common occurrence of incoherence in this realm suggests that it is important not to rely too heavily on neat analytic constructs in interpreting real-world situations and that we must learn to think about the implications of contradictions in examining resource regimes." (Young 1982: 53)

In all six countries we noticed in general a strongly increasing complexity of bundles of property rights and a strongly evolving public domain in terms of a communalization of water ownership and use rights. Young (1982) has already explained that "though private property is often regarded as sacred, the rights of private owners have been significantly curtailed in many areas through the actions of public authorities, and the power of eminent domain is regularly used to take private property for public purposes in the absence of voluntary consent" (Young 1982: 24). He indicated that "there has been some tendency for these restrictions to become more extensive in modernized and densely populated societies" (Young, 1982: 21). We should also notice that in Western European countries, even in the early 19th century, water resources and the benefits they could generate were never entirely subject to private property. There have always been restrictions on private ownership and private use rights by the legal definition of some public domain. However, during the 20th century, and especially after World War II, an increasing nationalization or communalization of water resources could be perceived, in spite of the ownership arrangement. States are increasingly controlling the access to water resources and are allowing more and more users to claim some form of access. Since the 1970s, new forms of access are especially being given to recreational, environmental and ecological use functions of water bodies. On the other hand, in terms of restricting private use rights, it still appears to be difficult for Western European states to get a grip on water use rights that cause diffuse water pollution or water depletion, and on land use rights in floodplains that indirectly contribute to problems of flooding as well as droughts. So the public domain of these countries is still weak in terms of restricting private property in these aspects, and thus national regimes are weak on external coherence in this respect.

Considering the public policy subsystem of resource regimes and its internal coherence, we distinguished five dimensions of governance (1. multi-level; 2. multi-actor; 3. multi-perspective; 4. multi-instrument; 5. multi-resource). With respect to the multi-level dimension we may conclude that most countries are struggling to develop an effective structure for co-governance between the various administrative levels involved in water management. The French and Dutch structures are the most elaborate; Belgium has set its final structure just recently (1993); Spain is struggling with interventions in the autonomous regions from the central level (inter-basin transfers); Italy is weak on providing integration from the central level; Switzerland is struggling with incoherence between federal attempts to integrate and a strong cantonal autonomy, on which the implementation of federal initiatives depends completely. With respect to the multi-actor dimension, we see in all countries an increased participation of new users,

environmental NGOs, and the general public in water issues. However, the degree to which this participation is institutionalized varies a great deal among the countries: participation is more institutionalized in the Netherlands, France and Switzerland than it is in Belgium, Spain and Italy. With respect to the multi-perspective dimension we conclude that all countries are rather similar in the evolution of extent. Although there are great ambitions for water management in all countries, the effectiveness of this ambition very much depends on the two dimensions related to the availability of policy instruments and resources for implementation. With respect to the multi-instrument dimension and considering the adoption of integrated water legislation as an important indicator, we see that the Netherlands and France have adopted such streamlined legislation, considering the resource as an integral one (in terms of quantity, quality, surface and groundwater, as well as the ecological aspects of the water system) in 1989 (Netherlands) and 1992 (France). Italy and Switzerland show attempts at integrated legislation in 1989 (Italy) and 1992 (Switzerland). Although these attempts have an integral appearance, they are based on an incomplete integral approach. Belgium and Spain have not yet developed integrated legislation. With respect to the multi-resource dimension we conclude that countries show a huge variation. The availability of resources for implementation partly depends on the creation of an effective structure for co-governance between the various administrative levels. It also depends significantly on the availability of money for implementation, important indicators of which are the public expenditure per capita on water management and the application of full cost recovery of water services. We noticed that the Netherlands, France and Switzerland have a much greater public expenditure and have more strictly applied the full cost recovery principle than Belgium, Spain and Italy.

To summarize the evolution of national water regimes: property rights on water resources have developed into more complex bundles of rights, especially from the 1950s on. According to Young (1982: 29): “Sometimes these problems can be handled through the simple expedient of adopting priority rules among individual rights and rules, indicating which right or rule is to prevail in the event of a conflict. But the existence of this problem also constitutes one of the principal arguments for the establishment of explicit organizations in conjunction with many resource regimes.” The need for co-ordination increased. A public domain evolved in which public authorities are restricting private use rights to guarantee access by rival users and to protect use functions of water resources (especially environmental and ecological functions) which are not very well represented by specific target groups. Despite the fact that a strong public domain is in place, this

domain still has problems with getting a grip on specific private use rights when certain activities cause diffuse pollution, when economic activities require water uses, and the problem of land use in floodplains. Furthermore, the public domain is struggling with incoherencies in the public policy subsystem of the regime. Young (1982: 61) has already warned that "the introduction of explicit organizations opens up an additional range of issues pertaining to the operation of resource regimes." Aspects that especially deserve attention are an effective, multi-level organization of water management (in terms of co-governance between central and decentral authorities), institutionalization of participation opportunities for rival users, developing integrated legislation, and creating sufficient resources for implementation in terms of public expenditure and based on full cost recovery of water services.

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Chapter 6

The transition of local regimes in the Netherlands

6.1 Introduction

The Netherlands is a relatively small, crowded country, located in the delta of three European river basins: the Rhine, the Meuse and the Scheldt. The country depends very much on transboundary inflows. Not only in terms of water quality and its vulnerability to upstream pollution sources, but also considering the country's dependence on over 75% of its total water resources coming from rivers abroad. Over 30% of the total surface area of the Netherlands lies below sea level, protected from the sea in the west and north by barriers of dunes and dykes. As much as 50% of the country's area is vulnerable to flooding from the sea or rivers. The Netherlands has a population of about 16 million inhabitants, an average of 470 inhabitants per km^2, giving it one of the highest population densities in the world. The highest concentrations are in the low-lying urban areas in the west of the country, which is the urbanized area including cities like Amsterdam, Rotterdam, The Hague and Utrecht. All Dutch urban areas together cover about 14% of the country's total surface. More than 50% of the country's area is agricultural land, and about 17% is water. Through Dutch history, there always has been a tension between urban, economic and agricultural development on the one hand, and the space naturally claimed by water in a delta area on the other. The need to protect the land from high water from rivers and sea, and the tradition of artificially draining low-lying areas, have given the country a complex hydraulic infrastructure. Through the ages the flow and level of almost every water body in the country have been subject to human control.

Although the Netherlands is internationally appreciated for its great expertise in water engineering solutions, the country also struggled with critics from various groups in society on the predominant civil engineering orientation in Dutch water management. In fact these criticisms, which started to find expression in the 1960s and 1970s, politicized water management and initiated a debate in society on water values. The critics

placed a greater value on the meaning of 'open' water for recreation, nature conservation, water storage, and the experience of unspoiled space in an already crowded and highly planned country. The intensification of agriculture since the 1950s and the related canalization of natural water courses and deterioration of landscape were also increasingly criticized. These criticisms resulted in a gradual greening of water engineering. In the 1980s, nature conservation and ecosystem protection became focal points of water management. The focus changed not only at the national level, where the state water authority [Rijkswaterstaat] takes responsibility for the main water bodies throughout the country, but also at the regional level, where for many centuries water boards [waterschappen] have been responsible for regional water management. The predominant focus of water boards on drainage for agricultural and urban development turned into an integral water system approach, combining quality and quantity aspects of water management, acknowledging the interrelatedness of surface and groundwater, and taking into account the value of water for the surrounding ecosystem (Grijns & Wisserhof 1992; Snijdelaar 1993; Disco 1998).

During the 1990s the Dutch scope of water management widened even further. River floods in 1992 and 1995 and high water in 1998, causing large scale evacuations of inhabitants and enormous damage to property, triggered the awareness that the Dutch hydraulic infrastructure is facing increasing problems in keeping high water under control. Although climate change causes a rising sea level and higher rainfall peaks, which strengthens the dynamics of river basins, it is especially human interventions in river basins that have caused an enormous loss of space which is needed to store excessive quantities of water. Land use decisions of the past have taken insufficient into account that a delta area cannot completely rely on artificial control of water levels, and therefore needs space along rivers to allow river levels rise and fall in a more natural way. Water management has always served land use decision making, but now it should be the other way around: land use planning should consider water as a guiding principle for decision making. Nowadays, the challenge faced by the Netherlands is to harbor water in a crowded delta area (Commissie WB21).

In section 6.2 of this chapter we consider the most important transitions towards integration in national water management during the past decades. In the following sections we question what has been the practice of integrated water management in two water basins as cases. Section 6.3 is about the IJsselmeer area in the heart of the Netherlands, an area where an interesting variety of water management dilemmas is revealed. Water management in this area is directed by the state water authority, although decentral water authorities are becoming increasingly influential. Section 6.4

is about the Regge river basin in the east of the Netherlands, a case which is considered to be one of the earliest examples of integrated water management at the regional level. Water management in this river basin is dominated by a regional water authority (water board), called 'Waterschap Regge en Dinkel'. In section 6.5 we discuss the conditions under which water basin regimes could become more integrated. What could be the influence of national and European conditions in achieving regime transitions at water basin scale? We also discuss the difficulties that integration attempts are facing and how easily integration might turn into fragmentation. The chapter ends with a concluding section.

6.2 Transitions towards integration in the national water regime

We are interested in transformation processes of water basin regimes, especially how they transform from complex into integrated regimes. In the case of the Netherlands such a transformation process started in the 1960s, with important transitions in the national water regime around 1968/69, 1985 and 1995. We shall consider these three transitions more closely to determine what kind of integration has been achieved. We use the indicators for integration as they are defined in this book, which means we look at the increase of extent and coherence. Although the identification of transitional moments is based on the appearance of important integration attempts at the national level in that year, we are aware that such attempts are part of a longer transformation process which generally started several years before and also continues for a few years after the identified transitional moment. For each transition, therefore, we describe the multi-year transformation process in which it is embedded.

6.2.1 The 1968 and 1969 transition

Until the 1950s the Dutch national water regime had little complexity. Water management was mainly a matter of flood prevention and water level control. During the 1950s and 1960s the complexity increased, and at the end of the 1960s first attempts at integrated water management could be perceived. These attempts included the adoption of a first National Water Policy Plan in 1968 and the adoption of a Surface Water Pollution Act in 1969. The water quantity oriented policy plan not only focused on flood protection and drainage (water security), but also on water scarcity and the rival demands of water supply, agriculture and navigation. The Surface Water Pollution Act involved the quantity oriented water managers in active

and passive water quality management. This means that they not only had to construct and to operate waste water treatment plants (active quality management), but also to work on the prevention of surface water pollution by means of permits and charges for waste water discharges (passive quality management). Water demand control and water quality protection thus became an additional focus of water managers (Grijns & Wisserhof 1992).

The 1968 transition with respect to water demand control forms part of a transformation process which had already started in the 1950s. After World War II and a period of economic recovery in the 1950s, concerns were raised about how to meet the demands for natural resources (water, space, nature), needed by a growing economy and a growing population, which was also demanding a higher living standard. In that context, a Groundwater Act for Water Supply Companies was passed in 1954 to better guarantee a constant and undisturbed water supply. In 1962 a Physical Planning Act was adopted, allowing expropriation of land (for instance to the benefit of water drainage as a public service), and introducing disadvantage compensation for the effects of public planning on private property. In 1963 a Fisheries Act was introduced to prevent over-catching and to generate a more efficient fisheries industry. The Clearances Act [Ontgrondingwet] of 1965 and the Nature Conservation Act of 1967 were the start of the protection of nature and landscape resources against rival water and land uses. As a result, the 1950s and 1960s are characterized by controlled use expansion, a debate on public versus private interests, and redistribution of property rights (Van Hall, 1992). This was reflected in the first national water plan of 1968, since it mainly focused on how to meet the future demands of an increasing population and how to prevent rivalries related to water resources. The plan clearly recognized problems of groundwater scarcity and the need for demand-side management (Snijdelaar 1993).

The 1969 transition with respect to water quality protection is also part of a transformation process which had already started in the 1950s. It has been a transformation from sanitation to quality protection. Sanitation was a focus of water management since the early 20th century, when sewage and supply systems started to be constructed as public services, mainly at municipal scale. After World War II the infrastructure for sewage and water supply gradually expanded into rural areas. Meanwhile the awareness was growing that sanitation measures would not be enough, and that something should be done about the increasing pollution of water resources, related to the expansion of economic activities after World War II. In the 1950s and early 1960s, many water boards and municipalities became active in the preliminary construction of waste water treatment plants, to prevent direct discharges of untreated sewage into surface waters. However, water boards and municipalities were insufficiently equipped to handle this in a systematic

way. Initiatives were mostly restricted to areas with a high concentration of inhabitants and industrial activities. This changed around 1970, when many European countries, on the basis of international agreements, adopted legislation to protect surface water quality, which the Netherlands did in 1969. The content of such legislation varied greatly among European countries at that time. The Dutch Surface Water Pollution Act includes a system of permits to regulate industrial waste water discharges and a charge system with strong incentives based on the polluter-pays principle as well as the principle of full cost recovery. The costs of construction, operation and maintenance of wastewater treatment plants were to be fully recovered from the polluters, and equivalent to the amount of pollution they emitted. The charge system applies to both industrial and domestic polluters (Leemhuis-Stout 1992).

Although the institutionalization of water quality management has been an important step towards integrated water management, it did not involve a direct integration between water quality and quantity management. Initially water quality management was established as a sectoral water policy, with its own separate water planning. In 1975, 1980 and 1985 the Dutch environmental department introduced sectoral plans for water quality protection, while in 1968 and 1984 sectoral policy documents for water quantity issues were presented by the water department (Snijdelaar 1993). While the Ministry for the Environment coordinated water quality issues, other water issues were controlled by the Ministry of Transport, Public Works and Water Management. In other words, the period from 1969 until at least 1985 could also be characterized as a period of increasing complexity and fragmentation.

6.2.2 The 1985 transition

A second important transition occurred around 1985 when the Dutch national water ministry issued a policy discussion paper on ‘integrated water management’ as a new approach for water managers. This advocated considering water as a system in which surface water and groundwater are interconnected. The new approach would be not only to integrate quantity and quality aspects of the water system, but to also take account of the system’s ecology. In fact, the second transition has been a crucial step in implementing a water basin approach which allows ecological considerations to enter water management decision making (Grijns & Wisserhof 1992). The policy vision of 1985 was formalized as the Third Integral Water Policy Plan of 1988, prefaced by the Second Sectoral Water Policy Plan of 1984. The second policy plan recognized water depletion due to over-drainage as a major problem for water management. It also

advocated integration between surface water and groundwater quantity management, but did not include quality aspects (Snijdelaar 1993). Generally speaking, the 1985 transition was triggered by a general growing environmental and ecological awareness in society, as well as by a deregulation and integration tendency in politics in the early 1980s, resulting in a political demand for more co-ordination by means of policy planning. The same developments are clearly visible in Dutch environmental politics of the 1980s, culminating in the National Environmental Policy Plan of 1989, which was the first Dutch policy plan that intended to coordinate all sectoral environmental policies at the national level. Another important change in the 1980s was the Constitutional revision of 1983, which proclaimed that the public domain should be dedicated to the protection and sustainable improvement of the living environment, including the natural water system. The newly added Article 21 of the Constitution provided a fundamental title for expropriation of all property rights which could harm the protection of the living environment. Besides these more general triggers, there ware several more specific contexts in the water policy field in which the 1985 transition is embedded and which we explain further below.

After the extension of Dutch water management into the field of quality protection of surface water in the 1960s and 1970s, the 1980s became an important decade for the institutionalization of groundwater management in the Netherlands. In 1981 a Groundwater Act was adopted to further regulate extractions of groundwater, not just extractions by water supply companies, like the previous Groundwater Act of 1954. While the Act of 1954 aimed to better serve public supplies, the Act of 1981 intended more to redistribute extraction rights among all users with extractions above 100,000 m^3, by creating a concession system. An important change introduced by the Groundwater Act of 1981 is that it proclaimed that the interest of public supply could no longer dominate the deliberation of interests. The Groundwater Act of 1981 should be considered an act that deals with water distribution, and not as an act that deals with water level management to prevent water depletion. For that goal, another act has been adopted in 1989, called the Water Management Act. This act introduced instruments for the level control of surface and ground waters, which could restrict all use rights affecting water tables, not only to prevent water depletion, but also to protect ecosystems. In fact, the Water Management Act has been the vehicle for the regional water boards, on the basis of which they could also use their ordinances for the regulation of water uses to protect the natural and ecological values of water systems (IJff 1993; Teeuwen et al. 1993). It has been decided that ecological considerations are in the interest of the general public, and therefore the general public should have seats and be represented on the water boards. Since the charging system administered by the water

boards is based on a 'profit-payment-participation' principle, the extended approach also implies that citizens should bear a certain share of the total costs of water management.

With respect to groundwater, not only its quantity aspects started to be regulated in the 1980s, but also its quality. In 1986, a Soil Protection Act was adopted to prevent, limit, and remediate changes in soil properties, especially applied to prevent agricultural contamination of ground and surface water. This resulted in the limitation of farming practice rights to protect groundwater, by means of standards for the application of animal and artificial fertilizers on soils. During the 1990s, the restriction of farming practice rights has gradually become more stringent, importantly induced by the EU Nitrate Directive for Groundwater.

Due to the rising influence of ecological and environmental considerations in Dutch water management during the 1980s, the need for interpolicy cooperation between water policy, environmental policy, nature conservation and agricultural policy increased greatly during that period. While sectoral policy plans for water, environment, nature and land use have become more integrated on their own during the 1980s, the integration between these policy sectors appeared to be very difficult. For instance, this has been very visible in the case of groundwater protection plans which are formally dealt with as part of environmental policy planning rather than water management planning, from which they are excluded for reasons of demarcation competency.

6.2.3 The 1995 transition

In 1995 the Dutch authorities fundamentally changed their traditional approach to river management and flood protection based on construction of dyke fortifications along the river banks. Triggered by serious river floods in 1993 and 1995, ascribed to climate change, a new policy document (entitled 'Space for Water') was presented in 1995, which stressed the need to integrate water management with land use planning. The document advocated the better anticipation at climate change by creating more space along river banks for water retention as a means for natural flood protection, in contrast to artificial protection by means of dyke fortifications. The Netherlands should be regarded as a delta area in a European setting. This new approach fits well with the water basin approach of 1985, since retention areas are a chance for natural and ecological restoration of water systems. Moreover, retention areas could help to replenish groundwater stocks in order to prevent water depletion in dry periods. So in fact, the 1995 transition has not only been triggered by river floods in the early 1990s, but also by the international alarm over climate change, the problem pressure of

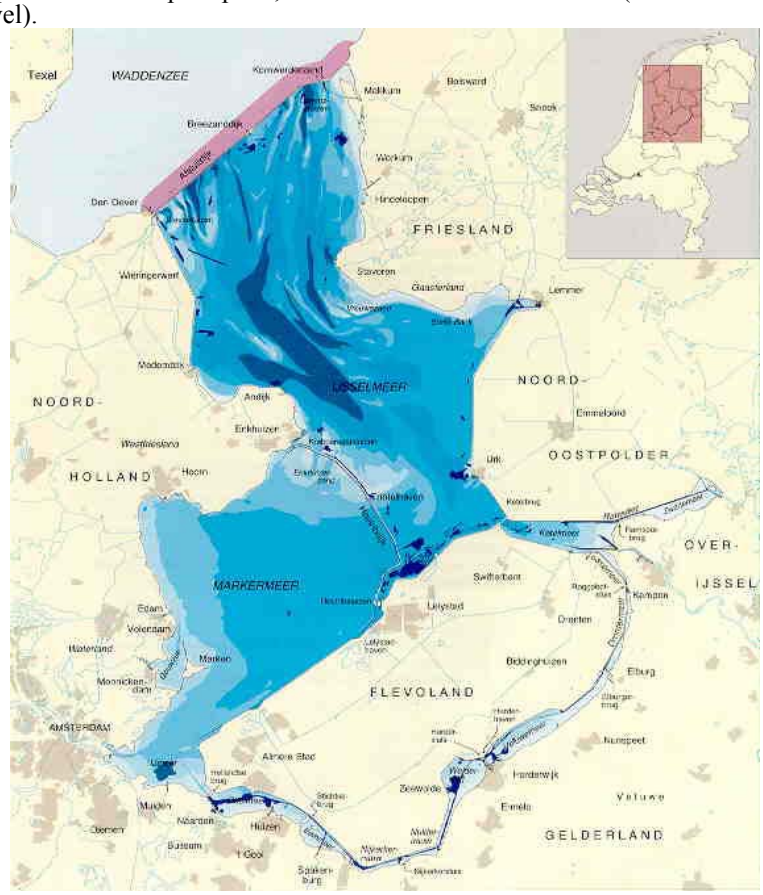
water depletion, as well as the preference to restore the natural flow of rivers and valuable ecosystems along the river banks. Like the 1985 transition, the policy document of 1995 was formalized by a Fourth Integral Water Policy Plan in 1998. Compared to the previous policy plan of 1988, this plan focused especially on climate change and on the restoration of the natural dynamics of water systems. It advocated regarding water and its natural movements as the key determining factor in spatial planning. It also emphasized the value of water in terms of open, unspoiled landscape (Hofstra 1999). In 2000, a state commission on Water Management in the 21st Century recommended creating extra titles for expropriation of flood plains and for limitation of land use rights in flood plains. The commission also recommended dividing the liability for flood damage among the national water authority, regional water authorities and private property owners. Water boards could avoid such liability by developing sufficient areas for water retention, based on a system of safety standards which determines what the storage capacity in a region should be (Commissie WB21).

Although the 1990s have witnessed many attempts at integral river management and development of sustainable river basins, the policy sectors of water management and spatial planning are still rather separate. This renders decision making difficult, especially at the level of the water boards and municipalities, where the former have an interest in considering water as a guiding principle in spatial planning and leaving areas unbuilt if a risk of inundation exists, while the latter have a final say in spatial planning and have an interest in economic and urban expansion within their geographical boundaries. The coherence between water management and land use planning might increase as soon as the intended titles for expropriation of flood plains and for limitation of land use rights in flood plains go into effect.

6.3 The IJsselmeer: nurturing nature in an artificial lake

The IJsselmeer, with its size of 2,000 square kilometers and 600 kilometers of shore-line, is one of the largest freshwater lakes on the European continent (see Figure 6.1). For the greater part of modern history the lake was actually a sea that was directly connected to the North Sea and regularly plagued the Dutch shores. This sea was tamed in the first decades of the 20th century with the help of a 30-kilometer long closure dam (‘afsluitdijk’ - see Figure 6.1), which created the current artificial lake. The lake was named after the IJssel, which is the Northern branch of the Rhine and the river that feeds the lake.

Figure 6.1 The IJsselmeer area. The different shades of gray in the lake indicate depth. At the deepest parts, this is 7 meters below NAP (the Amsterdam datum level).



The plan to ‘tame’ the sea was so ambitious that it actually took a few decades to devise it, then another few decades to gain political acceptance, and then again decades to actually implement it. Besides a closure dam, the plan also included the creation of new land by turning parts of the lake into ‘polders’, to be used for agriculture and to increase safety by shortening the shoreline. Resistance to the plans had been great. Improved technology, food shortages in World War I, and an enormous flood in 1916 pushed aside concerns. From 1918 until well into the 1980s, subsequent Dutch governments remained committed to the project. However, from the early 1970s onwards, the plans that had been approved in 1918 started being seriously questioned. They were de facto abandoned by the government after fifteen years of public debate. Subsection 6.3.1 describes how this came about. Rather than being perceived as ‘not yet reclaimed land’, the lake came

to be increasingly appreciated as a natural area with great value. In separate subsections we discuss two rivalries that have emerged since then: the rivalry between gas drilling and drinking water exploitation (6.3.2), and the rivalry between nature and recreation (6.3.3). Important as background to all these rivalries, however, is the discussion on the poldering plans, which became very intense in the 1980s, and the wrestling match between various authorities that has taken place since then.

6.3.1 The end of the polder plans. Coming to grips with the new situation

The plan to conquer the sea and to create the IJsselmeer was embedded in an act of Parliament of 1918. This act furnished both financial means and created an organization that became known as ZZW (Dienst Zuiderzeewerken) and it controlled the area for decades to come. In its operations of poldering the lake, the ZZW worked closely with an organization called RIJP ('Rijksdienst IJsselmeerpolders'), which was responsible for landscaping the newly created polders and making them fit for agriculture and inhabitation. The agenda of the organizations that worked on the project remained largely the same throughout the period 1918-1970. The project had initially been opposed by various government departments, including the Ministry of Finance, but this resistance waned after 1918.

Outside the government, the plans had been resisted by the fishermen that used the sea as fishing grounds. Their resistance was consequential as their economic significance was only moderate, and their claim to fishing rights was rejected. The latter is interesting from the perspective of ownership of the lake. Even though fishermen were obliged to hold a license to fish the sea since 1905, Parliament refused to hear their arguments that (a) they had vested rights to fish, and (b) that these rights prohibited the project. In the view of Parliament, the sea was collective property under the control of the state. The fact that the fishermen would suffer from the project was considered a 'normal entrepreneurial risk'. The act of 1918 did contain a promise to the fishermen that they would be helped to overcome the damage to their operations, but little financial compensation. Fishermen were offered re-education and also fishing rights in the newly created lake, which appeared useless at that time. The profound meaning of the 1918 act and the deliberations in Parliament was that public ownership of the lake was established.

It was only after the creation of the closure dam and the first polders that the first interest in the natural and recreational value of the IJsselmeer came

about. Working with ZZW and RIJP in a committee, environmental and recreational interests started influencing the actual landscaping of the polders. Instead of a long, straight coastline, the newer polders became more curved in shape, which was more interesting to see from sailing boats. Small islands for recreation were created. The gradient of the coast became less steep so that a richer bird life would become possible.

The 'second' wave of environmentalists, which arrived in the 1960s, was in many ways much more radical than the first wave. They took relatively little interest in the debate on the new polders, but this changed when the last polder (Markerwaard) that was yet to be constructed started being mentioned as a potential site for a second national airport. This was in itself related to a change in leadership at the ministry that oversaw ZZW, the Ministry of Transport and Public Works. The new Minister was an adept at social cost benefit analysis and had demanded a review of the polder plans. This decision had pressed ZZW in the direction of mentioning various possible beneficial uses of the last polder, among them an airport. Although ZZW succeeded in constructing the image of an economically worthwhile undertaking in its cost benefit analysis report, the agency lost precious time. In 1974, the government of the day announced an ambitious push towards national land use plans in 1974. The belief in planning was at its height, as was the discontent with the unstructured way land use decisions were being taken at the time. The Cabinet decided to introduce land use plans at a national scale, to be developed in highly participatory fashion. Added to this decision was a list of issues for which national plans had to be made. Among them was the plan to construct the Markerwaard polder and build an airport on it. The decision of the Cabinet had grave consequences for ZZW, in the sense that the water managers did not control 'their' project anymore, that the poldering project had to be discussed in land use terms, and that opponents now had a ready pathway to official decision procedures.

Even though the airport and the polder discussions were decoupled fairly soon, the polder discussion under the land use planning regime continued, with fierce criticism from opponents about the way ZZW advanced its course. The Cabinet of 1980 initiated the final phase of the discussion with a decision to actually construct the polder. However, the resolve to actually implement this discussion lessened quickly as time progressed and finally dissolved in 1991. The main driver for this decline of resolution was a fear of the enormous costs related to the project. A group of private parties made a bid to construct the polder in the mid-1980s, but this group withdrew when government insisted on a payment for the land 'under the lake'. Even though the 1991 cabinet decision formally ended the desire to polder the lake, the

old reflex of planning development 'in the lake' (in practice this means that smaller parts of the lake need to be poldered) is still very much alive. For example, the city of Amsterdam recently built an urban area (40,000 houses) in a reclaimed part of the lake.

In the 1980s, with ZZW's grip on control loosening and the population in the polders rapidly increasing, a discussion started on future government system in the IJsselmeer area. The central government decided to divide the lake and polders over three provinces (one new: Flevoland) and multiple municipalities (six new). With the advent of 'ordinary' governmental bodies in the IJsselmeer, the importance of ZZW and RIJP, which later merged into a new organization called RDIJ, was considerably reduced. Disagreement erupted between RDIJ (or more broadly speaking, central government) and the local authorities over various issues such as the possible construction of a nuclear reactor along the IJsselmeer coast, gas drilling, the location of new recreation areas, and the appointment of nature areas. The provinces broke off consultations with RDIJ and started developing their own 'interprovincial plan' for the area, which conflicts in various respects with national priorities. The land use planning system is very decentralized, however, and therefore local authorities cannot really be forced to take over national priorities.

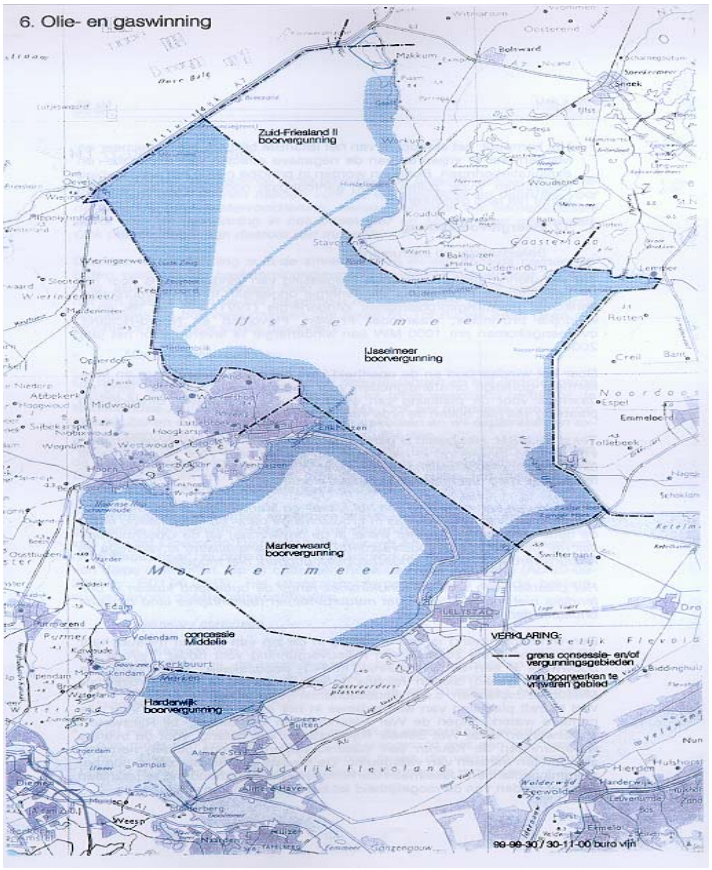
It is somewhat ironic that the water managers in the IJsselmeer (RDIJ but also certain water boards) nowadays have a much broader agenda than they had in the past. RDIJ is still very much concerned with flood safety and views many developments (i.e. climate change) in that perspective, but the agency has also become the water quality manager and has internalized a certain concern for the ecosystems in the lake, and until today RDIJ has retained its perspective on the entire water basin. All of this would have implied a broadening of the regime in the IJsselmeer, if RDIJ had not been dependent on the 'new' actors that entered the policy arena. The exact implications of the presence of these new actors are not necessarily negative from a sustainability perspective, however, as these would depend in part on the intentions of the new actors. We can assess this question especially in the sphere of rivalry between nature and recreation, and so we zoom in on this rivalry.

6.3.2 Gas drilling and drinking water exploitation

The soil under the IJsselmeer is quite likely to contain certain gas reserves at a few kilometers depth. We will not go into the legal details here (see Taverne 1993), but do wish to point out that under Dutch law, the state owns the gas as it is owner of the IJsselmeer. Gas drilling is a staged activity in the

sense that reserves have to be proven first, which is done by seismic tests and exploratory drilling. Government permission is required for such exploratory drilling. The government has chosen to exclusively allot 'search areas' to interested parties (see Figure 6.2), but even the parties that 'own' these search areas (mainly the companies NAM and Elf in the IJsselmeer) may not drill at a specific location without consent from central government. Nor does the actual discovery of gas reserves imply a right to actually exploit the reserves, but generally speaking it is the case that the company that proves the existence of certain reserves will be allowed to exploit them by government contract. On average, the state collects 85% of the proceeds, which can add up to considerable sums.

Figure 6.2 Drilling licenses granted in the IJsselmeer area. The interrupted lines indicate the outside borders of license areas; shaded areas are exempt from drilling activities. 'Boorvergunning' = drilling license.



Drilling for gas in the Northern part of the IJsselmeer became an especially contentious issue in the 1980s. A set of test drilling sites had passed the central bureaucracy after two years of proceedings and their selection had not resulted in any public response at all. However, shortly before the Minister of Economic Affairs was about to sign the license, the provincial water company of Noord Holland (PWN) started making noises about the potential negative effects of gas drilling on its intake activities. The company extracts drinking water from the IJsselmeer and was worried that in case of accidents, certain quantities of oil could end up in the lake, thereby spoiling the water quality (Gerits 1990). The likelihood of this event was extremely small, but the perception of the company (which had already permanently closed all other water inlets because of water quality concerns and which had just invested millions in water quality improvement measures) was that the risk was too grave. The company was backed by the provinces and most municipalities in the area and they started a fierce lobbying campaign to stop the license. This campaign was effective. The Minister did not sign the license, thereby leaving the company in question (NAM) in limbo. The company, however, is partly owned by the state and partly owned by certain large oil companies, Shell among them, which was rather cautious about conflicts with environmental groups.

Since then, the situation has been in deadlock, with NAM and the Ministry of Economic Affairs silently waiting for the real possibility of a political mood swing, and the municipalities and provinces attempting to prohibit gas drilling through land use plans. The courts frustrated the latter attempts, however, as they confirmed that land use plans cannot alter existing drilling rights. It is not unlikely that the current surpluses on the Dutch government budget will evaporate again at some time. That is likely to be the moment when Parliament will become more sensitive to the prospect of increased gas earnings from the IJsselmeer.

6.3.3 The rivalry between nature and recreation

Both the recreational and the natural value of the IJsselmeer (and certain parts of the polders) came as a surprise. The IJsselmeer holds numerous attractions for tourists. The lake itself is the largest open space in the Netherlands, with the greatest undisturbed visibility. Around 17,000 boats (mainly sailing boats) have their home in the region, served by 128 harbors. The villages around the lake, nature reserves, and fishing grounds are the main destination for much daytime recreation. The total amount of spending associated with tourism in the area was estimated at two billion guilders annually. Table 6.1 below gives some other data.

Table 6.1 Recreation in the IJsselmeer in the 1990s (adapted from RLG 1999).

Recreation form	**Number of days spent at/ near the corner lakes (per year)**	**Number of days spent at/near the rest of the IJsselmeer (per year)**
Tanning and swimming	250,000	100,000
Sailing and wind surfing	450,000	740,000
Motor yachts	2,600,000	130,000
Motor yachts (outgoing)	890,000	50,000
Rowing and canoeing	375,000	150,000
Angling	900,000	250,000

Even if we restrict ourselves to the lake and the immediate coastline, the ecological value of the lake is enormous. The basis for the ecosystem is algae growth, mussels (driehoeksmosselen), and to a lesser extent certain types of water plants. The importance of the Friesian coast has long been recognized and large parts of the coast have been assigned a status as natural reserve. There are many wading birds in the shallow parts of the lake, but many migrating birds use the lake as well. All in all, there are 25 bird species in such concentrations in the IJsselmeer as to make their habitat qualify as a Special Area of Protection (SPA) under the Bird Directive. Tourists come to the IJsselmeer for several reasons, but the presence of open space, an attractive coast, and nature are very important. Natural interests, of course, can also benefit from an association with recreational interest because it generates greater support for their existence and implies a connection with a politically and economically powerful sector. Despite the presence of such mutually beneficial relations, the possibility of discussions about the exact location of recreational and natural areas and the exact rules that regulate recreation remains very real, for instance because certain types of nature are rather sensitive to disturbance. By the mid 1970s, ZZW concluded that the enormous growth in recreation since the Second World War had done considerable damage to the natural beauty of the IJsselmeer. A round of 'integral plans', on an informal basis, started in 1977 for the ten so-called corner lakes (the bodies of water between the 'old' and the 'new' land). In a period of ten years, four integral plans were produced, but only one plan was formally endorsed by all participating parties. In most corner lakes, local authorities resisted limitations to tourist development. When the polders and the lake were formally incorporated into ordinary government structures, the voluntary cooperation between the government levels stopped. RDIJ continues to be concerned about developments in the area, such as the large number of illegal recreational settlements in natural areas (IIVR 2000: 23).

'Administrative fragmentation' is an important cause according to the agency (IIVR homepage).

A range of different responses is being developed to address the situation. In the corner lakes, RDIJ has continued to play an important role, 'helped' by ecological disaster. The ecosystem of the corner lakes collapsed completely in the 1970s because of exponential algae growth related to phosphate and nitrate emissions. Under the powerful influence of RDIJ, an emergency plan was developed in 1986, which had resulted in very positive effects by 1995. Partly encouraged by this precedent, RDIJ started a new 'integral planning' exercise for all corner lakes in 1996, with the participation of about 20 government organizations and much public involvement. The outcomes of this decision process had just become available when our empirical study ended, but seemed positive in the sense that much coordination had taken place. Ratification of the outcomes by other actors was uncertain, however, as the plans actually implied a reduction of bird habitat and might not be acceptable under the Bird Directive. This was defended with a somewhat twisted line of reasoning: 'Model calculations' were said to have shown that 'the possibilities' for water fowl lessen by 5% because of the plan, but that "this does not mean to say that the number of waterfowl will reduce by 5% (. . .)". Furthermore: "If previous actions within BOVAR [the plan to address algae growth, are ignored, the picture emerges that, on the whole, the foreseen measures do not fit in the desire to maintain existing bird values completely. However, when previous measures are taken into account, the picture changes. (...) the ambitions of the Bird Directive have been more than met, even before the Directive came into force" (IIVR 2000: 26). The reasoning is shaky at best. The Ministry of Agriculture, Nature Conservation and Fisheries (LNV) was especially vocal in its criticism.

The second route towards coordination is along the path of land use planning. The three provinces surrounding the lake have worked together quite well and have already produced two interprovincial policy plans. The provinces devote much attention to tourism and developed a policy of concentrated growth, which they claim to be consistent with national land use plans. The latter is probably incorrect because the national government considers the IJsselmeer as 'the' place for growth in recreational activities that are to be phased out elsewhere, and the provinces are clearly more conservative in their endorsement of tourism. Interesting in that respect is the fact that especially the province of Noord-Holland has succeeded in achieving a high level of coordination among its municipalities along the coast, mainly by suggesting that they should develop a common vision and by threatening to use its oversight powers. The municipalities succeeded in achieving a common vision but it must be noted that one or two

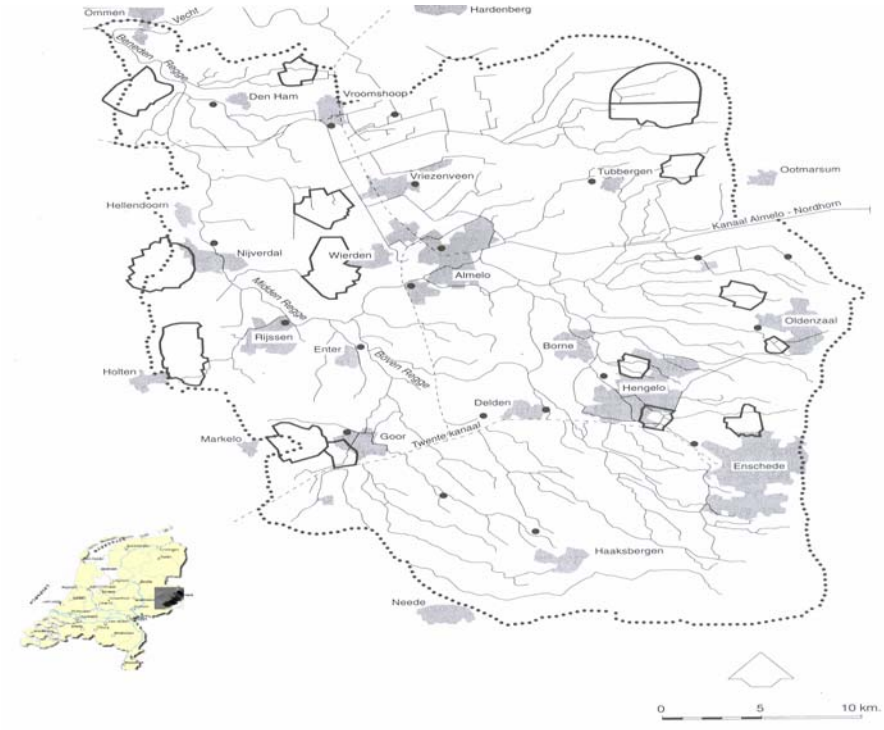
municipalities withdrew from the process because they were unsatisfied with their share of the pie. Since then, the province has refused approval of several municipal land use plans, which then resulted in litigation. So far it seems that the courts have upheld the provincial policies.

The third route towards more integration seems to be the private initiative. Especially the work in Noord-Holland has generated spin-offs in that respect. The Association for Water Recreation was retained by the municipalities to advise them on possible recreational development in the area. This Association is developing relatively unique databases on tourism, and has since then moved in the direction of vision development for the entire IJsselmeer. The Association has linked up with various other organizations, among them nature groups, and together they have developed their own plan for the lake, which will play an as yet unknown role in future policy development. It is interesting, though, that a few environmental organizations declined an invitation to talk with the Association for Water Recreation. It was suggested to us that this had to do with their expectation that they need not compromise their interests, given the presence of the Bird Directive. From the Dutch perspective, then, 'integral plan development' seems to be threatened by the Directive.

6.4 The Regge: undoing water management of the past

The Regge is a rain river in the Eastern part of the Netherlands, close to the German border (See Figure 6.3). The basin of the Regge is characterized by a mild slope, downwards to the northwest. The river basin is 900 square kilometres large and is bordered to the east and west by lateral moraines, caused by past glacier activity. From these moraines, which can attain heights of 30 meters above sea level, groundwater streams move downwards to the river valley. The area of the Regge contains about 500,000 inhabitants, concentrated in the built-up area (including the larger towns of Enschede, Hengelo, and Almelo). The area outside the towns is mainly rural with much agricultural land, but it also contains some important nature reserves (forests, peat land). Land use in the Regge basin is divided over agriculture (61%), natural areas (24%), and built up area (15%).

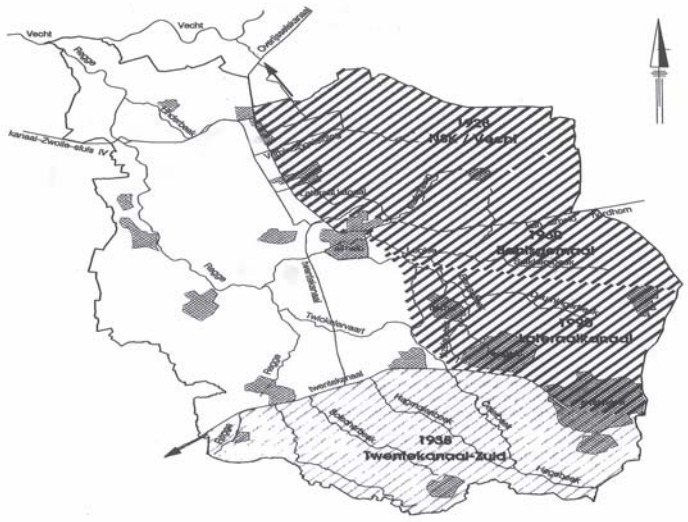
Figure 6.3 River basin of the Regge. Taken from Van der Vlist (1995). The dotted lines mark the border of the basin. Indicated are the towns in the area (shaded), groundwater protection areas (black lines), and the various streams that constitute the Regge and feeding streams (dark lines).



The manager of the Regge basin is the water board (‘waterschap’) Regge en Dinkel and this organization plays a central role in water management, together with the province of Overijssel and, somewhat more remotely, the Public Works Agency (‘Rijkswaterstaat’). The activities of the board in many ways reflect the demand for water services by the users of the land in the Regge basin. Founded to combat flooding of agricultural land, the board propagates flood protection. The board also wants to make sufficient water for agricultural purposes available in summer. Both purposes are enhanced by a complex of measures that include canalization, maintenance of waterways, admitting water from elsewhere, and barrages in the Regge (one for every seven kilometers of river). This system is of great importance for the groundwater tables in the Regge area. The water board has statutory duties of water quality management, which it seeks to achieve by a license system and the operation of wastewater treatment works. Especially in the summer, the effluent from these treatment facilities constitutes a significant part of the amount of water that is in the riverbed, making water quality a

concern. This concern is enhanced by the fact that, for the purpose of flood management, much of the cleaner water from the top of the basin has been redirected elsewhere (see Figure 6.4).

Figure 6.4 Disconnected parts of the basin. At least 60% of the basin has been disconnected. Arrows indicate the direction in which water is diverted.



In line with its agricultural roots, the water board advocates efficient use of agricultural land, which was enhanced for decades by land relocation and the canalization of 90% of the water streams. More recently, the water board has started to regard itself increasingly as an organization concerned with the appearance of the landscape and with ecology. Moreover, flood protection is increasingly undertaken through the creation of storage capacity within the basin (retention) rather than increasing transport elsewhere. These changes in water management largely came about in the 1980s through a range of factors, including the demise of agricultural control over the water board council and changing national priorities. We focus on these changes in the remainder of this chapter.

6.4.1 The first broadening of the water regime in the Regge basin

What we would currently describe as damage to the landscape was long and widely regarded as improvement, signified by naming the activities

'improvement works'. Starting in the 1960s, water board intervention in the natural landscape caused conflicts with environmental groups but also with other layers of government. As happened in the IJsselmeer, the land use planning system was instrumental in channeling claims for greater attention to nature. The regional plan ('Streekplan') for Twente of 1965 is a case in point. A draft of this plan had been developed by the province of Overijssel and listed nature development as the top priority, implying restrictions on water board activity. The water board, left out at the consultation stage, objected to the procedure that had been followed and suggested that the regional plan was at odds with its own policies. After much consultation, a compromise was struck and various changes were made to the plan.

Despite that, the position of the water board had fundamentally changed from the only public body engaged in management of the countryside, to one of the players involved. The improvement works (and even regular maintenance) by the water board now required planning permission. Various groups sought to protect the landscape and fought against the canalization of various streams. Some municipalities were sensitive to these pleas and started limiting water board activity in natural areas. On various occasions, municipalities and the water board stood against each other in court. Donker (1996: 119-128) writes that the province of Overijssel used its responsibility for oversight of the water board to warn that it did have a responsibility for nature conservation and should complain less about developments in land use planning. The water board rejected this role, and in doing so, could refer to a 1967 national inter-departmental report, which advocated a narrow task conception for water boards. The development of nature or recreation areas was explicitly mentioned as something that a water board should *not* engage in.

In 1974 the conflicts with environmental groups and other tiers of government inspired one member of the water board council to call for the establishment of a separate environmental commission, but such plans gained no majority whatever (ibid.: 127). The water board council did decide it would assign the task of consulting with the National Forestry Service ('Staatsbosbeheer') and environmental groups to one of the committees of the water board Council (the Finance Committee). This had certain effects on water management, although they cannot be described as very fundamental. The two most notable changes were the termination of the use of chemicals to fight weeds in the water and more nature-friendly water bank maintenance.

6.4.2 Bornsebeken plan: a change of paradigm

Despite the changes in water management just described, the water board continued to work on its main agenda dating back from shortly after the Second World War. This agenda revolved around canalizing the last remaining streams, lowering the groundwater table and increasing transport capacity out of the Regge basin. In the 1970s, the water board started developing a so called 'structure plan' for a part of Regge called the Bornsebeek. This plan, appearing in 1978, demonstrated that improvement of the situation in the Bornsebeek would involve much work in the connected creeks as well. The Bornsebeek plan (single) became the Bornsebeken plan (plural). The project would essentially involve the entire set of creeks to the east of the Regge, at least the ones located between the towns of Enschede, Hengelo, Almelo, and Oldenzaal (10,000 hectares). By 1983, the water board itself concluded that the plan was too expensive and had disadvantages in terms of water quality and effects on the landscape. In accordance with emerging (national) philosophy of the 'broad outlook', the plan would be reconsidered. The original plan would have implied damage to the landscape as a consequence of the canalization (especially the trees along the creeks) and water quality in some creeks would worsen, because wastewater coming from the towns would be spread over all creeks instead of concentrated in one stream.

It took until 1986 before a working group of municipal, provincial and water board representatives, working with a consultancy firm, had developed a concrete plan for the Bornsebeken that seemed to meet the various concerns. The essence was that water would be diverted from certain streams to others. For that purpose, certain new connecting canals had to be dug and numerous creeks would have to be deepened and widened. Creeks used to be 5-7 meters wide, but would now be become 15-20 meters wide (ibid.: 11) Creeks with high natural value were to be spared, but this was not possible throughout the entire area. Other effects included a lowering of the groundwater table in agricultural land.

Subsidies and societal resistance largely determined the fate of the plan, in that order. Subsidies were an important factor in this sense that the national subsidy scheme for the improvement of regional waterways was suddenly withdrawn. The water board had seen the change coming, and had sped up development of the Bornsebeken plan, but it was not completed before termination of the subsidy scheme. The speed with which the Bornsebeken plan had been developed and its content led to an outcry from various organizations, including large landowners (Stichting Twickel) and

environmental groups (e.g. Nature and Environment Federation Overijssel (NMO)). The province of Overijssel was critical as well. All these actors considered the project too one-sided.

The critique was taken to heart, it seems, and the working group that had developed the water board plan now established a so called 'alternatives committee'. The Committee identified seven possible alternatives for the original plan. Especially the ideas to allow flooding to occur and to create retention ponds were intensively discussed, with water board representatives voicing concerns over the costs and the amount of land needed for this solution. The committee's final decision was that the existing plan was better than all alternatives. The representative of the Ministry of Agriculture Nature Management and Fisheries, however, did not agree to the outcomes. At the Minister's request, a group of students wrote a report on the Bornsebeken plan. They developed an Integral Water Management Plan in Twente (abbreviated to PIWAT) that heavily criticized the water board plan as being 'mono-functional'. The PIWAT plan was different, in the sense that it pleaded for giving the river free reign ('meandering'), for retention areas, less drainage capacity of the waterways, acceptance of a higher level of flooding, and separation of water streams with good and poor quality (ideas that were already circulating in the context of the Third Note on Water Management). The response of the water board was that implementation of PIWAT would require the water board to step outside its legal responsibilities, which was something they did not intend to do. The PIWAT plan was rejected.

The Minister of Transport, Public Works and Water Management, however, was made aware of the PIWAT study too and she noted the obvious fact that new national policy directions were well embedded in the plan. In a Solomon's verdict, the Minister suggested she was willing to grant a subsidy for the water board's plan but that she was not convinced that it was integral enough. To guarantee that the improvement works would be implemented in an integral fashion, the Minister suggested that a new plan needed to be developed by all authorities involved. This group would operate under the supervision of the province, and consensus in the group would be a precondition for any subsidy.

A new working group started its activities near the end of 1990. The water board assembled an interdisciplinary working group that assisted them. The group started with an inventory of already existing ideas, particularly at the national level. The issue started to broaden because there was space to bring forward all problems that existed in the basin. The new project, for instance,

was linked with the older recommendation to concentrate wastewater in certain streams, so that at least some other streams would achieve better quality. The water board had also received an indication that the water soil was seriously contaminated with mercury in certain parts. A solution to this problem (excavation of the water soil) became part of the project. Ideas from others were now also reconsidered. The inlet of water from the Twentekanaal was reconsidered and an opportunity was suddenly seen to reconnect the creeks south of the canal to the creeks north of it. The idea of a retention area was also taken on board (40 hectares of flooding area). Studies were commissioned on groundwater levels in the area, and the idea that groundwater tables should perhaps rise was discussed. By October 1991, the water board executive approved of a draft of the new plan and consultation with organizations outside the working groups started.

This time, nature organizations were much more positive, although it was noted that the plan still contained proposals for drainage and would not be sufficient to combat drought. From the agricultural side there was much criticism. According to the GLTO (Regional Agricultural Organization) the original plans had already paid sufficient attention to nature. Agriculture had suffered long enough from the flooding, and now the water board would take much of their land away. And that for a problem caused by urban development! The farmers feared most the expropriation of land, but also expropriation of use rights. Especially the fact that natural areas tended to have implications for nearby agricultural land was pointed out. To most of these questions the water board replied that land would only be taken on a voluntary basis and would be compensated by other land or by finance. The comments did not lead to many changes in the vision, and by May 1992, the authorities involved in the working group informally approved it. Procedures to change municipal zoning ordinances were started near the end of 1992. By 1993, the Minister personally came to the water board to endorse the plans. Much resistance from farmers has accompanied the land use planning procedures that have followed since. Although, in most cases, the water board succeeded in friendly negotiations with the various landowners, some have continued to object to the various stages of the plan.

6.4.3 Influence: a new way of working

The Bornsebeken plan has had a lasting impact on water board policies. New personnel were attracted to be able to approach the project in a multidisciplinary fashion. These people (biologists, ecologists, etc.) brought new visions of water management with them and could better connect to networks such as the environmental NGO's. New insights regarding water

management were thus anchored in the (top of) the organization and these came to be reflected more generally in the water board policies. Many of the people involved with the Bornsebeken plan would later become involved with the development of a vision for the Regge basin as a whole (Regge Vision 1996) and the similarities between the two plans are striking (separation of water streams, retention areas, etc.). Note that the initial hesitation of the water board about the PIWAT plan had been based on a narrow conception of the water board's task. Many of the goals of the PIWAT study could only be realized through the cooperation with other actors and the more conservative water board officials did not want to be responsible for that. After preparation of the Bornsebeken plan, the officials holding that opinion were largely gone, however. A new breed of officials entered the scene, with a taste for exactly the kind of interaction with other governments that had initially been rejected. At the national level, many of the new ideas on water management essentially implied a warp into the domain of other policy sectors such as land use planning. Regge en Dinkel got an early taste of that through the integral version of Bornsebeken plan.

6.5 What do the cases illustrate for the Netherlands?

In the previous section we have discussed developments towards integrated water management for two different water bodies in the Netherlands, the IJsselmeer and the Regge river. In both cases the extent and the coherence of the regime have considerably increased on many of the important aspects during the period 1970-2000. In case of the IJsselmeer in fact three rivalries have been discussed. First a rivalry about the use of a water body for land reclamation versus the value of open water. Secondly, a rivalry between the use of a water body for gas drilling versus the potential use of the water body for drinking water preparation. Third, a rivalry between the use of a water body for recreation versus natural values.[1] The presentation of the Regge case has added a fourth rivalry between the drainage function of a river basin for agriculture versus the desire to restore and further develop the ecological values of the water system. In this section we analyze for all four rivalries the regime changes that have been observed (both in terms of a changed extent and a changed coherence), the implications of the observed regime

[1] In chapter 7, in which all cases of the Euwareness-project are analysed together, a fourth rivalry about fisheries in the IJsselmeer area is also taken into consideration. Different from the other rivalries between heterogeneous resources users, the fisheries sub-case is an example of a rivalry between homogeneous users. To keep this chapter on the Netherlands within the margins of an acceptable length, we have chosen not to describe and analyse the fisheries sub-case here.

changes for sustainability, as well as the change agents and conditions by which the regime changes have been induced (see chapter 7, figure 7.1).

6.5.1 Regime changes in terms of extent

The extent of a regime refers to the extent to which relevant uses and users of a water basin are recognized by the regime. It is an indicator of the completeness of the domain of the regime. In both cases we have described, a considerable increase of the extent could be observed. In case of the IJsselmeer the extent started to increase around 1974, when the maintenance of the lake and various uses related to open water (except for ecological uses) came onto the government agenda. Open water related aims were uses that were not recognized before. Later on (around 1985), ecological values of the lake came also onto the agenda. However, in the 1990s plans were still made and implemented for small scale land reclamations (urban expansions outside the dykes close to Amsterdam, Lelystad and Almere). It took until 2000 before these plans were more generally considered as unfavorable in terms of water safety and management (by the national Commission on Water Management 21st Century, although other actors - like the province of Flevoland - still advocate the need to reclaim more land in the IJsselmeer for urban expansion). The extent also increased with respect to the rivalries around gas drilling and recreation. The potential negative effects of gas drilling on natural values (like birds) and on the quality of drinking water reservoirs in the IJsselmeer are fully recognized now. The IJsselmeer area is nowadays regarded as the 'Blue Heart' of the country, to be preserved. The values of nature and bird life in the corner lakes are recognized, although they are coming under pressure from increasing recreation settlements. In the case of the Regge river, the period 1989-1992 has been a demarcation. In that period the water board, which is the water management authority for this river basin, adopted a reconstruction plan for a subsystem of the Regge river (Bornsebekenplan). This was an attempt to serve both agriculture (drainage, flood protection) and the natural values of the water system. For the water board this has been a crucial step towards the adoption of an integral approach of water systems throughout its entire area.

6.5.2 Regime changes in terms of internal coherence of public governance

The coherence of a regime distinguishes between the internal coherence of public governance, the internal coherence of property rights, and the external coherence between public governance and property rights. First, we consider the internal coherence of public governance. This is the degree to which the

interdependencies in the water system and its management are reflected in the elements of public governance. In this book we distinguish five elements of public governance: (1) levels and scales; (2) actors and networks; (3) perspectives and objectives; (4) strategies and instruments; (5) responsibilities and resources for implementation.

With respect to *levels and scales* we have seen that the state is the main water authority in the IJsselmeer basin, while a regional water board is the main water authority in the case of the Regge river. In both cases we could observe that increased interaction with other administrative levels has increased the complexity of water management, which in case of the IJsselmeer resulted in integration attempts accompanied by fragmentation, and which in the case of the Regge river resulted in successful integration attempts. With respect to the rivalry around land reclamation in the IJsselmeer, the state (as resource owner and main planning administration) and the provinces (as involved planning administrations) have emerged as relevant authorities. However, it remains unclear which one of them has the primacy in planning. Fragmentation could be observed since 1989. With respect to the rivalry around gas drilling in the IJsselmeer, the state (as water resource owner and as Ministry of Economic Affairs, implementing the Mine Act) decides on concessions for gas drillings and their locations. Emergence of the provinces since the 1980s, being responsible for the availability and quality of drinking water reservoirs, has led to high complexity and fragmentation. Together with the municipalities, the provinces have obtained land use planning responsibilities to ameliorate any negative effects of gas drilling. On the other hand, this fragmentation is in favor of more integrative decision making, because land use authorities at the provincial and municipal level are forced to deliberate between the interests of gas drilling and drinking water reservoir protection. Such an integrated deliberation of both interests is not provided by the national level of government. With respect to the rivalry around recreation in the IJsselmeer, since 1977 the Ministry of Transport, Public Works and Water Management (V&W) took the initiative for integrated coordination at the scale of the corner lakes, including the participation of the provinces and municipalities involved. However, fragmentation at the national level could be observed between the Ministry of Transport, Public Works and Water Management, taking care of integral water management, and the Ministry of Agriculture, Nature Conservation and Fisheries (LNV), taking care of the implementation of the EU Bird Directive. In case of the Regge river, interventions by the state and the province were needed to force the water board, dominated by agricultural interests, towards a more integral approach. In the end, however, the water board proved to be able itself to adopt an integral plan at basin level. So integration at basin level has been successful.

With respect to *actors and networks*, in both cases we have seen strong indicators of increased access opportunities and participation by new users. In most cases a policy planning system has been the access channel for new users. With respect to the rivalry around land reclamation in the IJsselmeer, the discussion on the land-water conflict has been impelled by NGOs, such as the 'Vereniging tot Behoud van het IJsselmeer (VBIJ)', and also by recreational interest groups. With respect to the rivalry around gas drilling in the IJsselmeer, provinces and municipalities have become important players in the arena, often in coalition with environmental pressure groups which oppose gas drilling. With respect to the rivalry around recreation in the IJsselmeer, the Ministry of Transport, Public Works and Water Management organized participation for all interested parties. In the case of the Regge river, a working group has been assembled, supervised by the province, to prepare the integral plan. All the authorities involved participated. Consensus in the group was made a precondition for any subsidy. After a draft plan was approved, consultation with organizations outside the working group started (nature as well as farmers' organizations).

With respect to *perspectives and objectives*, we generally find a powerful tendency towards integration. In case of the rivalry around land reclamation in the IJsselmeer, the perspectives of different actors and user groups have converged. Only one actor (province of Flevoland) still sees the lake as 'not yet land'. Flevoland does not have the resources to polder, which they would like to do. The objectives of the water management sector have turned from a classical approach of engineering water works (until 1980) into an approach of protecting other water values and the importance of water areas as storage basins (as a response to climate change and rising sea level). In case of the rivalry around gas drilling in the IJsselmeer, there are several visions for the lake. The picture of this rivalry is more one of fragmentation. 'Official' government visions come both from the provinces and from the national government. The plans are at odds with each other. This situation is made possible by a desire to start land use planning in the lake. However, the EU Bird Directive and the national (drinking) water policy documents provide a perspective for the protection of birds and drinking water resources in the IJsselmeer. On the other hand, these documents do not really provide a single direction perspective to solve the rivalry. In case of the rivalry around recreation a round of integral plans started in 1977 for the corner lakes. In case of the Regge river, the Bornsebekenplan has become an integral vision (after the rejection of several previous versions), in which the perspectives of the rival users have converged. The approach developed has strongly encouraged the development of an integral vision on the river basin as a whole, which resulted in the Regge Vision in 1996.

With respect to *strategies and instruments*, we could observe that planning has been the most important policy instrument for adopting new uses in the policy process and for getting user groups around the table. In case of the rivalry around land reclamation in the IJsselmeer, the introduction of a new planning procedure (PKB) for large infrastructural works in 1974 has resulted in a better recognition of rival uses. However, at the end of the 1990s water management authorities still lacked adequate instruments to get more grip on land use planning. In case of the rivalry around gas drilling in the IJsselmeer, the main instruments seem to be (land use) plan formation and concession permits on basis of the Mine Act. These are at odds, and increasingly so. However, since 1989 an Environmental Impact Assessment is required for gas drilling. This is seen as an important instrument to achieve more integration. In case of the rivalry around recreation in the IJsselmeer and in case of the Regge river, plan formation is also the main instrument to achieve integration. In the Regge case, the supervisory role of the state and the province and their ability to facilitate with subsidies has been used to force the water board to develop an integral approach.

With respect to *responsibilities and resources for implementation*, we could observe that implementation still is fragmented in the IJsselmeer case, while it is much more concerted in the Regge case. With respect to the rivalry around land reclamation in the IJsselmeer, in the 1970s land use planning instruments had to be applied to get the value of open water adopted by the state water management sector with its one-sided focus. However, during the 1980s this sector changed from a rather closed into a much more open policy community, which very much broadened its scope and accepted the value of rival uses. Conversely, at the end of the 1990s we see that the water management sector has problems in getting the value of open water adopted as a guiding principle in land use planning. With respect to the rivalry around gas drilling in the IJsselmeer, responsibilities are fragmented and very little co-ordination is possible, which leads to conflict. The gas drilling issue goes to court many times. On the other hand, the EU Bird Directive is working as an influential tool or resource which strengthens the drinking water interest. In case of the rivalry around recreation in the IJsselmeer, the integral visions had to be implemented by the system of land use planning, and by that means they had to be adopted (ratified) by local ordinances. That didn't work very well. Besides that, formal responsibilities are not where the money is. The national government has the money; provinces and municipalities have land use planning authority. In case of the Regge river, the plan formation functioned as a concerted action for the implementation. All authorities involved have been committed to applying their resources. Support was built by consulting representatives of the main

user groups. However, land had to be acquired to implement the plan. The water board declared it would take only land on a voluntary basis and compensate with other land or finances. Despite this statement, individual farmers still objected in procedures to change the municipal zoning ordinances. In most cases, the water board succeeded in friendly negotiations with the various landowners, although some others maintained their resistance.

6.5.3 Regime changes in terms of internal coherence of property rights

The internal coherence of property rights refers to the degree to which the interdependencies in the water system and its management are reflected in the distribution of property rights among the users involved. In the cases described, the internal coherence of property rights generally increased. With respect to the rivalry around land reclamation in the IJsselmeer, the state (holding the ownership of the IJsselmeer) has greatly restricted its own decision-making power to polder by committing itself to the outcome of a PKB-procedure, which attributes participation rights to rival users. This happened around 1974. In case of the rivalry around gas drilling in the IJsselmeer, the internal coherence became more complex and fragmented. The state ownership of the IJsselmeer and the use right by the state to allow concessions on gas drilling are in conflict with the use rights of provinces on drinking water reservoirs as well as with the regulatory rights of provinces and municipalities to help other users effectuate use rights which are threatened by gas drilling. An indicator of more integration in this case is that the obligation of an Environmental Impact Assessment for gas drillings is restricting the use rights for gas drilling. On the other hand, the courts seem to be uncertain about the extent to which these restrictions could hold. With respect to the rivalry around recreation in the IJsselmeer, municipalities and provinces initially had an influential say (by means of regulatory rights) in the siting of recreational settlements. Natural life in the corner lakes was hardly protected by property rights. However, recreation is increasingly brought under land use controls, although there is still much illegal land use. Nature rights are increasingly recognized by the land use planning system too. The land use planning system is improving the internal coherence, since this is a system which attributes by ordinance property rights to the uses involved. The EU Bird Directive is another change which could attribute property rights to bird life in the corner lakes. However, divergence (fragmentation) could be observed between the flexible nature protection provided by the land use planning system and the strict nature protection by the Bird Directive. In case of the Regge river, nature is hardly protected by

property rights. However, nature rights are increasingly recognized since the water boards are allowed (by the Water Management Act of 1989) to promulgate ordinances which incorporate ecological considerations in decision making on water basins.

6.5.4 Regime changes in terms of external coherence between public governance and property rights

The external coherence between public governance and property rights is the degree to which changes in public governance are reflected in changes of the property rights. In the cases we described the external coherence has increased on only a few of the important aspects. With respect to the rivalry around land reclamation in the IJsselmeer, the right to polder (reclaim land) has been restricted in favor of access rights for rival users. Nowadays, the right to polder (in the hands of land use planners) is still out of the control of water managers wanting to protect open water. Although it is expected that this will change in the future (the state is working on legislation), it still has not been put into effect. Therefore, the external coherence has changed from high in the period 1974-1995 to incomplete in the 1990s for this rivalry. In case of the rivalry around gas drilling in the IJsselmeer, the status of property rights is still not clear. Many government actors would like to stop drilling, but this is difficult. The Environmental Impact Assessment obligation has increased the external coherence only somewhat in some of the more important aspects. In case of the rivalry around recreation, the property rights of municipalities according to the land use planning system are not sufficiently redistributed to guarantee nature protection rights, despite the protection goals of the Bird Directive and Dutch nature policy. In case of the Regge river and the implementation of the Bornsebekenplan, the water board had to rely on voluntary cooperation of landowners, as far as they are willing to provide land against compensation. In that respect, the change has been more policy driven than property rights driven. However, municipal zoning ordinances are used to restrict use rights on land that is needed for the natural development of the river basin (to attribute property rights to nature).

6.5.5 Implications for sustainability

If we want to assess the implications of the observed regime changes for the sustainability of the regime, we could draw a distinction between: (1) implications for natural resources and the environment; (2) implications for economic development; (3) implications for social development. We are only able to make a general assessment of implications of observed changes

for sustainability. The overall sustainability of the resource use is beyond our capacity to judge as social scientists (see chapter 7, section 7.2.5).

Considering *implications for natural resources and the environment*, we could observe that in the case of the IJsselmeer the uses related to open water have become much more widely recognized. After the introduction of the PKB procedure in 1974, there still have been cases of land reclamation in the IJsselmeer-area. These cases are disputed nowadays, and the importance of open water for safety (climate change, rising sea level) has become increasingly recognized since the mid 1990s. With respect to gas drilling, we have to notice that they still might affect the lake, especially if oil leaks occur. Until now, the concessions for gas drilling have not been activated and still can be reconsidered as a result of the rivalry debate. This is a bit of an artificial problem, since it is mainly a reflection of society's changed priorities. The fear of possible risks related to gas drilling has led to a rethinking and a court battle on the sustainability of gas drilling in the IJsselmeer. With respect to the recreation rivalry, we may conclude that nature is better protected than it was. Although the implementation of nature protection in the municipal zoning ordinances doesn't work well, the authorities try to channel tourism away from the sensitive/valuable areas. The strong use-driven policies to encourage recreation in the corner lakes (opportunities for tourist and economic development) prevented substantial reductions of recreation settlements. Most authorities that are involved, except for the Ministry of Agriculture, Nature Conservation and Fisheries (LNV), still try to run away from the implications of the Bird Directive. In case of the Regge river we could observe that natural and ecological values of the river basin are nowadays much better recognized and expressed in water management by the water board.

Considering *implications for economic development*, we could observe that in case of the rivalry around land reclamation in the IJsselmeer, the loss of water has been capitalized and incorporated into cost-benefit analyses of land reclamation projects. With respect to the rivalry around gas drilling, it is clear that the option of not drilling would cost the economy quantities of potential income due to the government. However, the drinking water reservoirs have been valued more highly and will strongly affect the cost-benefit analysis of gas drilling. In case of the recreation rivalry, we notice that significant investments in waste water treatment have been done to fight against growth of algae and to improve the life conditions in the corner lakes. In case of the Regge river, the water board is spending part of its taxation revenues for nature development. The expanded extent has been accompanied by the entrance of new participants (inhabitants and representatives of nature organizations) in the water board, which since then have started to contribute with taxes to the water management tasks in which

they have an interest. Important provincial and national subsidies are also involved.

Considering *implications for social development*, we observe that the decision making on land reclamation (poldering) has become the subject of an open debate with the public. Gas drilling activities have become the subject of an intensive public debate in society, with great political sensitivity. This could help the protection of drinking water reservoirs. In case of the recreation rivalry, the value of the lake for bird life went much higher up the agenda, especially as a consequence of the EU Bird Directive. In case of the Regge river, the water board has gone through an existential debate on its mission. The nationally introduced 'broad water system approach' of 1985 has been finally accepted by the farmers which were rather dominating the water board.

6.5.6 Agents for regime change

Looking at the agents, which in combination have forced regime change, we make a distinction between: (1) national regime changes; (2) EU policies; (3) problem pressure; (4) other change agents. We are only able to consider the combined force of the listed change agents as an impetus to set in motion regime changes towards more integration (see chapter 7, section 7.2.3).

In case of the rivalry around land reclamation in the IJsselmeer, we observed three *national regime changes* that have driven regime change at basin level. First, the adoption of a Physical Planning Act in 1965 has been influential, together with the changing political climate in the 1970s and growing political legitimacy of groups protesting against the establishment in general, and in particular against the classical approach of water management (engineering) by Rijkswaterstaat. A second impulse has been the incorporation of ecological values around 1985. A third impulse has been the national attempts to integrate between water management and land use planning in the period 1998-2000. In terms of *problem pressure*, first the gradual loss of natural values in reclaimed water areas has been a change agent. Second, an increasing awareness of insufficient water safety in the 1990s, in particular the river floods of 1993 and 1995 and related flood damage liability concerns, have triggered regime change. A third change agent has been the alarming report in 2000 by the national Commission on Water Management 21st Century, demanding serious attention for problems of climate change, rising sea level and water safety in the country. *Other change agents* have been first a decreasing need for new land and a gradual decline of the agricultural sector. Second, alternative options for the Markerwaard, especially the plan for a new national airport in that area, has led to growing protest against expansion of urban areas and infrastructure at

the cost of natural areas and open space. Third, budget reforms in the early 1980s have definitely changed the willingness of the state to invest in land reclamation.

In case of the rivalry around gas drilling in the IJsselmeer, we observed two *national regime changes* that have impelled regime change at basin level. First, the national recognition of groundwater scarcity and increasing drinking water needs (around 1988-1989: Third National Water Policy Document and Policy Document on Supply of Drinking Water and Industrial Water) has led to awareness of the importance of drinking water reservoirs in the IJsselmeer. It has also triggered the provinces to look eagerly at these reservoirs. Second, the introduction of more stringent requirements regarding environmental impact assessment (around 1989) has been a change agent. As far as *EU policies* could trigger regime change, it is relevant to notice that the IJsselmeer has become a Special Protection Area (SPA) under the EU Bird Directive as of 2000. However, until now the directive hasn't been applied in this case to help protect the drinking water reservoirs. In terms of *problem pressure*, it is uncertain to what extent drilling would actually affect drinking water quality. Probably there is only a small risk. However, if the gas market opens up, there will be a more powerful incentive to sell and explore for gas, and the awareness of this has increased the fear of problem pressure in the near future.

In case of the rivalry around recreation in the IJsselmeer, the integral water system approach, introduced by the Ministry of Transport, Public Works and Water Management in 1985, has had a major impact as a *national regime change* on the adoption of nature protection values and ecological considerations in the land use planning system. *EU policies* have not yet become a change agent, but could become a greater force in the future. The strengthening of natural values by the Habitat and Bird Directives is important. The status of the IJsselmeer as a Special Protection Area potentially limits tourism. In terms of *problem pressure*, environmental degradation of the corner lakes (with enormous growth of algae as an indicator) has triggered much more active work on nature protection. On the other hand, chances for tourist and economic development prevented substantial reductions of recreation settlements. The national Ministry of Agriculture, Nature Conservation and Fisheries (LNV) even promotes the transfer of recreation from the Wadden Sea in the north and from the Province of Zeeland in the south to the IJsselmeer area in the heart of the country.

In case of the Regge river, the integral water system approach, introduced by the Ministry of Transport, Public Works and Water Management in 1985, has also been the most influential *national regime change*, which triggered the adoption of nature protection values and ecological considerations. In

terms of *problem pressure*, social resistance (by nature and environmental organizations, as well as country-seat owners) has largely determined the change of the traditional drainage approach into a more integral approach. In terms of *other change agents*, we could observe that subsidy programs have had a powerful impact on regime change at basin level.

6.5.7 Conditions for regime change

For making a general assessment of conditions that have been favorable or unfavorable for regime changes towards more integration, we distinguish the following conditions, which should be regarded together to assess their influence: (1) tradition; (2) joint problem; (3) joint opportunities; (4) credible alternative threat; (5) institutional interfaces (see chapter 7, section 7.2.4).

In case of the rivalry around land reclamation in the IJsselmeer, *tradition* has been a favorable condition in the sense that earlier cases of land reclamation in other polders and the Lauwerszee (in the Province of Groningen in the north of the country) have triggered the state to think more of incorporating natural values and the value of open water into water management. At that time, too, the awareness of environmental and natural values was growing. Protest groups were hotly disputing land reclamation by the state water authority (Rijkswaterstaat), while advocating a more open decision making process on water works and claiming more participation rights. Initially, the perspective of a *joint problem* was absent. There wasn't much common knowledge in the form of reports, or information symmetry between the actors. However, among politicians, overlooking these disputes, a sense of responsibility for the future value of open water was growing rather quickly. So a joint problem turned out to be a favorable condition in the end. Another favorable condition has been the existence of *joint opportunities*. There were lots of protest groups demonstrating against land reclamation for various reasons. However, they shared a common interest in stopping the classical land reclamation process by Rijkswaterstaat. A *credible alternative threat* on the side of the state and national politicians has been that they could meet the strong wish of protest groups to skip the Markerwaard land reclamation, by using budget reform considerations as a formal argument for it. The alternative option (land reclamation) would have had much more severe budgetary consequences than the choice for integration. An important *institutional interface* has been the PKB (Planologische Kernbeslissing) planning procedure for major infrastructural works, which was introduced in 1974 on basis of the Physical Planning Act, and which provided a legal leeway for a more integrated approach.

In case of the rivalry around gas drilling in the IJsselmeer, a *tradition* of integrated thinking has been absent. The absence even of a *joint problem* has

been an unfavorable condition. Very different visions of the problem resulted in a heterogeneous understanding of the problem. Distrust exists between national bodies and the provinces, as far as this rivalry is concerned. *Joint opportunities* are lacking, since there is no information symmetry and no notion of possible joint gains from integration. The provinces and municipalities involved don't want to respect the almost established rights to drill. A *credible alternative threat* is not available. The central government cannot, or rather will not, compel the provinces because of the political costs. There is a legal path for integration through the land use planning system, but political opportunity forbids this use. However, in terms of *institutional interfaces*, national water policy documents are in favor of protecting the drinking water reservoirs in the IJsselmeer. This has very much motivated the provinces to oppose the gas drilling. The Environmental Impact Assessment obligation and the Bird Directive could be seen as a legal leeway for more integrated approaches.

In case of the rivalry around recreation in the IJsselmeer, a strong *tradition* of integrated thinking at the national level has been a favorable condition. However, this tradition wasn't that strong at the local level, so it was not shared by all actors. In terms of a *joint problem*, there is certain awareness among the rival users that nature is the basis for recreation, and must be preserved. Some municipalities oppose tourism and are happy to let others develop it. This should also be seen as a *joint opportunity*. Since the presence of attractive nature is an attractive condition for tourism, and since tourism is a way of experiencing nature, there has been a sense of respect for each other's interests. In terms of a *credible alternative threat*, no imbalance of power could be observed. The national government (also a resource owner) is strongly advocating nature protection and integral solutions, but they are very dependent on the local zoning ordinances. The municipalities do not really have a strong interest in integration. The provinces could compel the municipalities, but they also have an interest in tourism. The Ministry of Agriculture, Nature Conservation and Fisheries (LNV), responsible for the implementation of the EU Bird Directive, could become an important player, but isn't now, as far as this rivalry is concerned. In terms of *institutional interfaces*, the approach by the Ministry of Transport, Public Works and Water Management of forming steering committees to stimulate integral visions and to work on agreements among the actors involved, has been a favorable condition.

In case of the Regge river, a strong *tradition* of consensus and mutual respect, characteristic of the democratic functioning of water boards, has been a favorable condition for a change of attitude on the farmers' side. The absence of a *joint problem* was initially an unfavorable condition. Very different visions of the problem existed, resulting in a divergent

understanding of the problem. There was also distrust between farmers and non-farmers. However, it has been a *joint opportunity* that the alternative, advocated by the opponents of natural development, didn't harm the interest of the farmers in getting river flood problems solved. It was only that they didn't want their money to go to nature development and to sell agricultural land for it. In terms of a *credible alternative threat,* the dependence on subsidy programs has been in the joint interest of all parties involved to develop a common plan, as well as being an instrument by which the national and provincial authorities could force change. In terms of *institutional interfaces*, the nationally introduced 'integral water system approach' as well as the increased societal resistance against traditional drainage solutions (canalization) have forced an integral solution. The national and provincial authorities could use their supervisory role (and their subsidy resources) to force through an integral plan.

6.6 Conclusion

One of the objectives in this chapter is to evaluate institutional regimes at water basin scale from the perspective of the EU Water Framework Directive. This directive aims to make water management at basin scale more integrated, and through that more sustainable, by expanding the scope of water management, by getting citizens involved in water management, by streamlining legislation for water management, and by getting the prices right for water management services.

In the Dutch cases of this chapter we have seen that the *scope of water management* at basin scale has changed from a rather mono-functional and economically driven use orientation (land reclamation, gas drilling, recreation, drainage for agriculture) into a multi-functional perspective which not only focuses on resource use but also on resource protection (sustainable use). The recognition of new values, like open water, drinking water for the future, and natural resilience, has increased the extent of water management. In fact, we have shown that the increase of extent has been driven by a combination of national regime changes, EU policies, problem pressure and a few other change agents. As far as national regime changes are concerned, the adoption of rival values by physical planning around 1974 as well as the national regime transitions of 1985 and 1995 have been important for the recognition of natural values and the resilience value (natural flood prevention) of water basins. As far as EU policies are concerned, the Habitat and Bird Directives are becoming increasingly important for the protection of natural values, but are not fully implemented and used in that way. As far as problem pressure is concerned, societal

resistance to mono-functional water management, the gradual loss of natural values, and the increasing awareness of insufficient water security (due to river floods in the 1990s) have been of great influence. As far as other change agents are concerned, the gradual decline of the agricultural sector and the economic appraisal of natural values (for instance by means of subsidy programs) have been important triggers, inter alia.

The increased extent has been accompanied by an increased *participation of new users*. In addition to the traditional mono-functional users of water basins, which were already strongly represented in water management, citizens have become more involved in water management, especially as representatives of the new values and the common interest of sustainable resource use. Planning has been the most important instrument for providing them access, as we have seen in the case of land reclamation in the IJsselmeer around 1974, and in the other cases in the 1980s. Access rights in planning procedures have been formalized at the national level by the adoption of various legal provisions which aim at a broader deliberation of interests in water management. Access rights for citizens in the regional water boards have also been formalized at the national level. The increased participation of new users initially resulted in more complexity and fragmentation of water resource regimes due to rivalries between the different users that want to claim a specific use of the resource. In fact, the water basin regimes changed from a simple (mono-functional) regime into a complex (multifunctional) regime. A positive implication of the increased complexity has been that the 'new uses' went higher up the political agenda and that the 'old uses' have become the subject of an open debate with the public. However, in all cases it has been difficult to achieve an extra step from fragmentation to integration, and thus from a complex regime to an integrated one.

The way to integration is not only a matter of improving the internal coherence of public governance, but also a matter of improving the internal coherence of property rights, as well as a matter of improving the external coherence between public governance and property rights. With respect to the *internal coherence of public governance*, we have seen that the water basin *scale* has become more central in both cases. In case of the IJsselmeer, the provinces are playing a stronger role in addition to the traditional control by the state. In case of the Regge, the regional water board has gradually developed a total plan for the water basin as a whole. Looking at *actors and networks*, we have observed that participation of new users has increased. Looking at *perspectives and objectives*, we noticed that the extent has increased. Looking at *strategies and instruments*, we concluded that planning has been an important instrument for integration. In terms of *implementation*, we observed much more concerted action in the Regge case

than in the case of the IJsselmeer. With respect to the *internal coherence of property rights*, we have seen that in the cases of land reclamation and recreation in the IJsselmeer the deliberation of rival uses has increasingly been brought under land use controls. In the case of gas drilling, use rights are restricted by the obligation of an environmental impact assessment. In the case of the Regge, regional water boards are allowed to incorporate ecological considerations in their ordinances for water level control. Although these changes of property rights have increased the internal coherence, they are only changes in the sense that a careful deliberation of interests is required. They do not guarantee that the new uses may rely on a property right on their own. The only exceptions are the EU Habitat and Bird Directive, which really do attribute property rights to natural values, but which still are not put into effect in that way in the Netherlands. The consequences for the *external coherence between public governance and property rights* are that the Dutch consensual approach of deliberating interests by means of planning instruments does not always guarantee a proper protection of new uses, and therefore does not guarantee a high external coherence. For instance, in the case of land reclamation in the IJsselmeer it is still difficult to provide sufficient protection to the value of open water and water security. Even the requirement introduced (at the end of the 1990s) that local land use plans always need to be assessed by water boards in terms of water risks, is only a guarantee for interpolicy cooperation between municipalities and water boards, but not a redistribution of property rights. So the integration tendency in the Netherlands has mainly been a public governance driven tendency, and much less a property rights driven tendency.

How can one evaluate the Dutch situation with respect to the wish of the European Union to *streamline legislation* for water management at basin level? It is clear that the Dutch legislation has been streamlined to facilitate a better deliberation of rival uses. The Dutch streamlining has been rather weak in the sense of redistributing property rights among rival users. Until now, the Dutch have been very reserved in treating the EU Habitat and Bird Directives as a tool for redistribution of property rights. Another EU criterion is to *get the prices right* for water management services. Evaluating the Dutch situation from that perspective, we observed at least clear attempts to capitalize the value of new uses and to incorporate them into cost-benefit analyses. This has especially been the case for the value of open water and the value of drinking water reservoirs. In the Regge case we have seen that taxes are paid by citizens to generate revenues for nature development, as well as that subsidy programs have become available for developing a more natural water basin.

Considering the conditions that have been most important for more integrated water management at basin level, we may conclude that, speaking generally for the Dutch situation, the tradition of integrated thinking, which started in the 1960s, and the much older tradition of consensus and mutual respect have been influential in the evolution of water basin regimes towards more complexity and integration. Although problem perspectives in the cases started to diverge widely, and therefore the perspective of a joint problem mostly has been absent as a condition, in some cases the presence of joint opportunities or a credible alternative threat has been important as a condition for achieving a breakthrough. In all cases, institutional interfaces have been a most favorable condition, in the sense that national policy documents and national initiatives have been an important trigger for change at water basin level. This conclusion supports the image of the Netherlands as a so-called 'decentralized unitary state', in which a strong tendency towards subsidiarity and decentral autonomy exists, as long as it fits within a nationally harmonized approach. The history of Dutch water management has shown that national interventions in regional and local water management always followed after events that threatened the water safety of the country at a supra-regional scale. Although the Dutch have started to anticipate climate change through water management at a basin scale and by water boards as basin authorities, it is to be expected that the national authorities will again intervene powerfully after future calamities.

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Chapter 7

Comparing the transition of local water regimes in Europe

7.1 Introduction

This chapter contains a comparative analysis of the case studies in the Euwareness project. In these case studies we looked at the accessibility of water systems as a natural resource for various users and use functions. In that context we considered rivalries between users and use functions as an indicator of an insufficiently sustainable use of water systems. A water system means a discrete and homogeneous element of surface water or groundwater such as an aquifer, a lake, a reservoir, a stretch of stream, river or canal, an estuary, or a stretch of coastal water. We assume that the sustainable use of water systems requires an optimum distribution of use options among present and future users and use functions. An example of distribution of use options is the distribution between upstream and downstream users. An activity that pollutes water upstream (using a stream to discharge waste or waste water) could interfere with the downstream use of that stream for drinking water supply. Or an upstream weir could impede the downstream flow and flow dependent use options. Such rivalries not only exist between different (heterogeneous) use types, they may also appear among homogeneous uses (uses of the same type). In arid areas farmers may feel the need to co-ordinate the water use for irrigation. Or in the field of fisheries, quotas may be used as an instrument to prevent the depletion of fish stocks.

A water system is often demarcated as a river or water basin, which means the area of land from which all surface water run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea via a single river mouth, estuary or delta. This implies that a water basin not only includes the water beds, but also the surrounding area of land from which the water bed receives and transports the water run-off. In this view the land use of river

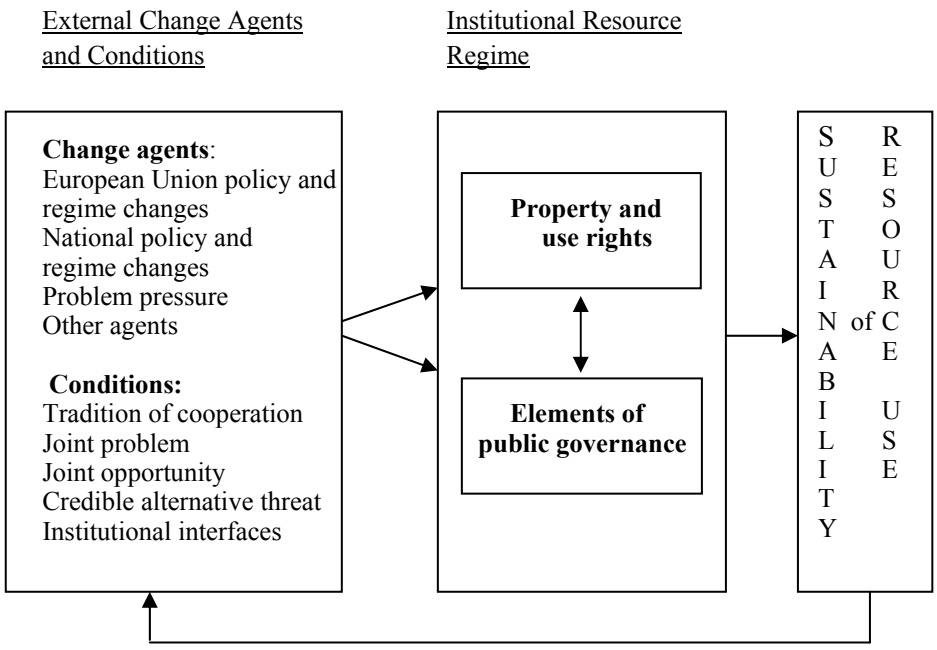
flood plains for urban development should be considered as a use that interferes with the use of flood plains for river dynamics and flooding. Another example of a water use rivalry in a water basin could be the rivalry between drainage of land for agricultural development versus the function of a minimum groundwater level for nature conservation in that area.

The main question for the researchers was whether the regime for the management of a water system provided sufficient guarantees for its sustainable use, by diminishing or preventing rivalries between users and use functions. To answer this question we focused on institutional regimes for natural resources, both from a public governance perspective (Bressers & Kuks 2001) and a perspective of private property and use rights (Ostrom 1990; Bromley 1991). The first perspective focuses on the management of natural resources from a public domain (although in interaction with private actors). The second perspective focuses on the accessibility of a natural resource in a broader sense, including the private domain, the domain of collective property and use, as well as the domain of 'no property' (res nullius). By applying both perspectives in a complementary way, we have developed a framework for understanding the access rights that users or use functions may possess or claim, and the proportion between and exclusiveness of the various domains. For instance, the option of having intervention from the public domain could be blocked by the existence of a private domain based on long term concessions for water use (which, especially in Spain and Switzerland, appears to be a problem of redistributing water access rights). On the other hand, attempts initiated by the public domain to redistribute private property and use rights could be effective in providing a better access to or protection of alternative users and use functions. Another question could be how the exclusiveness of the public domain is interpreted by public authorities. Does the public domain offer equal access to society as a whole, or are specific users and/or use functions discriminated against in favor of others? A public domain could appear as a private domain in the hands of society at large, or as a 'no property' domain, owned by no one and thus equally accessible to all.

We interpret 'regimes' as institutional resource regimes, comprised of a public governance component and a property rights component. The combination of those components can be more or less integrated and influences the sustainability of the use of the given natural resource. In turn, these regimes, or rather their property rights and governance components, are influenced by external change agents, which leads to regime change.

Figure 7.1 illustrates these dynamics[1] as will be investigated in the case study comparison.

Figure 7.1 Research model



As the figure shows there are three groups of variables. These are linked by the central relationships in the research questions:

1. How far do more integrated water resource regimes lead to more sustainable resource use?
2. What change agents and conditions cause shifts towards more integrated regimes?

The integration of the 'institutional resource regime' is the central variable. Question 1 should show the results of such integration. Question 2 should provide explanations for it.

In the next section, we start by explaining the regime components, the factors that might contribute to the integration of resource regimes, and our expectation of how more integrated regimes might benefit a more sustainable resource use. Section 3 goes into the methodology of the study

[1] We acknowledge the existence of several other possible feedback relations, but they are not presented in the graph since they receive less attention in our discussion.

and the comparison. Section 4 shows the results of the comparative analysis. Section 5 concludes with an outlook on the implications of these results for the European water management policies.

7.2 The public governance and property rights components

7.2.1 Governance

On the concept of 'governance' we will be very brief here as this subject is also dealt with in chapter 2. There the following five elements of governance are stipulated:

1. Levels and scales of governance (Where? - Multi-level)
2. Actors in the policy network (Who? - Multi-actor)
3. Problem perception and policy objectives (What and why? - Multi-faceted)
4. Strategy and instruments (How? - Multi-instrumental)
5. Responsibilities and resources for implementation (With what? - Multi-resource-based)

This elaboration of governance is used in the Euwareness study, for instance to determine the degree of coherence of governance.

7.2.2 Property and use rights

Property rights arrangements are the second important component of an institutional resource regime (cf. Fuchs 2003). In the context of resource research, the property rights approach is particularly worthy of mention (Bromley 1989, 1991; Bromley & Hodge 1990; Burns & Dietz 1996; Feeny et al. 1990; Schlager & Ostrom 1992; Libecap 1993; Devlin & Grafton 1998), specifically the common-pool resources theory (Ostrom 1990; 1992a; 1992b; 1994; 1997; Ostrom et al. 1994). According to Ostrom, property and use rights exercise a decisive influence on the use of natural resources in that they determine who has access to the resource and when and in what form it can be used. They define the position of interacting individuals in the community with respect to the utilization of scarce resources (Pejovich 1975: 40; Young 1994). As Stubblebine (1975) argues, the definition of property rights becomes necessary as soon as two individuals share a living environment. Robinson Crusoe didn't need them, until Friday's arrival on the island. Property rights are created or changed in response to economic

forces, as opportunities to gain arise (North 1989: 1324; Feeny 1988: 273; Ensminger & Rutten 1991).

Property rights generally include the rights to use and consume the asset, to exclude others from the use of the asset, to change its form and substance, to obtain income from it, and to transfer these rights either in their entirety through sale or temporarily through, for instance, rental (Barzel 1989; Furubotn & Pejovich 1975; Kasper & Streit 1998). They are generally not unrestricted. This fact is important to remember in the context of debates on the environmentally desirable property regime. Private property rights are often treated as absolutes, which in reality they rarely are. Rather than having to choose between private property regimes, common property regimes, and state ownership, the imposition of some constraints on private property is often a reasonable alternative. Governments, for example, often impose regulations limiting the owners' options in terms of how they can use their resource.

Property rights should be conceived of as bundles of rights. With respect to environmental resources, for instance, property rights exist and frequently differ for the stock of a resource and the produced yield or the goods and services derived from a resource. 'Ownership of the resource' would thus pertain to a specific bundle of rights the owner holds with respect to the resource. The owner may, for example, hold the right to farm the land, but not to kill rare species on the land. What specific rights are regarded to be 'normally' included with the property title and to what extent these rights can also be unbundled, differs between different periods and cultures, and also between resources or other goods. Different 'property regimes' are likely to exist with respect to the attributes of many environmental resources. Property rights and regimes for such a resource thus tend to form a complex structure with several layers and dimensions.

In the context of the Euwareness project, the 'coherence' of this layering of property rights is of particular importance, because some combinations of property rights can also evoke rival demands for water resources. Farmers' rights to extract water for irrigating their land can rival each other in times of scarcity, such as in Ostrom's early irrigation studies, focusing on homogenous uses. In both the case of scarcity in a homogenous and heterogeneous use situation, property rights compete with each other. For instance, this is for instance the case when some farmers have the right to use a pond as a source for irrigation water, while the local fishery association has the fishing rights for that small lake. The objective of policy intervention in the context of an institutional resource regime, then, can lead to a co-ordination and harmonization of rights to different attributes of the resource

and pursue sustainable management through a reduction in conflict between these rights.

7.2.3 Change toward more complex resource regimes

In general, we expect the elements of public governance (and the regime in general, i.e. including property rights) to exert a stabilizing influence on each other. This stabilizing influence occurs through processes of mutual adaptation of values, cognitions and resources. Thus, while changes in the elements of the governance pattern can be caused by changes in other elements, ultimately these changes must have external sources affecting one or more elements from the outside. Mutual adaptation mechanisms that, without external 'disturbances', have a stabilizing influence become the mechanisms by which substantial changes in one of the elements are followed by responding changes in other elements, resulting in complete regime changes.

Sources of change

In principle, external change agents can enter the scene through all of the elements that are discerned in the regime. There is a difference, though. Property rights might be conceived as somewhat more stable and less oriented towards invoking change than the elements of public governance. That means that, although property rights may act as a powerful context for developments in public governance, changing governance patterns is not their subject per se. On the other hand, interventions from the governance side often have the specific and deliberate intent to change property rights.

External change agents for the governance pattern stem from changes in political institutions, in the general policy process or policy processes in related fields, the spectrum of technological, demographic, and cultural developments mentioned above, as well as feedback from the actual problem situation. Examples, are some specific and general external sources of change linked to the five elements of public governance (cf. Bressers & O'Toole 1995):

- Levels and scales of governance: Rise of the European Union;
- Actors in the policy network: Rise of environmental and nature organizations;
- Problem perception and objectives: Rise of environmental degradation information;
- Strategy and instruments: Rise of general ideological preference for indirect and procedural instrumental strategies; and

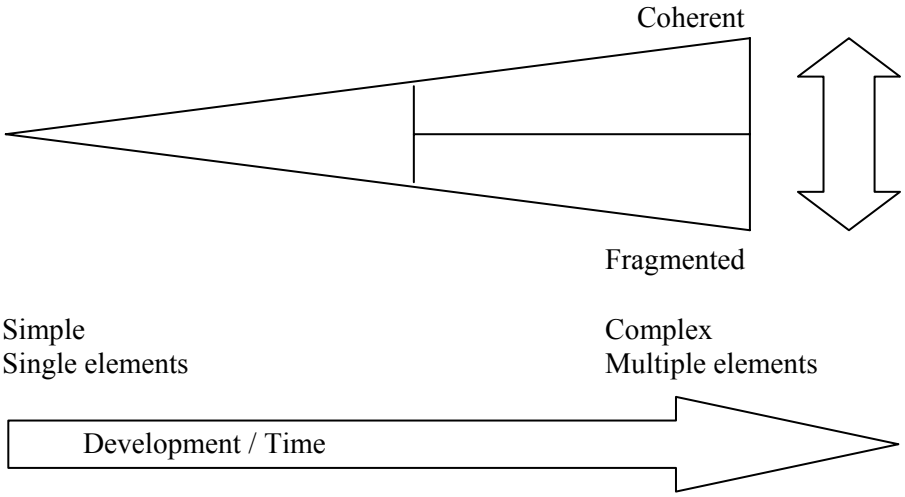
– Responsibilities and resources for implementation: Rise of proportion of (relatively) independent and businesslike organized implementation organizations, including privatization of water management.

While these fundamental sources of change agents are grouped by separate elements of the regime, we will use in the empirical research uses a general categorization of the more direct change agents that evolve from these fundamental ones:

a. European Union originated policy pressures;
b. National regime developments;
c. Problem pressures;
d. Various other pressures (e.g. rise of environmental NGO's).

These groups of change agents can be related to the development of regimes. The regime can be portrayed as moving from one stage to another. As long as one acknowledges that various intermediate and mixed situations are possible and probable, such stages can be a useful heuristic.

Figure 7.2 Regime developments



The integration of regimes can be described in terms of extent and coherence. The extent of a regime is the scope of the uses and users that are regulated by one or more of the regime's elements. Coherence is the degree to which these elements fit together. Very simple regimes regulate only one resources use or user. It's the way - in theory previously unregulated - resources begin to be a subject of regimes. Furthermore, relatively singular (or simple) regimes (one level, one governing actor, one problem aspect -

e.g. a certain use or user - one instrument, one implementing agency) will not need coherence. Only after growth in complexity does coherence become a relevant concept. But then, it is by no means a logical follow up. Complex but fragmented regimes are empirically quite common.[2] While more complexity is part of a stream of societal developments that seem to increase as time goes by, both coherence and fragmentation seem to be common developments.

When we speak of complexity it means that regimes can be characterized by multiple formats in most of their elements. The most eminent feature is the gradual increase of the domain of the regime, that is the uses and users regulated by one or more parts of the regime. We will refer to this crucial variable as the regime's *extent*. Regimes with an insufficient extent are by definition weak as guardians of sustainable use, while some relevant parts of the domain go unregulated. With it also comes an increase in relevant property and use rights. The elements of governance tend to differentiate too: more layers and scales, more actors, and more perceptions of the problem and accompanying goals are involved, more instruments are part of the policy mix and more organizations share responsibilities for implementation.

Thus, complexity as such is not wrong. Most of the time, growing complexity is an answer to real needs and developments. Societies generally grew into more complexity during most of modern times. The sector of water management is no exception to that general course of development. A growing complexity in governance can be viewed as a logical adaptation to that development. This leads to the first hypothesis:

Hypothesis 1

The observed change agents (in the period and context of our cases) will lead to more differentiation in the regime (resulting in more complex regimes), but not without additional prerequisites to more coherent regimes.

7.2.4 Change toward more coherent regimes

While the growth of complexity in water management regimes seems a fairly straightforward part of a more general development in society, integration as

[2] In fact, while integration has clear theoretical advantages, it comes at a price. Every form of integration creates the need for additional interaction and increases transaction costs, at least initially.

a development is not. (See Figure 7.2) While the term 'integration' is common in most policy papers (e.g. 'integrated water management'), in this project we choose to use the term coherence instead, for the reason that, in most policy papers the term integration is used in a sense that implicitly or explicitly includes an increase in the domain of the regime, the extent to all relevant users and uses. Therefore, we believe that integration as it is used in the policy sphere is a combination of what we call *extent and coherence*. For the sake of conceptual clarity and the possibility to adapt to the meaning of the term integration in policy practice, we use these terms further when appropriate, and reserve 'integration' for the combination of the two.

The resource regime consists of two components and their mutual relationships: the regulative system of property and use rights and the public governance system. Consequently we discern three forms of coherence:

1. internal coherence of the public governance component of the regime,
2. internal coherence of the property rights component of the regime, and
3. external coherence between the public governance and property rights components.

By *coherence of the public governance* component we mean the following. When more than one layer of government is dealing with the same water resource (as is often the case), then coherence means inter alia that the activities of these layers of government are recognized as mutually dependent and influencing each others' effects. When more than one actor or target group is involved in the policy, coherence means that there is a substantial degree of interaction in the policy network. When more than one use or user is causing the sustainability problem, coherence means that the various resulting objectives are analyzed in one framework so that deliberate choices can be made if and when goals are conflicting. The same holds for instrumental strategies that are used to attain the different objectives, as well as for the different instruments in a mix to attain one of these objectives. To conclude, coherence of the organization of implementation means that responsibilities and resources of various persons or organizations that are to contribute to the application of the policy are co-ordinated, or these actors themselves are co-ordinated.

The *internal coherence of the property rights system* is threatened when property or use rights are given to actors for uses that threaten uses already granted to others. This can have several background reasons. Sometimes use rights that were long seen as non-rival and thus compatible can become rival ones by a drastic increase in use, or by the use of new techniques. The internal coherence of the property rights system is thus the degree to which

the interdependencies in the water system and its management that occur in reality are reflected within and between the property and use rights. The essence of this variable is that property and use rights of one actor do not inherently or under given circumstances make it unavoidable to clash with other rights and/or with the sustainability of the resource, without external intervention to prevent it.

The two components of the resource regime lack *external coherence* in case of a mismatch between actors targeted by the public governance system and actors with relevant property and use rights. In the second place a mismatch of the goods and services involved in both systems might also lead to a lack of coherence and thus change towards more coherence.

Important change (even if they involve change towards 'consensual management' or the like) often involves some kind of conflict, struggle or manipulation, with losers also involved. Even though these changes are heading towards integration, the change process itself will often involve overt or hidden conflicts (as observed in several of the case studies). Such opposition can also lead to 'failed' or partial regime shifts towards coherence, when changes in one element of the regime are encapsulated, rather than followed by matching changes in the other elements of the regime.

So, a change towards coherence occurs only when relevant actors acknowledge that coherence is necessary to prevent further deterioration of the resource and take action. Coherence is not a spontaneous development. Unlike an increase in complexity, then, developments in the direction of more coherence need some sort of deliberate attempt by motivated actors. This all leads to the question under what conditions such attempts will be relatively successful.

Conditions for coherence

Change agents and conditions belong to the same set of causal factors. We distinguish them for the reason that the 'conditions' are often forgotten. Causal explanations are often sought in the form of 'new' and 'provocative' factors that are labeled as the 'causes'. In reality, this image of causality often forgets the array of factors to which the analyst is used as being the 'normal' status (causal factors that one is inclined to forget about). It might then be delusory to think that the 'causes' really are the complete explanation of what happens.

A simple example may clarify this. When a fire burns a house and one seeks the cause, one will be looking for sources of fire (e.g. an electrical short circuit) and exceptional forms of flammable material (e.g. a leaking

cooking gas container). That there is a great deal of flammable material and sufficient oxygen in a normal house will be considered 'normal' or not even considered at all, while these factors are, of course, as essential as the previous ones.

In our cases, the division between the 'extraordinary' causes (that we labeled 'change agents') and the 'normal' conditions are not as clear cut as in the example. Nevertheless, also in the case studies analyzed in this chapter similar change agents sometimes set in motion a development towards coherence. Compare similar seeds sown in different seedbeds. For us, the reasons why similar problem pressures all over Europe and similar EU and even national developments have dissimilar effects on water management regimes at the case level are interesting. Here the 'conditions' enter the picture. We hypothesize the following relationships:

Hypothesis 2

Attempts to change regimes into a more coherent status will have relatively more success when:

- There is already a longer *tradition of co-operation* in the water management sector.
- There is a common understanding that the counteracting (side) effects of non-integrated water management harm sustainability and that this sooner or later will have to be stopped anyhow (*joint problem*).
- There is a notion of possible joint gains from coherence, so-called 'win-win situations' (*joint opportunities*).
- There is a credible threat of a dominant actor accumulating power and altering the public governance pattern in his interest when no solution is reached (*credible alternative threat*).
- There are well functioning institutions that provide fertile ground for coherence attempts (*institutional interfaces*).

(see appendix 7.1 for indicators for these types of conditions)

7.2.5 The sustainability implications of more integrated institutional resource regimes

The sustainability of a given institutional resource regime depends on its property and use rights component, the public governance component, and the interaction between these. The expectation that more integrated regimes will ceteris paribus perform better for sustainability is part of European political ideology on water management. Here we will theoretically underpin

this relationship only briefly. First we make some remarks on how we dealt with the variable 'sustainability of the use of the natural resource'.

There are many indicators that can genuinely be considered to represent aspects of sustainability (cf. the 'good status' as specified in the EU water directive - see Chapter 3, section 3.3). It is not the purpose of our research in this book to assess the overall sustainability of the resource use. Though, for various reasons, it is hard to give an overall assessment of the sustainability of the regime, it is less difficult to assess whether the concrete regime changes lead in the direction of more or less sustainability.

The overall sustainability of resource use was beyond our capacity as social scientists to judge. Furthermore we were especially interested in the effects of the observed regime changes. This starting point is also part of the solution to the first problem. The assessment was concentrated on the *implications of the observed regime changes* for indicators that are relevant to sustainability. Developments in sustainability of use that clearly had nothing to do with observed regime changes, for instance climate change or rapid economic development, were excluded from the judgment.

The balance between environment, natural resource protection and risk avoidance on one hand and the economic and social implications of these ecological changes and/or measures taken to achieve them on the other hand is a hard nut to crack. We weren't inclined to judge in favor of increased sustainability without some ecological improvements, even though economic or social indicators might have improved. Here we also paid attention to the relevant EU 'good status' indicators.

That a sufficient *extent* is a precondition for a benign effect on the sustainability of the use has been previously explained. Non-regulated uses and users will tend to disrupt the regime effects on sustainable use.

The *internal coherence of the property and use rights component* is important for the sustainability of resource use since such coherence enables stakeholders to better come to an agreement to guard a sustainable use even without government interference (Ostrom 1998; Sandler 1992).

The *internal coherence of the public governance component* is important because it lessens the chance that negative side-effects of one element (level, actor, instrument, etceteras) undo the positive effects of another element (cf. Ligteringen 1996). Stronger coherence will also increase the visibility and feasibility of chances to create more synergy of the various elements. More coherence can also lead to less initial uncertainty, and increase in information exchange and trust, important for dealing with uncertainties (cf. Arentsen, Bressers & O'Toole 2000). The chances also get better for productive combinations of motivation, information and balance of power

with the actors involved in policy implementation processes (cf. Bressers 2004).

The *external coherence between the property & use rights component and the governance component* deals with the degree to which the proper connections are made between the elements of governance (for instance policy instruments) and the relevant aspects of property and use rights. For instance: are the actors that hold the relevant property and use rights also the designated targets of such policy instruments?

All in all this leads to the last hypothesis:

Hypothesis 3

a) Regimes with a deficient extent will be more likely lead to degradation of water resources or inability to protect the ecological functions of the water resource, than regimes with a larger extent.
b) Regimes with a large 'extent', but with low coherence will more likely lead to degradation of water resources or inability to protect the ecological functions of the water resource, than regimes with a similar extent but a higher degree of coherence.

7.3 Case study design

7.3.1 Selection of cases

In the research on which this chapter is based, the Euwareness project, two cases are studied in each of the six participating countries. The main criteria for the selection of the cases were:

- The demarcation of a case should follow the hydrological and geographical boundaries of a water basin at a regional scale or with a tributary character.
- We have been looking for cases of rivalry between heterogeneous / homogenous uses/users of the same water resource. We preferred cases where several rivalries show up to allow intra-case analysis. It was not necessary that these rivalries are manifest in the whole case area, they might also be at stake in just a part of the case area.
- There was a preference for cases where not only public ownership but also private ownership of water resources could be found.
- Cases should be selected on the presence of at least attempts to obtain transitions towards more coherence during the last two decades.

The sample of case studies is based on a combination of similarities and differences. In some respects, it seeks similarities (e.g. medium size river basins) that define boundaries of the research subject. In some respects, it deliberately encompasses different situations (e.g. 'wet' cases and 'dry' cases). But the most significant decision has to do with how the cases relate to the three main variable-groups, since these relations influence the inferences that can be drawn about the hypotheses that relate to these variables.

There are various modes of sample selection, depending on the sort of inferences one wants to make. On the surface, the last mentioned criterion, namely that there should be the ex ante impression that a serious attempt to attain more integration in the regime took place in the proposed case, looks similar to the other (similarity) criteria. Nevertheless, this criterion is a combination of an extreme case sampling strategy and a random variation driven strategy (cf. Patton 1980). It is extreme case sampling in the sense that it leaves out all possible cases where there is no ex ante evidence that attempts towards more integration have been made. The implication of this is that if we don't find improved factual ('real') integration in our cases, the chances are slim that we shall find it on any large scale outside of our sample.

It is also a random variation strategy though, since any attempt to attain more integration surely doesn't imply its success in close observation. On the contrary, we expect to see anything, from major improvements to only symbolic alterations and everything in between, due to the various conditions of the case. To re-use a metaphor from above: we confine ourselves to cases where seeds have been sown, in the expectation that these will be shown to bear fruits to very divergent degrees. This gives us the opportunity to make an inventory of change agents observed and test expectations about beneficial conditions. On a separate case level, the disadvantage is that in case that in practice little or no regime change towards more integration could be shown, it is not possible to look for sustainability effects of these non-existent regime changes. Nevertheless, on a comparative level we'll find some variation in the independent variable, with the hypothesis to be tested that improved integration will show connections with some improved aspects of sustainable resource use.

7.3.2 Case study protocol

The case studies had two stages. The first one is a descriptive one, in which the emphasis lies on the story or stories to be told. The second one is an analytical one in which the values of the variables are assessed that play a role in the theory that is used in the intra- and/or inter-case comparisons to

arrive at an answer to the research questions of the project (Dente, Fareri & Ligteringen 1998). In many cases, the case study will contain more than one story of regime change. This may imply developments that can be seen as partial coherence in geographical sub-units of the case study territory or between certain aspects of the resource use but not between others. Our proposal was not to submerge these sub-stories and force them into one over-all case description, but to pay separate attention to them against the background of descriptions of the more general case situation and development. Some of the cases contain general more or less independent developments or 'stories'. In these examples, *sub-cases* may be discerned. There is only one case-story under the following conditions:

- If there is only one (major) or at least only one selected rivalry;
- If there is only one line of development or only one aspect with which the regime has changed;
- If the regime changes observed are highly interdependent; and/or
- If the rivalries in the case are highly interdependent.

If none of these statements hold true, we discerned separate sub-cases when analyzing the variables and hypotheses. A sub-case is then a set of observations for which the above criteria *do* hold.[3] In many instances, this also meant that not only regimes on the water resource, but regimes on land use, nature protection and other natural resources (e.g. fish) were also at stake.

The analytical part of the case studies consists of the assessment of relevant variables (translating 'real life' observations into theoretical language) and the inferences and conclusions that can be based on these variables and their relationships.

As an aid to the comparative analysis, questionnaire forms were used for the case study researchers to fill in. These 'case study fact and assessment sheets' represent the variables and indicators of the theoretical model. Their purpose was to summarize the case information in a uniform format so that it case is comparable along the lines of the theoretical variables and hypotheses. The exercises of filling in the forms also proved very helpful in getting a grip on the case analysis itself.

Apart from the few short statements per variable ('key facts'), the researchers were asked to use a five-point scale to score the variables in

[3] Compare a detective story in which more than one murder takes place. If these are interconnected it makes no sense, when analysing the plot, to divide them into sub-cases, but if they are just connected by the fact that they take place in more or less the same period, they will probably have quite different plots that require separate attention when analysed.

order to make the cases comparable. Of course such a score is not a fact, but a judgment, much like marks are with school test papers. Therefore, we also wanted to know the most relevant facts that they had in mind while scoring ('key facts'). While it might give a case study researcher an uncomfortable feeling to transform observations into scores, in fact, it gave them an influence on the way the case study comparison is made. For when comparing cases one always makes, explicitly or implicitly, these kinds of judgments on the rating of variables. We chose to do so explicitly.

The great advantage of this procedure is that the people who do the assessments have extensive and intensive knowledge about the cases at hand, often even more than they described in the reports. In this way, we tried to combine the best of both worlds: the depth of information realized in extensive case studies and the clarity and overview of a data-matrix enabling all kinds of comparative analysis (cf. Patton 1980). Compared with the direct, qualitative comparison of the case studies as reported, the approach diminishes the risk of bias that the comparative analyst is mislead by surprising, but anecdotal evidence of only one or two cases not representative of the relationships in the whole sample.

Since sub-cases are treated as equal cases in the analysis of the assessments of the relevant variables, cases that are split into sub-cases are in a sense over-represented in the data for the comparative analysis. Therefore, we also constructed a 'weighted database' in which all cases were assigned four units of research. That means that when a case is not split into 2 or 4 sub-cases but analyzed as a single case, that case was included fourfold in the 'weighted database'. All the analyses were also done with this 'weighted database'. Rarely, though, did the results differ.

In addition, one might question whether the case study researchers were not unconsciously inclined to 'fix' the case by assessing the variables not independently of each other but having the scores on dependent variables influenced by their assessment of independent variables or vice versa. The demanded association with mentioned 'key facts' already gave some protection against this. Luckily, we were able to test this possible form of bias. In the theory, both the forces of the change agents and the conditions for change explain regime change. The latter are the less 'visible' elements of the causal set. In the case study reports, far more attention was paid to the various change agents than to the conditions. This is often a large part of the story in the reports. If the suspected form of bias were real, then one could expect the variables of 'degree of regime change' and 'force of change agents' to be scored by the researchers in such a way that they would correlate strongly. But the opposite is true: the force of change agents proved

afterwards to be far less correlated with regime changes than the conditions are. This attests that the researchers assessed the variables independently on their own merits.

7.4 The results of the comparative analysis

This section presents the results of the comparative analysis. This is based on the assessments of cases (including sub-cases) by the researchers of the main variables of the theory. These assessments were based on ordinal scales with five values. The 24 (sub)cases and 13 variables per case are of course too many to be handled in a purely qualitative way. Therefore the analysis below mostly uses descriptive and analytical statistics that are apt for ordinal level variables. Some of the main conclusions are illustrated by real life examples from the case studies. [4]

In this section we start first in 7.4.1 by presenting the developments for the central variable, the regime changes. Thereafter we relate them first as independent variable with the sustainability of the resource use. In 7.4.3 the regime changes are themselves the dependent variable and we consider which incentives and circumstances have influenced them.

7.4.1 Regime changes

What interests us here is the degree to which the listed aspects of the regime, separately and as a set, moved in the direction of more integration (extent and coherence) in the cases studied.

The *extent* is the degree of completeness of the domain of the regime in terms of relevant uses and users. In most of the cases and sub-cases in the study the extent of the water resource regime changed positively, in many cases even to include more or less all relevant uses and users. Almost always the introduction or the increase in valuation of the protection of the environment and nature are part or even the core of the extent changes. Sometimes new human uses like tourism are the extra issues that are taken into account. Where ecological values were already incorporated, new issues might arise, like diffuse agricultural pollution.

The *internal coherence of public governance* is the degree to which the interdependencies in the water system and its management that occur in reality, are reflected within and between the contents of the elements of public governance. The internal coherence of public governance generally

[4] These illustrations are derived from the case studies that are described in Bressers and Kuks (2004).

increased too, but less than the extent. Almost nowhere could a 'full coherence' statement be made and in several instances only small improvements occurred. The changes in the internal coherence of public governance in most cases included aspects of all five elements of public governance: levels and scales, actors and networks, perspectives and objectives, strategies and instruments, and responsibilities and resources for implementation.

Illustration 1: Remaining difficulties with non-river basin jurisdictions
In France the SAGE process has generated a collective dynamic. Among other things the extent of the regime that was slowly built before, was quickly enlarged. The SAGE process could build on the gradually increased openness to cooperation that emerged over the last 25 years. The SAGE procedure has led to awareness of most (and new) stakeholders that they are not the only one 'main' user. But that doesn't always imply that there is participation from all actors or this participation is dedicated to reinforcement of collective action, but rather considered by some powerful users as a way to get information that helps them to keep their power. They proceed actually in behind-the-scene negotiations. Therefore, the participation is often only to defend one's own interests. Some powerful actors, like industrialists, abstain from further participation once their interests are safeguarded, mainly because their management of water and wastewater relies upon technical supports (i.e. when their demand is satisfied they often don't see an interest in participating any more since they cannot really get more assets).

The main problem remains that there can be lack of co-ordination or even competition between state administrations at the regional and departmental levels. There can be incoherence in rules and public actions when administrations share the same river. In the case of the Sèvre Nantaise, where the river is the boundary between two Departments, you can take all the water you want on one side, while it is forbidden on the other side. (*Isabelle Verdage, Jean-Marc Dziedzicki & Corinne Larrue, Sèvere Nantaise case study)*

The *internal coherence of the property rights* is the degree to which the interdependencies in the water system and its management that occur in reality, are reflected within and between the property and use rights. The essence of this variable is that property and use rights of the one do not inherently or under the given circumstances cause rival uses to unavoidably affect the sustainability of the resource, without external intervention. With the internal coherence of the property rights the picture is somewhat more differentiated. In two cases no improvement or even new inconsistencies occurred. But there were also four cases with a rather complete (change to) coherence in this respect. Generally when absolute limits of the resource are at stake (water, fish) the property and use rights are used more for self-regulatory regimes, than when the protection of the quality of the resource (water, landscape, shores) is at stake. For the water resource in a stricter

sense this means that predominant protection by property and use rights occurs more in the 'dry' cases than in the 'wet' cases. In 'wet' cases property and use rights are often restricted and must give way to public governance in order to improve the sustainability of the resource use. At least, this seems to be common practice.

Here, for instance, developments were reported like the transfer of shares in relevant private and public companies, privatization, gradual acceptance of the water body as a common good, the lack of introduction of concession system with new uses, introduction of tradable fishing rights, multi-level issues like state ownership as a basis to allow new uses (e.g. to issue gas drilling concessions), while provinces and municipalities hold the public authority to protect other uses, the redistribution of property and use rights, disposition rights, the buying of land by a user or a public authority to solve conflicting property and use rights, expropriation for similar reasons (rarely and sometimes on the basis of 'expropriation agreements', as in Spain), regulatory unification of the property of land and water, the organization of users, the acknowledgement of traditional and 'de facto' use rights of some users, agreements (between fishers and kayakists or irrigators and fishermen) to share water use and the withdrawal of informal use rights.

The *external coherence between public governance and property rights* is the degree to which the interdependencies in the water system and its management are reflected in the interdependencies between public governance and the property and use rights. External coherence between public governance and property rights changed considerably in half of the cases for the better and only modestly or less in the other half.

Here the following developments were reported, among others: expired use rights were gradually transferred to other (public or semi-public) institutions, the aim of minimal water flow was incorporated as a sort of use right for environmental protection, an EU inspired programme gave compensation to farmers for not exerting their use right to part of their farm land, some technical measures required new responsibilities and resources for implementation that demanded changes in property rights, adaptation of use rights to public policy aims, voluntary restrictions of the property right holder accepting public policy aims (one of the Belgian cases), the localization of drinking water industry was problematic but not considered as a question per se, subsidies allowed the regional administration to influence nature management by owners, modification of property rights by creation of zones that were liable to flooding, concessions were given by law to user communities, a policy plan to improve the information for self-governing user communities by the development of a census to prevent free riders and by studies, creation of (semi-)public bodies or platforms where

practically every user is represented, policies opening up to take also other users than those with a use right to the water itself into account (tourists, fishermen, nature), incorporation of relevant use right holders (farmers, tourists) as targets in public water policy.

The *overall assessment of the regime change* is clearly that in most cases there were considerable improvements on many of the important aspects. Nevertheless seven occasions of more or less failed attempt to regime change and 3 occasions where the results were better than average and where at the end of the case period one could really speak of integrated water management also occurred.[5]

Illustration 2: An example of broad improvements

In the Matarranya river process, there are clear signals of regime change, both regarding extension and coherence of the water regime. The extension of the water uses increases as it includes irrigation, population supply, cattle rising, nature protection and tourism. Rivalries between users can be interpreted in territorial terms (intra-basin driven rivalries). There is also an increase of public governance coherence, as it regards levels and scales, multilevel interaction and networks. The most relevant event proving the increase of governance coherence is the Water Agreement reached by the main actors operating at the river basin level. This agreement is the outcome of a process in which a wide range of actors operating at different scales of governance interact: the regional government promoters environmental initiatives; local actors appeal to EU regulation as a legal resource by local actors; the Central Union of Irrigation Communities is created as a body representing all irrigation communities at the basin; PLADEMA - an ad hoc local association - aggregates and mobilizes actors against the construction of hydraulic works; the Ebro river basin administration negotiates with the local irrigation communities; and the Ministry of Environment finances the construction of lateral pools. These actors, especially those located at the river basin, share a perception of risk caused by an extreme situation of drought among the basin actors and progressively adopt a new water culture.

Regarding the internal coherence of property rights, some improvements can be identified: the Ebro river basin Plan establishes water needs and uses as well as a minimal ecological flow; some maladjustments between legal aspects and real practices of the CHE and the Central Users Community increase its level of influence regarding decisions on the watering out of the Pena dam and the distribution of water; traditional use rights of some users are respected; and a

[5] While 7 of the 12 areas studied were analyzed as single cases and the other 5 split into 17 sub-cases, one might suspect that the sub-cases are on average more coherent than the single cases, while each sub-case only deals with a part of what is relevant. We tested whether such an artificial 'coherence' bonus was indeed observable in the assessments. This was hardly the case. The assessments of the internal coherence of public governance, the internal coherence of property rights and the external coherence were almost the same with the single (un-split) cases as with the sub-cases in the sample of 24.

kind of de facto use rights are given to illegal users of water by the Irrigation Communities of the basin. After the signature of the Water Agreement, the external coherence between public governance and property rights improves to a certain extent. All the main water users have proved to be able to negotiate and reach an agreement based on a common perception of the river as a key element for the future development of the basin. (*Meritxell Costejà, Nuria Font & Joan Subirats, – Matarrana River case study)*

7.4.2 Implications of regime changes for sustainable use

The approach to the assessment of this variable (-group) is the following: the researchers started with the rivalries that are at stake in the case story or stories. In the first instance, the assessment of the changes in the sustainability of the resource use is limited to the natural/environmental indicators that are directly at stake in these rivalries. Without any ecological improvements the researchers were not inclined - in wealthy Western Europe - to judge an improved sustainability even when economic parameters would have improved. In the second instance, the social and economical development consequences of the changes in these indicators and/or the measures taken for this purpose are also taken into account. In the last instance, a marginal check was performed to see whether the observed changes had important side effects on other natural resource/environmental indicators and whether these in turn had indirect social and economic consequences.

Illustration 3: Rivalries and ecology
In the Idro Lake and Chiese River case the problem generates from conflicting interest of the various users of the lake and the water basin. The conflicts occur between water uses for agriculture, hydropower production, tourism, ecological balance, and protection from risks related to flooding, soil erosion, and land sliding. As a response the use of water was managed not only accounting for water needs, but also for water availability. Environmental and land conservation was supported by the maintenance of a constant minimal vital flow, even in summer and controlling the speed of lake depletion. The maximum water-storage level was reduced to avoid the risk of flooding. (*Bruno Dente & Alessandra Goria, Idro Lake and Chiese River case study*)

Often the picture for the *economic consequences* is somewhat mixed. As negative economic consequences we found the financial costs and/or restrictions for the sectors involved (agriculture, fishery, resource extraction or industry) and in some cases higher water prices are mentioned. On the positive side the following economic phenomena were often mentioned: gains for tourism, avoidance of future costs, job creation and job safeguarding, and an improved natural resource basis for further economic

development. Occasionally lower water costs and increases in productivity were also reported.

Illustration 4: Nature reserves
In the Dender basin, the structure of the economy is modifying. The relative importance of industry and agriculture diminishes as tourism is increasing. In this context changes in the ownership of land are occurring. In fact, associations for the protection of nature buy land to the farmers. Their purpose is to develop natural areas, creating 'green corridors' throughout the region. This activity was initiated and is still supported by the Region. The Flemish Region subsidies the acquisitions. Nature associations negotiate with individual farmers. The farmers are often aged and then get additional financial resources (to the pension). The two groups of actors benefit from the subsidies of the Region that still manages the conduct of the policy. (*David Aubin & Frédéric Varone, Dender River Basin case study)*

Illustration 5: Tourism development in the Vesdre basin
The low quality of the Vesdre creates rivalries. Pollution prejudices the development of tourism, the only economic reconversion expected for this former industrialized area. At the same time purification of urban wastewater has come compulsory. The tourist sector and the water purification sector are mutually supportive. In both cases the European Union plays the role of institutional interface. In the first place it allocates structural funds. The valley of the Vesdre is classified as an area in economic reconversion. Both tourism development project and purification plants benefit from the subsidies. In the second place, the EU compels the Member States to purify domestic wastewater. As a consequence, the competence authority, i.e. the Walloon Region, developed an ambitious catch up policy and raised the necessary funds. The Vesdre river basin is one of the main recipients. This context should allow of tourist activities in the valley to take off. (*David Aubin & Frédéric Varone, Vesdre River Basin case study)*

While the economic consequences were mixed, the *social consequences* were often very positive and remarkably varied. The only negative social consequences mentioned were limitation of land ownership rights and a negative impact on the landscape, both mentioned once. By contrast, the positive social consequences include: modernization of agriculture, development of new associations of people, more open public debates and more information for the people in general, improved feeling of safety, prevention of population decline and maintenance of young population, fairer distribution between upper and lower communities, resolution of conflict in the local area, improved living conditions, and the reinforcement of the qualities of the river as a key element of social identity.

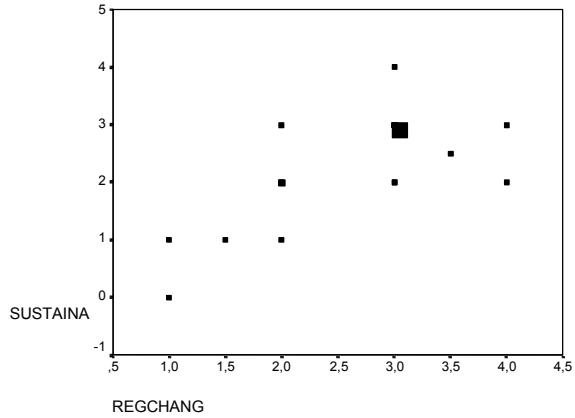
Illustration 6: Concertation
In Wallonia, the tributary basin of the Hoëgne-Wayai hosted a conflict between the fishers and the local mineral water producer. Fishers were complaining about accidental discharges of caustic soda that caused fish disease. During the case, the actors exchanged violent arguments via the press. In order to come out of the conflict, the fishers' federation proposed to the mineral water producer to make a river contract. The river contract is a non-binding, voluntary local concertation mechanism. All the local actors meet and discuss their problems. A monitoring network is put in place. The rivalry is broadened to the whole range of uses. All the quality aspects are taken into account. However, every action is done on a voluntary basis by the actor concerned actor and at its own expenses. Even if results in terms of water quality are mitigated, the initial conflict moved into cooperation and then every local water actor adopted a resource logic. (*David Aubin & Frédéric Varone, Vesdre River Basin case study)*

Our expectations (hypothesis 3) regarding the relation between the regime (change) and the sustainability of institutional resource regimes were:

a) Regimes with a deficient *extent* will be more likely to lead to degradation of water resources or inability to protect the ecological functions of the water resource, than regimes with a larger extent.
b) Regimes with a large extent, but with low *coherence* will be more likely to lead to degradation of water resources or inability to protect the ecological functions of the water resource, than regimes with a similar extent but a higher degree of coherence.

Indeed, the relation between the extent and the sustainability estimates is rather weak and hardly significant, if one leaves out the coherence of the regime aspects (Spearman's Rho is .342 with one-tailed sign. $p = 0.051$, all calculations $n = 24$). The relation between the general assessment of regime change and the assessment of sustainability is however much stronger ($rho = .533$, $p = .004$). In a scatterplot this is made visual (see Figure 7.3). Remember that several (sub) cases share their values in this plot. This is shown by the size of the dots.

Figure 7.3 Relation between the general assessment of regime change and the assessment of sustainability



Of the separate regime aspects, by far the most important factor was the coherence of public governance. It correlated even more strongly with the assessment of sustainable resource use than the general regime change.

The correlations of the development of separate regime aspects with the development towards a more sustainable resource use are as follows (all correlations in rho):

General regime change	.533	(p = .004)
a. Extent	.342	(p = .051)
b. Coherence governance	.686	(p = .000)
c. Coherence property rights	.527	(p = .004)
d. External coherence b. & c.	.380	(p = .034)

Illustration 7: Sustainability and regime changes
Regime changes in the case of the Mula river have some positive impacts on sustainability including the environmental, economic and social dimensions. Regarding the environmental dimension, energy and water savings are considerable, there is a decrease in water loses, some measures to avoid the overexploitation of wells and aquifers are adopted, and a minimal ecological flow is established. Regarding the economic dimension, the price of water to farmers is lower than it used to be and the productivity of the huerta improves. Finally, regarding the social dimension, there are some training programs for farmers and an improvement of life quality. In general terms, the positive impacts on sustainability seem to be more related to the increase of internal and external coherence rather than to the increase of extent. (*Meritxell Costejà, Nuria Font, Anna Rigol & Joan Subirats – Mula River case study*)

All in all, the conclusion is that there is only weak support for our first expectation here (hypothesis 3a): that an increased extent contributes as such to a more sustainable resource use. The support for the second expectation (hypothesis 3b) - that increased coherence contributes to a more sustainable resource use - is much stronger. Though this can be regarded as supportive evidence for the proponents of 'integral water management', it should be considered that this isn't a sort of 'mechanic' causal relationship. It still holds true that 'the devil is in the details'.

Illustration 8: Voluntary restriction
The lower part of the Vesdre river basin was regularly under water due to water releases from the dams of Eupen and the Gileppe. During periods of heavy rainfalls, the dam reservoirs reached their maximum capacity and it became dangerous to stock more water. People and communes downstream were complaining. Consultations went on to circumscribe the problem in the basin despite the lack of regulation. In fact the manager of the dam agreed with the main user of the reservoir, i.e. the drinking water producer, to constitute a higher safety margin in case of significant rainfall. The two actors have endorsed the risk of water shortages in drought periods. The dams no longer threaten the downstream part of the basin. Informal agreements were later extended to other consequences of water releases, i.e. minimum flows and extraordinary releases for canoeing. Moreover, this kind of agreement generated an extended mobilization of all the local actors involved in water quantity management as the problem of floods remains, but on different patterns. (*David Aubin & Frédéric Varone, Vesdre River Basin case study)*

7.4.3 Explaining regime changes by change agents and conditions

Change agents
This is the combined force of the listed change agents as an impetus to set in motion regime changes in the direction of more integration. The joint force of the identified change agents in the cases was assessed as moderate (4x), strong (12x) or even very strong (5x). Only in 3 (sub)cases was it assessed as weak or absent. The types of change agents mentioned were EU originated pressures, national regime developments, problem pressures and various other case circumstances. In 13 of the 24 cases EU policies were mentioned as relevant.[6] In all but two cases national policy and regime changes were

[6] As such a great variety of EU policies were mentioned as relevant: the standard for minimal flow of rivers, (national laws that were triggered by) directives on the water basis system, the 1991 waste water treatment directive (5x), phosphate and nitrate standards, fishery policies, the 1972 wild birds and 1992 habitat directives with their special protected areas (3x), the 1975 drinking water directive (3x) (and the role of the European Court of Justice to force implementation), the regional development policy with its

influential.[7] In 19 cases was there influence from problem pressure.[8] In 10 cases various other circumstances were mentioned.[9]

> **Illustration 9: Example of a set of change agents on case level**
> Change agents in the case of the Mula River include the leadership of regional government, which has technical and financial resources and support from other institutions (EU, national administration) in the elaboration of the Modernization Plan. Of crucial importance is the ability of the Irrigation Community to break the Heredamiento monopoly of water distribution. Problem pressure also becomes an important change agent -- drought conditions precipitate a deep crisis of the traditional structure of the Mula huerta. In addition, policy initiative and new scientific knowledge about the state of the resource are important variables leading to a regime change. (*Meritxell Costejà, Nuria Font, Anna Rigol & Joan Subirats – Mula River case study*)

Maybe national policy support is a necessary, though not a sufficient condition. Often the national government provided crucial resources like formal rules and money. The two cases where such influence was not reported had a very low overall force of change agents. But generally it is not the type of change agents or the presence of a variety of them that matters. Each change agent can 'do the job' of exerting a major 'force of change agents' if it is pressing enough.

Our expectations (hypothesis 1) regarding the relation between the general force of the change agents and regime change was: "The observed change

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structural funds (2x). More generally various EU regulations were used as arguments in the debates, even when not self-enforcing.

7 Apart from various 'normal' water (and some nature) policies, some more regime oriented pressures were also mentioned: promoting regime development at the level of the water basins (3x), laws demanding (land-use) planning (4x), acts that allow the government as owner of the water to regulate fishing on the basis of considerations of nature protection, environmental impact assessment, white papers pushing for 'integral water management' (3x), federalisation (Belgium), legislation allowing expropriations and indemnities in favour of flood protection, and the designation of parts of the basin as nature protection area. Note that several of these are not or might not be independent from the relevant EU policies!

8 With the problems at hand there is a clear division between 'wet' cases (the majority) and 'dry' cases. In the dry cases increased use by agriculture and tourism are main problem causes. In the wet cases pollution and the risk of flooding are the most mentioned problems. For almost all cases the increased value attached to nature and environment considerations makes these enter the picture as 'new' problem pressures.

9 Some examples are: the expiration of concessions for irrigation, changing market regulations pushing for new economic developments, state withdrawal from participation in economic developments, expanding land use for building, the break-down of traditional management regimes, experts providing new information, local and environmental associations and devoted individuals.

agents (in the period and context of our cases) will lead to more differentiation in the regime (resulting in more complex regimes), but not without additional prerequisites to more coherent regimes." As expected of the various forms of regime change, only the extent seems directly related to the force of the change agents. For the other relations more is necessary. And these attempts to attain more coherence are expected to depend on several conditions.

The correlation of 'the combined force of all change agents' with the general regime change in the direction of more integrated regimes, and with the separate regime aspects are as follows:

General regime change	.200 (p = .175)
a. Extent	.446 (p = .015)
b. Coherence governance	.128 (p = .275)
c. Coherence property rights	.072 (p = .369)
d. External coherence b. & c.	.153 (p = .238)

Illustration 10: Finding political will

In Verviers, drinking water consumption has led to lead-poisoning for more than a century. Poisoning was due to lead pipes attacked by naturally acid water. Diverging interests and the weakness of knowledge around the nature of the contamination explained the status quo. The dam that provides water to the town had initially been build for industrial uses. The network was later extended to private housings and water declared to be drinking water without prior treatment. Acid water was very convenient for the industries because of its cleaning properties. This position was well reflected in the municipal council. The commune was the owner of the water distribution service. In 1980, the EU drinking water directive set up constraining standards for lead concentration in drinking water. The commune of Verviers had to adapt but missed both the political will and the financial means. Finally, the building of a treatment plant was taken in charge by the Region and a deviation of the main pipe did not counteract the industrial interest. Work began only when industry had guarantee on the unchanged properties of its water. The public health problem was taken into account without inducing any redistribution at the detriment of other water uses, industry in the present case. (*David Aubin & Frédérich Varone, Vesdre River Basin case study)*

Illustration 11: Bottom-up regime changes

Sometimes it was not national regime change influencing the extent of the regime at the case level, but the other way around. Here are two examples of bottom-up processes and subsequent 'legitimization' of local developments through national legislation in Switzerland.

The process of regional regime inventions arising from local problem pressure which are subsequently supported and thus legitimated by changes in the policy design at federal level can be observed in both Swiss case studies. In the Seetal valley, the canton of Lucerne had already issued a notice in 1988 reducing the restrictions on the number of production animals on farms from

> four to three livestock units per hectare. Even if this restriction was never really implemented at regional level, it served as a model for the introduction of the same restriction into the Federal Law on Water Protection of 1991. In the Maggia valley in the canton of Ticino, quantitative protection of the water resources dates back to 1976, anticipating the changes in the federal regime by a wide margin. At the level of the water basin, protective measures in terms of minimal residual flows were applied in 1982, a full 10 years before the enactment in the Federal Law on Water protection of 1991. (*Corine Mauch & Adèle Thorens – Swiss case studies)*

Conditions

This is the degree to which the listed conditions provide, separately and as a set, favorable or unfavorable conditions for regime changes in the direction of more integration (extent and coherence).

Hypothesis 2 was that attempts to change regimes into a more integrated status would have relatively more success when:

- There is already a longer tradition of thinking in terms of cooperation in the water management sector or such a thinking is built during the case early enough to influence later stages of the case history.
- There is a common understanding that the counteracting (side) effects of non-integrated water management harm sustainability and that this sooner or later will have to be stopped (joint problem).
- There is a notion of possible joint gains from coherence, so-called 'win-win situations' (joint opportunities).
- There is a credible threat of a (potentially) dominant actor accumulating power and altering the public governance pattern in his own way and to his own interest when no solution is reached (credible alternative threat).
- There are well functioning institutions that provide fertile ground for coherence attempts (institutional interfaces).

Generally the researchers assessed that in their (sub)cases there was no very stimulating tradition of earlier co-operation between the actors involved in the rivalry/ies. Joint problem awareness has been present to some extent in several cases, though often only on a part of the relevant aspects or only with some of the relevant actors. There has been considerable differentiation between the cases in terms of the degree to which the actors involved saw chances to actually gain by solving the rivalry with a more integrated regime. In one case there was even a sense of joint loss. With the condition of a credible threat of interventions by a dominant actor to solve the disputes to his own benefit there has been a considerable differentiation among the cases. Generally speaking the condition of institutional interfaces was somewhat better that most of the other conditions. Nevertheless, in many

cases these were only a part of the relevant aspects or not functioning very well.

All in all, the assessments of the conditions for regime change in many cases are rather favorable. In nine cases the conditions are viewed less favorably. Especially the awareness of joint chances and good institutional interfaces - and to a lesser extent an existing tradition of co-operation were all seen as important positive conditions for regime change. These assessments of the favorability of the conditions was especially related to the assessment of the institutional conditions (.679), joint chances (.508) and previous experiences with cooperation (.405).

Lower assessments of the general conditions indeed correlate with smaller regime changes, as expected in hypothesis 3. The correlation is .687 (p = .000). Figure 7.4 shows this relationship in a visual way.

Figure 7.4 The relation between favorable conditions and regime changes towards more integrated water management regimes

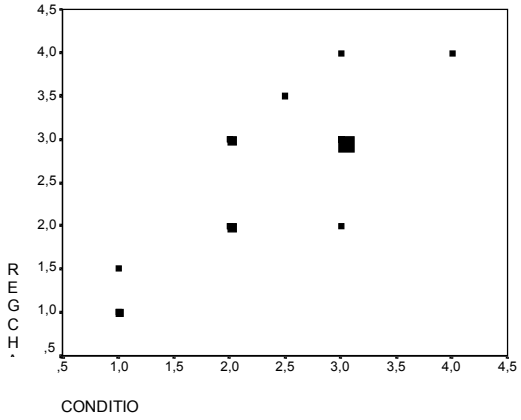

Illustration 12: Polders and wateringues versus water floods

All along the river Dender in Flanders, riparian landowners are involved in a particular kind of public administration, the polders and the wateringues. The polders and wateringues manage drainage on their territory. They finance their activity with direct taxation. Draining activities are in conflict with the need to create buffer zones. The competent authority for water quantity management on the Dender faces frequent floods of growing importance. As the problem pressure is growing, solutions introduced are residual. The weakness is due to an absence of common concern between the involved users. The water manager has no possibility to build new relief basins. It only builds dikes to divert the flood. It is not confronted with claims from the polders and wateringues that come under flow as a matter of tradition. Moreover, there is no real mechanism of concertation between the users and no coordination

> between the various competent authorities. Mutual information remains weak. Everyone is only preoccupied by the evacuation of water out of its territory. The problem should increase without a sustainable response is put in place. The only answer consists in building a huge pumping station at the mouth of the Dender. (David Aubin & Frédéric Varone, Dender River Basin case study)

The *assessment of the conditions* not only correlated with the general regime change, but also with all other aspects of regime change.

General regime change	.687 (p = .000)
a. Extent	.721 (p = .000)
b. Coherence governance	.798 (p = .000)
c. Coherence property rights	.583 (p = .001)
d. External coherence b. & c.	.527 (p = .004)

Hypothesis 2 mentions the conditions separately. This implies that the various circumstances can have different effects. We have investigated this by a correlation analysis of all conditions mentioned with all regime aspects. Here we mention all significant relations. Also a few almost significant relationships are mentioned, with their uncertainty.

The *tradition of cooperation* in the water management sector showed significant correlations only with the internal coherence of public governance (.416) and almost with the extent (.315, p = .067).

The condition of a common understanding that the counteracting (side) effects of non-integrated water management harm sustainability and that this sooner or later will have to be stopped anyhow (*joint problem*) did not correlate significantly with any of the regime indicators. Closest was the correlation with the internal coherence of public governance (.313, p = .068).

The notion of possible joint gains from coherence, so-called 'win-win situations' (*joint opportunities*) again correlated with some regime indicators (coherence governance .509, external coherence .599) and with general regime change (.554). The fact that the correlation of the awareness of 'win-win' situations is even stronger with the external coherence between public governance and property rights than with the general regime change is striking. It might point to an often 'public-private' nature of such opportunities.

The credible threat of a dominant actor accumulating power and altering the public governance pattern in his interest when no solution is reached (*credible alternative threat*) did not correlate significantly with any of the regime indicators. It almost significantly correlated with the extent, though (.305, p = .074).

Last but not least, the existence of well functioning institutions that provide fertile ground for coherence attempts (*institutional interfaces*)

correlates with the extent (.751, p = .000), internal coherence of public governance (.3431) and with the general regime change (.380).

All in all, of the separate conditions (and the force of change agents) the *joint opportunities* and the *institutional interfaces* conditions (see appendix 7.1 for a specification of these factors in this study) stand out in the explanation of the various forms of regime changes.

Illustration 13: Joint opportunities and institutional interfaces around the IJsselmeer

Sometimes rival uses can nevertheless be turned into win-win situations. The shores of the Dutch IJsselmeer (Lake IJssel) have rival uses of inter alia nature (bird habitat) and tourism (boating marinas). Of course tourism on the other hand benefits from beautiful nature. Seeking the balance between the two uses can therefore be beneficial for both. With a homogeneous use like IJsselmeer fisheries there is rivalry between the users, but on the other hand all users have a certain interest in a just distribution of rights, and therefore may favor a regime that guarantees this while preventing a 'tragedy of the commons'. This creates a basis for joint action that can be further exploited by having the right institutional interfaces in place.

These institutional interfaces can be triggered by European and national measures. In the IJsselmeer case the national government founded a negotiation platform, a steering committee on the so-called corner lakes, a producers' organization on fishery, environmental impact procedures (gas drilling) and land use planning procedures with open participation. Such institutions catalyzed the involvement of users and other citizens (cf. the EU WFD) and functioned sometimes as 'policy brokers' and sometimes as forms of 'institutional leadership'. (*Dave Huitema, IJsselmeer case study)*

7.5 Outlook: our conclusions in the perspective of the European water management policy

European water policy has developed along two lines - water quality and emission standards - that reflect different national views. The new European Water Framework Directive (WFD) is an attempt to reconcile the two approaches and to integrate water quantity aspects. The purpose of the WFD is to achieve good ecological quality for all waters inside the European Union, at the scale of water basins, where an authority implements integrated management programmes. The WFD should guarantee, as of 2015, a 'good status' for all ground- and surface waters, in quality and quantity, according to an eco-centered logic. In order to achieve this goal it promotes an integrated water management, i.e. a management that considers all the water aspects and legislation in a single picture and on a delineated territory, the water basin. The integration of control and action should occur for quality and quantity aspects, surface and groundwater, exploitation and preservation,

objectives of quality and emission limit values and water policy vis-à-vis other policies. The WFD sets up guidelines and leaves significant room for manoeuvre to the Member States. The guidelines allow an evaluation and a comparison of the efforts developed by the Member States and their results.

The main concepts of this chapter relate closely to the central themes of the new European water policy. The *'good status'* of the WFD is related to the ultimate dependent variable in our analysis, the degree of 'sustainable use', especially to the ecological aspect of sustainable use. However, even in the 1996 communication leading to the WFD due attention is also paid to the 'evaluation of costs'. This aspect is reflected in the 'economic consequences' aspect of sustainable use. We observed that besides costs, economic consequences could be observed both positive and negative. A third aspect that was included in our research was that of the social consequences. Here a remarkable number of positive developments were reported from the case studies. Generally, a higher degree of sustainable use correlated with a more integrated regime at the water basin level, just as was expected by both the theory described in this chapter and the 'practical policy theory' underlying the WFD. Though this can be regarded as supporting evidence, it should be considered that this isn't a sort of 'mechanical' causal relationship. Under certain circumstances it can even be envisioned that more integration leads to deterioration of sustainable use. It still holds true that 'the devil is in the details'. Nevertheless, empirically in our 24 cases the relationship between integrated management and the status of the water resources shown to correspond with the ideas guiding the WFD.

The main venue by which the new European water policy seeks to improve the good status of European waters is by 'integrated water management at water basin scale'. In this chapter the cases that are studied were not at the full water basin scale, but at the lower level of tributary river basins. The reason for this is that we believe that integration of management is a multi-level endeavor. At the higher level of international rivers like the Rhine or even large national rivers like the Loire, circumstances vary to such a degree that there is not one, but several sets of uses and users and consequently also multiple resource regimes needed at a sub-basin level. This is not to state that the full water basin should not be in need of coordinated management, but only that for impacting many uses and users, sub-regimes at a tributary river basin level are also needed. This idea is in accordance with the principle of subsidiarity that is explicitly endorsed in European water policy. The case studies concentrated on this level (with areas of some 500 to 2500 km^2) and found many interesting experiences with (attempts to achieve) more integrated water management. These illustrate the assumption of the

European water policy that it is necessary to accept some variation of the institutional arrangements that are used to promote integrated management. Though the organization of management on a sub-basin level is left predominantly at the discretion of the member states, we think that at least devices for Europe-wide communication and exchange on experiences with integral water management on that level could be helpful for the actual practical implementation of the WFD. This could be part of 'joint implementation' arrangements.

Integrated water management in this dissertation is conceptualized with the help of the concepts of extent and coherence. The 'extent' of the regime reflects the elements of integration in the WFD that stress that all relevant directives and all waters in the area should be managed in a combined approach. We stress the completeness of the regime to regulate all relevant uses and users. The elements that stress multi-level (even international if necessary) and multi-actor (stakeholders and citizens) involvement and the coherent action guided by management plans are reflected in the concept of 'public coherence'. As a special feature of our research, not only the coherence of public governance, but also the coherence of the property & use rights regime and the coherence of the relation between public governance and property and use rights are included in the assessments. The study illustrates that these are important aspects of the water management regimes, especially - but not exclusively - when quantity issues are at stake. Theoretically it can be expected that inclusion of former socialist economies in Eastern Europe would increase the variation in the regimes of property and use rights considerably and would make this issue even more important. In Switzerland public policies that reduce use rights by more than 7% need to include compensations acknowledging these rights. All aspects of integrated water management studied seem to make a difference, though not equally in all cases. The research in this chapter has shown that special attention to the property and use rights affected and the relation between those and the public governance measures is a worthwhile extension of the focus of integrated water management.

The integration between water management and other sector policies is in the new European water policy envisioned by the mechanisms embedded in 'full cost pricing'. In our cases we did not specifically encounter this subject. Consequently we don't have a conclusion on full cost pricing. What we did encounter were a number of cases in which issues other than direct water issues entered the process of development of new water regimes. Examples are issues of landscape, wetlands and fishery, which were entered into the debate by interested actors. Though 'full cost pricing' could be important to send the right price signals to all actors, there will probably remain various

rivalries that need a form of integrated water management that deliberately tries to bridge externally to other sector policies for coordination.

The research in this chapter did spend a great deal of effort in providing better insight into a variety of change agents and conditions that stimulate more integrated water management. We learned that integrated management regimes are not something that one can 'proclaim into reality'. Deliberate attempts by motivated actors are surely needed to realize it in practice. We won't repeat all our conclusions on this subject here, but concentrate on the points where EU policies come in.

Among the change agents we have seen that in more than half of the cases EU directives and other policies play an important role. Among these directives are also some that are not directly 'water directives'. Another observation is that national policies that are mentioned as leading to regime changes were often in their turn triggered or in any case related to EU directives.

Even more important than the change agents mentioned proved to be the conditions for change. The European Union can have important - indirect - effects here too. A first observation is that European policies are often used in the internal debate at case level as arguments to pursue a certain position. This holds especially for NGOs and other actors with little formal power and of course when they want to move in the same direction as the relevant EU policy involved. Even when these policies are non-obligatory, in this way they have a certain influence. Of course, part of this influence is generated by the prospect that these policy lines will become more compelling after a while. So for the WFD aim of participation in water management, EU policies can play an important role. Of the several conditions joint chances and institutional interfaces proved to be the most important. Both can be seen as venues at which to aim supplementary EU measures in the context of joint implementation, to improve the chances for regime changes in the direction of integrated water management.

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Appendix 7.1

The indicators for the relevant conditions used are:

a Tradition of co-operation
- a dominant policy ideology that supports integration
- positive examples of integration known by the actors involved
- mutual respect and trust in 'fair play' of the actors involved

b Joint problem
- knowledge bases in the form of reports and statements by respected sources on resource deterioration due to fragmentation
- information symmetry between the actors involved on these points
- a sense of responsibility for the future with the actors involved

c Joint opportunities
- knowledge bases from respected sources on opportunities stemming from more integration
- information symmetry between the actors involved on these points
- a sense of respect for each others' interests among the actors involved

d Credible alternative threat
- sufficient imbalance of power favouring a dominant actor (government?) to enable unilateral action
- information on alternative options to 'solve' the problem from the perspective of the dominant's actor's perspective
- alternative option has more severe consequences for the other stakeholders than the specific form of integration would have

e Institutional interfaces
(not all indicators below are equally important to all forms of integration)
- clarity of assigned responsibilities (to prevent territorial battles)
- free and alert mass media to induce awareness of challenges to the system
- legal or practical possibilities to protect negotiated compromises from continuous litigation
- actors, independent or within the administration, with solely process objectives (brokers)
- a small number of stakeholders or a strong representative organisation for the major groups of stakeholders to enable authoritative a small number of interaction processes
- legal leeway for more integrative approaches
- official (not only laws, but also white papers and the like) policy guidelines to achieve more integration in water management

Part three

Public gaps and private bridges in groundwater governance

Chapter 8

Groundwater governance at the national level in the Netherlands

8.1 Introduction

8.1.1 A regulation gap as a window of opportunity

Water problems make up a considerable part of the environmental problems with which our world struggles. The problems are worst for the poor people across the globe (World Bank 1992: 11). Water quality is bad and worsening in the low-income countries and generally acceptable and slightly improving in the high-income countries (id: 46). In Europe, the improvement of drinking water quality has been the single most important cause of the increase of life expectancy (id, p. 99). Nevertheless, even in Europe water supply is threatened. In the European Union this is generally not a quantitative, but a qualitative problem. Especially the pollution of aquifers with nitrates and pesticides and the pollution of surface waters with nitrogen, phosphorus and various other substances give cause for concern (Commission EC 1992: 21-24). Meanwhile, the amount of water that is withdrawn for various uses is still increasing and the water has to be purified in ever more expensive ways (id, pp. 19-20). Nevertheless there remain uncertainties that hamper adequate action. These consist not only of uncertainties about the relationship between 'human dimensions' and the deterioration of sustainable environmental quality of aquifers, but also of uncertainties about the possibilities to produce the desired changes in these human 'inputs'. In this chapter we want to stress this aspect of the problem.

The possibilities for adequate action do not only depend on possibilities for direct government intervention. More and more such possibilities are even considered with some sense of criticism. Solutions are more sought in changing regimes and other institutions. We want to stress here that besides their direct impact interventions like financial incentives and general standards can also

form an important institutional context in which changes in policy networks, regimes and more concrete policy interventions can evolve. The European drinking water standards have been the driving force behind the recognition of the threats to the usefulness of groundwater aquifers (and surface waters) as sources for the drinking water production in large parts of the European Union. Directly and indirectly, these standards have stimulated policy-developments in various member states, of which the feasibility and implementability without these European standards would not have been obvious.

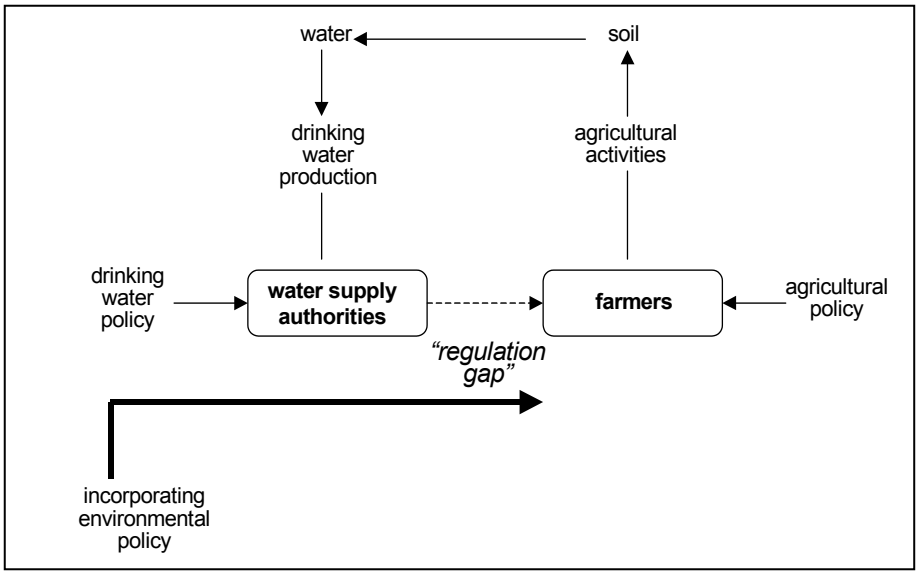
Such pressures are extremely important to open new 'windows of opportunity' (Kingdon 1984: 21). Together with the pressure on public finance, the increased consciousness of the ecological challenge changed the 'policy networks' of organizations in the water policy field in the 1980s and 1990s in countries like Great Britain, the Netherlands, Germany and the United States. They were all very different in many respects at both the beginning and the end of that period. Nevertheless they all became more open, more businesslike and less dominated by an engineering orientation (Bressers & O'Toole 1995). These changes on their turn have made also new innovative management strategies more feasible.

A general institutional and policy context is the more important because fear for deterioration of mutual terms of competition forms a permanent threat to the legitimacy of strong environmental policies with the public and (in this case agri-) business. The danger exists that without such a context EU member states do not attune their environmental policies on the basis of an equal bottom line of environmental quality, but on the basis of equal costs for their economies. With an unequal degree of environmental deterioration and an unequal contribution to the threats to sustainability, unequal efforts for the environment seem justified however, and are to be viewed more and more as a normal part of the conditions of the place of business of a certain region.

Drinking water standards, as generated by the EC Drinking Water Directive, force water supply authorities to do something. Whether they like it or nor, they become part of the water policy network. However, such standards are only affecting the behavior of water suppliers directly, and not the behavior of those who are polluting water resources. Water suppliers need to fill in the 'regulation gap' that exists between them and the farmers that are polluting. In several European countries this leads to situations in which water supply authorities feel forced to negotiate with farmers on a reduction of agricultural pollution. To be sure that farmers do cooperate, in many cases financial compensations are paid. Water suppliers are then 'buying the good behavior of farmers' in water protection zones. Such contracts appear to be decisive

instruments in helping to move towards a more environmentally friendly agriculture. The implementation of agro-environmental policies becomes easier, or in certain cases even only possible through such contracts. A sustainable agriculture can be obtained far more cost-effectively than by using exclusively compulsory regulations (Dosi 2001). Despite the success of this approach, questions might be raised concerning the 'polluter pays principle'. To prevent this violation of the principle, political interventions on the national and subnational levels are necessary. In this respect it is important to keep in mind the distinction between reference level (the minimum standard of environmental care) and target level (compliance beyond the reference level). In accordance to the EU borderline between 'polluter pays principle' and 'polluter being paid', compensation to farmers only applies in cases of over-compliance where society asks farmers to provide an environmental service beyond the reference level (Dosi 2001). Such cases are cases were water companies want farmers to fulfill higher requirements in water catchment areas by obligating them to certain preventive measures. An important desired effect of compensation for over-compliance is to achieve equal treatment of farmers and to avoid market and concurrence distortions.

Figure 8.1 Regulation gap between water supply authorities and farmers



Against this background we will analyze more in detail the situation in the Netherlands. We report on a study that has been produced in the context of the international research project 'Water supply authorities in Europe preventing agricultural pollution', in which also studies on Germany and the United

Kingdom were involved.[1] The Netherlands is an interesting case because it combines high aspirations on environmental policy and a flexible attitude towards policy innovations at a general level with an actual environmental situation regarding the agricultural pollution of the soil that is among the worst in Europe. The conclusion will be that experiences with an active role of water supply companies, consulting and negotiating directly with farmers, revealed it as a 'promising strategy'.

8.1.2 The case study on water supply authorities in the Netherlands

For this case study of water supply authorities in the Netherlands and the way they try to prevent agricultural water pollution, we selected the working districts of five water supply companies in five different provinces. First we selected five of the twelve provinces in which intensive agricultural operations take place in areas where extremely vulnerable groundwater systems are used for drinking water supply. These are the provinces of Drenthe, Overijssel, Gelderland, Noord-Brabant and Limburg, which together include, generally speaking, the east and the south of the Netherlands. Secondly, in each of these provinces we looked at the activities of the water supply company that is most involved in problems with the agricultural pollution of drinking water sources. In all provinces that were studied, this was the largest or one of the largest companies. We have interviewed one or more representatives of these water supply companies to acquire data for this case study. We also asked them to identify the most closely involved representatives of the agricultural community and of the provincial authorities in each of the provinces. In all provinces the agricultural community has been represented by a regional division of the national agricultural board. We also interviewed these representatives and the provincial officials involved (see chapter 9, appendix 9.1: list of interviews). While writing this case study, the interview data have been used in two ways. On the one hand we tried to describe what was going on in each of the provinces as far as possible, according to the common sense views of the respondents. On the other hand we tried to aggregate the interview data from the five provinces to give a description of three perspectives on the policy problem, one perspective for each of the three parties involved (water suppliers, agricultural communities and provincial authorities).

We have focused the case study on a ten year period from 1985 until 1995, knowing that 1987, 1989, 1991 and 1993 were important years for the

[1] The project 'Water supply authorities in Europe preventing agricultural pollution' has been funded under the 4th Framework Programme of the European Union (contract number EV5V-CT94-0368) and co-ordinated by the University of Twente (CSTM).

protection of groundwater. In 1987 the national government started to regulate agricultural practices with standards to restrict the use and spreading of animal fertilizers on agricultural fields. In 1989 many provinces in the Netherlands came up with an ordinance for more stringent regulation of fertilizer use in groundwater protection areas. In 1991 the Dutch government succeeded in finalizing a negotiated agreement with the agricultural community on a reduction of the use of pesticides. And in 1993 the implementation of the European groundwater directive resulted in the designation of the Netherlands as a whole as a vulnerable area in which the upper groundwater throughout the country should be protected by meeting a standard of at most 50 mg nitrates per liter. Most interviews for the case study took place at the end of 1994 and in the first half of 1995.

Figure 2 Map of the Netherlands with the five selected provinces

The results of the Dutch case study are reported in two chapters of this dissertation: chapter 8 and chapter 9. Our leading question is: *to what extent are water supply authorities in the Netherlands trying to prevent agricultural water pollution and to what extent do they succeed in that?* Before answering this question in chapter 9, we will use chapter 8 to describe three contexts within which water supply companies choose their strategy. The first context described in this chapter is the *problem context*. This context should give an idea about the seriousness and size of problems

with agricultural water pollution in the Netherlands, and the need for action as observed or advocated by several stakeholders (authorities, water suppliers, environmentalist groups, farmer groups). An important input for the definition of problems are the European standards which set maximum allowable amounts of nitrates and pesticides in drinking water and groundwater. We expect that the problem context, as perceived by water suppliers, will affect their mission and orientation, and through that the strategy they choose.

A second context described in this chapter is the *regulatory context*. We try to identify regulations that give direction to the actions of water supply companies, not only through their mission and orientation, but also by setting their competence and discretionary power as an organizational resource and part of their ability to control. Although water supply companies are made completely responsible for the drinking water quality, they carry no responsibility for the quality of groundwater. So, if they want to control agricultural pollution of groundwater, they will meet other authorities working on groundwater protection in this field of control. In this chapter we describe how the Dutch national government is trying to regulate farmers and the amounts of fertilizers and pesticides they use. The national legislation on fertilizers and pesticides sets a regulatory framework within which water supply companies can develop their own strategy.

A third context that we expect to influence the strategy of water supply companies is the *network context*. We seek to describe how water suppliers in general are dealing with agricultural issues and how the agricultural community is dealing with environmental issues. We expect that the way in which both communities have interactions with each other (structural dimension), the way in which they share cognizance (cognitive dimension), and the way in which they sympathize with each other (affective dimension) will affect whether and how water suppliers are going to encourage farmers to take preventive action. We will use the concept ‘interrelatedness’ for describing the structural dimension of networks, and the ‘commitment’ concept for describing the cognitive and affective dimensions of networks.

In Chapter 9 we focus on the actions of water supply companies in the five selected provinces that we studied. First we give a general overview of the way in which provincial authorities and water supply companies were involved in policies for groundwater protection areas during the ten-year period of our study. We learned during the case study that two different periods could be distinguished in all five provinces. In a first period, from 1988 to 1991, provinces delineated groundwater protection areas, ordained

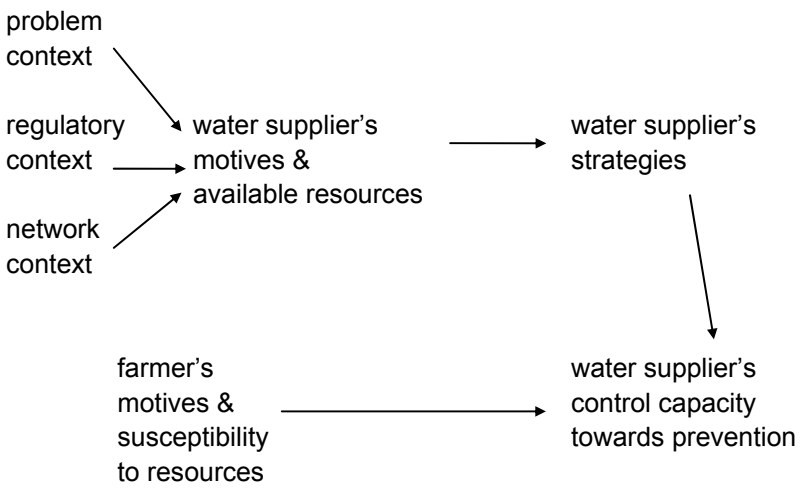
regulations for agricultural operations in these areas, while most larger water supply companies negotiated with representatives of the regional agricultural communities on agreements for financial compensations, trying to make the regulations for the protected areas work. In a second period, from 1991 to 1995, expectations about the effectiveness of the ordinances with compensation agreements declined, while expectations about the effectiveness of another kind of policy strategy ('encouragement policy') grew. Although it is possible to discern a general picture in all provinces, we also found differences among the five selected provinces that at least are related to different ways in which the problem context is experienced. Therefore we also describe the problem context and the policy approach followed for each of the provinces separately.

Secondly, we discuss the extent to which water supply companies are motivated to encourage the farmers to take preventive action. The motives of the water suppliers, or the factors driving them (their mission and orientation) are an element of their control capacity. They can be understood in relation to the three contexts we describe in this chapter 8. The seriousness and size of water problems (problem context), the presence of specific regulatory provisions or gaps (rule context), and the way water suppliers and farmers get along with each other (network context) all have some influence on the mission and orientation of water supply companies.

Thirdly, we take a look at the organizational resources that are available to water supply companies and the way each of these resources might help them to gain control over water pollution. We are interested not only in the resources that are available to water suppliers, but also in resources to which farmers are susceptible and which might change the farmer's behavior, if they were to be transferred to them. The resources we distinguish are organizational capacity, financial capacity or money, information, confidence, authority, and time (based on: Klok 1995).

In drawing our conclusions on our case study, we suppose that the motives and resources of water supply companies determine their strategies on how to control the agricultural pollution of drinking water sources. This strategy might be one of remediation, of prevention, or both. As far as a strategy is prevention oriented, part of the strategy is the instruments they use to influence farmer's behavior. The application of instruments will be considered as the transfer of specific resources from water suppliers to farmers. The susceptibility of farmers to resources, and the extent to which this results in their adoption of in preventive measures, will be our measure of the presence of control capacity on the water supplier's side towards prevention.

Figure 8.3 Research model for the case study on the Netherlands



We have chosen to include the case study on Dutch groundwater governance in this dissertation to deal with the fifth research question, as formulated in chapter 1: *What institutional lessons can be learned from governance arrangements in which non-governmental actors do play an influential role?* Although water supply authorities in the Netherlands are formally speaking the national and provincial governments being responsible for public drinking water supply and groundwater management, in practice they have to rely on a public performance delivered by water supply companies as non-governmental actors. While drinking water policy objectives require a certain performance of the water supply companies, these companies are not authorized to regulate farming practices to achieve drinking water sources control. This has resulted in negotiated agreements between water suppliers and farmers to privately bridge the public gap between drinking water policy and farming practice. In fact, this is an example of 'external coherence' (see part two of this dissertation) between the public policy subsystem and the property rights subsystem of the groundwater resource regime in the Netherlands. Drinking water policy has not been designed to redistribute farming rights in such a way that drinking water policy objectives can be met.

The research model in Figure 8.3 has been a preliminary framework in the process of constructing an analytical governance framework for this dissertation, as presented in the first part of this dissertation. However, it covers already most of the governance elements that we distinguished in

chapter 2. The 'levels and scales' aspect is largely covered by the 'regulatory context', which focuses on the various administrative levels involved (European, national, provincial) and their mutual relationships. The 'actors and networks' aspect is largely covered by the 'network context', which focuses on the dynamics of the agricultural network and the water supply network. The 'perspectives and objectives' context is largely covered by the 'problem context', which focuses on the various problem analyses that are circulating in the policy formulating process and the evaluation process of policy results. The 'strategies and instruments' aspect is largely covered in chapter 9, where we deal with the motives and strategies of water suppliers. The 'resources for implementation' aspect is also dealt with in chapter 9. The strategies and resources partly depend on the three contexts that we distinguish, which indicates the mutual adjustment between the five aspects of governance. In chapter 2 we distinguished three mechanisms that are responsible for this mutual adjustment: values (objectives), cognitions (information), and resources (power). Mutual adjustment arises partly from the tendency towards mutual consistency of values, partly from the tendency to fit cognitions into a common framework for interpretation, and partly from mutual dependency on resources. Although in chapter 9 we deal with information as one of the resources for implementation, the case study on Dutch groundwater governance learns that the information aspect is more than just a resource. The information aspect is also relevant in terms of mutual role expectations of actors in networks, as well as in terms of problem interpretations and the problems and objectives in which they result.

8.1.3 Introduction to the Dutch water supply sector

Organizational structure

In the Netherlands the drinking water supply is primarily considered to be the government's responsibility, although it is organized as a public utility. While countries like France and the United Kingdom have opted for privatization of the water supply, the Netherlands still leaves open a supervisory role for public authorities. The general opinion of both the government and the water supply companies themselves is that they disapprove of privatization in the water supply sector. The Dutch government officially declared itself not to be a proponent of full privatization of water supply companies (VROM 1993). This statement is motivated by the conflict the government sees between the interests of consumers and those of shareholders. The consumers' interests lie in having a guaranteed delivery of water at a reasonable price level; public health interests lie in having drinking water of good quality that meets the drinking water standards. Both of these require a drinking water price based on actual

costs. The Dutch solution, which takes the form of commercial operating companies with public authorities as majority shareholders, is considered by both the government and the water supply sector to be an adequate organizational structure to meet these requirements.

At the time of writing the Dutch case study (1997) the Netherlands had 28 water supply companies, only one of which is a private company.[2] The others are public companies in which public authorities participate. About 15% of them are municipal companies, the remaining 85% being regional companies. In general the municipal companies in urban areas are the oldest, because the urban water supply started to become organized in the second half of the nineteenth century by linking houses to a central water main. Most of these companies are already 100 to 125 years old. Much younger are the water supply companies that also intend to serve households in the rural areas. Most of these companies, which in general have a much more extended service area than the municipal ones, were founded in the 1930s. These are also the larger companies in terms of organizational and financial capacity. Some of them serve almost about 90% of the households in a province, like the Waterleiding Maatschappij Overijssel (WMO) and the Waterleiding Maatschappij Limburg (WML). Recent decades have seen much reorganization, resulting in larger companies in the water supply sector, leading to a reduction in total number of water supply companies in the Netherlands, with a concomitant increase in the area serviced by the remaining companies. Because of these reorganizations the water supply sector has grown into organizational units of a size that is considered to be large enough to produce and provide water of good quality (Vewin 1991a; Vewin 1993; Langendijk 1994).

A water supply company is in fact an administrative unit that organizes the abstraction of surface or groundwater, the production of drinking water from the extracted water, and its distribution or delivery. Abstraction can be from groundwater sources or from surface water. Groundwater is abstracted in well fields, where each well field has a pumping station in which the water extracted from the wells is collected before pumping it to a production unit where the groundwater will be treated, or purified if polluted, to meet drinking water standards, or other standards if the water is to be provided to another destination, such as an industrial application. Water supply

[2] In 1960 the Netherlands had about 200 water supply companies; in 1980 there were about 100 companies; in 1990 this was reduced to 60; in 2000 there were just 20 left for about 16 million inhabitants (which are on average 800,000 inhabitants or 250,000 households per water supply company connected). See also chapter 10. Afterwards, further reductions have resulted in 11 companies in 2004, which are: Brabant Water, Duinwaterbedrijf Zuid-Holland, Evides, Hydron, PWN Waterleidingbedrijf Noord-Holland, Tilburgse Waterleiding-Maatschappij, Vitens, Waterbedrijf Groningen, Waterleiding Maatschappij Limburg, Waterleidingbedrijf Amsterdam, Waterleidingmaatschappij Drenthe.

companies in the Netherlands are not involved in water treatment in the sense of waste or sewage water treatment. This activity is organized by Water Boards in the Netherlands, which are responsible for the exploitation of waste water treatment works and the treatment of water that has to meet surface water standards. Despite this, there are water supply companies, mainly in the western part of the country, which use surface water sources for the production of drinking water, which they have to treat very intensively. As far as the distribution and delivery of drinking water is concerned, 99% of the households in the Netherlands are connected to a water main (Vewin 1993; Van den Nieuwenhof 1995).

In the 1970s and 1980s, the question of what might be the optimum structure of a water supply company started to gain attention. To have a viable water supply unit, the Council for the Drinking Water Supply judged that such a unit should have at least 100,000 connections, and also at least two well fields that are connected with each other. In the first place they were thinking of companies serving an area with the size of a whole province, since the provincial governments have responsibility for the water supply and are also the licensing agency with respect to the abstraction of groundwater, while the Inspectorate of Public Health and Environmental Quality is also organized into provincial divisions (Langendijk 1994). It is the Water Supply Act that allocates to provinces the competence to supervise the water supply sector and to impose reorganization plans, if they think that is necessary for an efficient water supply and for public health reasons. Most provinces took advantage of this power in the1980s, since problems with the water quality and quantity were increasing at that time.

In 1993, the Dutch government - in its the Policy Document on the Supply of Drinking Water and Industrial Water - emphasized that the national policy should lie in the direction of a strong industry, containing sufficient, large-scale companies whose service areas need not be restricted to the borders of the provincial territories. Although crossing these borders is not considered to be a problem, most water supply companies restricted their radius of action to service areas on a regional scale - mostly smaller than a provincial territory - because of the infrastructure costs that would be involved with transport over a longer distance (VROM 1993).

Limits to the potential use of groundwater sources

Water supply companies in the Netherlands use about 70% groundwater sources and 30% surface water sources. Half of the surface water sources originate in the Rhine, the other half coming from the Meuse. The amount of surface water mentioned also includes surface water that is purified through infiltration in the soil, and dune water. Of the water produced by water supply companies, 95% is delivered as drinking water and 5% as water for

other purposes, such as industrial applications. Besides that, industries also pump up their own groundwater, which is not included in the percentages above. Neither is the amount of groundwater or surface water abstracted by farmers for irrigation. Only the amount of water produced and delivered by the water supply companies has been considered (Vewin 1993; VROM 1994).

In the Netherlands, the domestic use of water has increased by 50% over a period of 20 years (1970-1990), while the population has increased by 12%. The average domestic use per capita per day was 97 liters in 1970, and 125 liters in 1989. A further increase, up to about 135 liters in 2010, is expected. In 2000, the drinking water use will have increased by about 14% compared to 1990, a figure which might double before 2060, if the volume of domestic use remains unchanged (in the absence of water conservation measures).

Between 1970 and 1980, the total volume of industrial water use has decreased in absolute terms since the introduction of the Surface Water Pollution Act in 1970, despite a large increase in industrial production during that period. This started to change from the beginning of the 1980s. Water conservation measures were then no longer able to compensate for the continuous growth in production. On this basis it is expected that the industrial use of water will increase in the future. At the moment, much high quality drinking water is still being used for purposes that don't require this quality. Using water of lesser quality, produced from surface water, could diminish the pressure on groundwater use, with the additional advantage to industry that it can save 40% on its water bills (Vewin 1989).

At the beginning of the 1990s, the government started to intensify its water conservation policy and decided to increase the amount of surface water as a source for the water supply (VROM 1990b). An important motive for this was the increasing environmental problem of dehydration in Dutch nature conservation areas, due to sinking groundwater levels. In 1991, the Dutch water supply companies - that cooperate in the national association of water supply companies Vewin - produced an environmental document, in which the goal was set of saving 10% domestic water use in 2000 compared to 1991 (Vewin 1991b). Although the available quantity of surface water would not be a problem, the quality of this water is lower than that of groundwater sources, and much more susceptible to pollution from abroad. Because of incidents in the Rhine and the Meuse it frequently happens that water supply companies have to suspend their intake of river water for a while.

What about the vulnerability of groundwater sources that are used for the production of drinking water? There are about 220 well fields that can be classified in terms of their vulnerability. Most vulnerable are about 70 well

fields with no natural protective layers of clay (sandy areas) which together account for 25% of the water supply in the Netherlands. In another 50 well fields the groundwater is partly protected by relatively poor covering layers of clay. In the other 100 well fields the groundwater is abstracted from relatively deep levels and is very well protected by quite good subterranean covering clay layers. Most groundwater well fields are situated in the northeast, the east, the middle and the south of the country. In the west, there is too much salt in the groundwater at quite shallow levels, which makes it difficult to produce drinking water from it (RIVM 1991).

In July 1995, the Dutch environmental minister wrote in a letter to the Parliament, that she was concerned about the quality of the drinking water sources, both groundwater and surface water. Research had revealed that at least 15% of the well fields and half of the surface water abstraction sites were more or less polluted. Groundwater sources were becoming increasingly polluted with pesticides and nitrates. The minister expressed her concern about the increasing efforts that were needed to deliver a drinking water product of good quality. Water suppliers were being forced to increasingly greater expense in this regard. In the same letter the minister also concluded that there appeared to be no problem with the quality of the drinking water in the Netherlands. The most recent data (1993) show that only incidental violations of the quality standards have been recorded. In no case was there any danger to the public health and measures had been taken to ensure that these incidents would not recur (VROM 1993-1997; VROM 1995b; VROM 1996). In September 1995 the Dutch government issued a new Policy Document on Drinking Water Supply and Industrial Water Supply, in which it announced that more efforts would be put into the protection of groundwater and surface water sources over the coming years (VROM 1995a).

In the Netherlands the water supply companies are regarded as one of the target groups of Dutch environmental policy. On the one hand they contribute to some environmental problems, such as dehydration, the emission of heavy metals from obsolete water pipes, and the disposal of polluted treatment sludge. On the other hand they are considered to be ‘environmental producers’, like the waste disposal companies and sewage water treatment companies. They are environmental producers because they are upgrading the quality of natural water. They also play a role in tracing groundwater pollution, and they are expected to communicate reported pollution to government agencies and inspectorates to enable them to frame adequate regulations and enforcement measures. For water supply companies, which are traditionally used to concentrating on geohydrological mapping and water treatment, it is a new field to build up knowledge on

agricultural practices within the areas where their well fields are located (Van der Schot 1995).

Regulation of the water supply

Water supply companies primarily have to deliver drinking water that meets the quality standards as provided by the Water Supply Act. These standards are national requirements, which means that no regional differentiation of standards is permitted. Water supply companies have no responsibility to protect groundwater from being polluted. It is left to the twelve Dutch provinces to create conditions for good quality groundwater and surface water. The national government provides national planning for water management and requires the provinces to implement this plan in terms of their own provincial water management plans. These are plans in which surface water management and groundwater management are integrated. Provinces have delegated the operational management of surface water to water boards, who regulate all discharges to surface water in collaboration with the municipalities, who manage the sewage systems.

The provinces cannot delegate the operational groundwater management, since there is no regional agency like a water board to take over the implementation work and until now there has been no serious consideration of delegating groundwater management to water boards. As far as the groundwater quantity is managed, provinces are enabled by the Groundwater Act to issue permits for groundwater abstraction. They also have to impose a levy on each 1,000 liters of groundwater abstracted. The permit and the levy system are especially used to prevent exhaustion of groundwater resources and the associated dehydration problems.

The quality management of groundwater is regulated under the Soil Protection Act, which gives to provinces the responsibility to designate groundwater protection areas and to regulate activities in those areas that might harm the groundwater quality. Groundwater protection areas are designated to protect groundwater that has to be used for the production of drinking water. In most areas regulations are in force for the agricultural use of fertilizers and pesticides. The Soil Protection Act also provides that water suppliers have to financially compensate farmers in these areas in so far as they are more stringently regulated than farmers outside the protection areas.

Provinces also have a role in supervising the efficiency of the water supply sector, a competence that has been settled on them by the Water Supply Act. Groundwater is considered to be a collective property, which should justify public interventions in the way water suppliers operate. The supervisory role of the provinces also means the service area of the water supply companies mostly do not cross provincial borders, no matter how large or small they are.

In other words, the provinces have a primary responsibility to protect groundwater that is needed for the production of drinking water, and they have a supervisory authority with respect to the efficient operation of water supply companies. However, provinces do not have the authority to impose drinking water quality standards. Only national and European requirements have such authority, and these are addressed directly to the water suppliers by the national government (Glasbergen, Groenenberg & Roorda 1989).

In this study of the Netherlands, we see 'water supply authorities' as water supply companies that aim to supply the public with drinking water that has to meet the water quality standards provided by the national government and the European Union. Although water supply companies are regulated by drinking water standards, they do not themselves have any regulatory competence to implement these standards by regulating farmers in order to prevent agricultural pollution of drinking water sources. Nevertheless, we are interested in the control capacity of water supply companies in bridging this 'regulatory gap'. Related to this: are water supply companies interested in encouraging preventive action and controlling agricultural operations in their water catchment areas, or do they rely more on engineering the water quality by purification techniques? The factors driving the water supply companies in the direction of encouraging prevention and their capacity to control farmers will be discussed.

8.2 Regulating nitrates as a source of groundwater pollution

8.2.1 How serious is the problem of nitrates, looking at the European standard for drinking water?

Nitrates are a very serious problem in the Netherlands, although the facilities for the purification of groundwater from nitrates are better than those for pesticides. The maximum level of acceptance for nitrates in drinking water is 50 mg/l. This is required by the EC Drinking Water Directive, that has been implemented in Dutch legislation in 1984 ('Drinkwaterbesluit'). The revised EU Drinking Water Directive of 1994 has been implemented in Dutch legislation in 1995. Of the 220 groundwater well fields in the Netherlands, about 70 are very vulnerable to agricultural pollution (nitrogen and pesticides). In the period 1970-1986, an evident increase in the nitrate level in the untreated groundwater appeared in more than 25% of the vulnerable well fields in the Netherlands. In the mid-1980s at two well fields (Montferland in Gelderland and Reuver in Limburg) radical interventions were necessary to decrease violations of the drinking water standards in the

untreated groundwater. In some cases the siting of the well field had to be changed, either by moving to sites with less intensive agriculture or by abstracting water from a greater depth (RIVM 1991).

In the mid-1980s it was calculated that - in the absence of any manure policy - 25% of the well fields would show nitrate concentrations of more than 50 mg/l in the short term. In 1989, an evident increase of nitrate concentrations was observed at well fields, especially in the east of Overijssel, the east of Gelderland, the east of Noord-Brabant, and the south of Limburg. It was expected that within ten years a large number of groundwater sources would require nitrate purification. In 1989, the 'Advisory Committee on Perspectives for the Agricultural Sector in the Netherlands' reported that, as soon as the year 2000, 50 million m^3 of groundwater would need nitrate purification. The groundwater abstracted for drinking water purposes amounted in 1990 to about 800 million m3. In 1989, it was expected that in 2050 the standard for nitrates in drinking water would be exceeded at about 35 pumping stations (V&W 1989).

In general, the groundwater quality is still sufficient to prepare drinking water without any excessively complicated technology, especially when it is possible to use water from deep aquifers, covered by protective layers. However, in the shallow groundwater, even around the water well fields, a lot of pollution has been found already. In 1989, the nitrate concentration in the upper groundwater (10 to 25 meters below the surface) appeared to exceed the drinking water standard (50 mg/l of nitrates or 11.3 mg/l of nitrogen) in about 70% of the agricultural land in sandy areas. The soil structure determines the mobility of underground pollution. The age of the abstracted water might vary from hundreds of years in areas where the groundwater is very well protected underground, to less than 25 years in areas where hardly no protection for the groundwater is available, like the sandy areas. The long period of time during which water travels underground explains why the increasing agricultural use of nitrogen, which started about 40 years ago, first came out in the 1980s. A lot of nitrogen from the past is still on its way, and that process is irreversible. It is expected that, despite policy measures, the same nitrate concentrations will show up in the groundwater, at least until 2010. Therefore it is also expected that purification techniques will be unavoidable for the next decade (RIVM 1991; Vinkers 1991; Van den Nieuwenhof 1995).

8.2.2 What regulatory framework for nitrates is available at the national level in the Netherlands?

On the national level in the Netherlands, there are two related legal frameworks that create a basis for a national manure policy: the Soil

Protection Act and the Fertilizers Act. Both items of legislation came into force in 1987. However, while both acts were signed by the ministers for agriculture and the environment, the Soil Protection Act was formulated mainly by the Ministry of Environment. This act focuses on the environmental effects of excessive manuring, and seeks to regulate the process in which manure is applied. These standards do not directly affect the livestock holding process itself, and thus the production of manure. Instead, by setting standards to the application of manure, the concept of manure surpluses is defined, with the attendant problems.

The Fertilizers Act was formulated mainly by the Ministry of Agriculture. This act focuses on the problems with surpluses and on the production of manure itself (the livestock holding process). The policy instruments created by this act can be typified as financial and communicative incentives. The preference for these types of instruments may be explained by the existence of a strong 'interrelatedness' and a strong 'commitment' within the traditional agricultural network, as it existed at least until the end of the 1980s (cf. Bressers & Kuks 1992). As a result of this, the objective of economic growth for the target group dominated the traditional Dutch agricultural policy. Setbacks in growth were compensated by incentives and instructions to encourage technological innovations. The actors involved had a great confidence in technological solutions and in the ability of the target group to govern itself (Kuks 1988; Dietz & Termeer 1991; Baldock & Bennett 1991).

8.2.2.1 Manure policy (first and second phase): the Soil Protection Act and the Fertilizers Act

The Soil Protection Act. The introduction of manure standards in the Netherlands can be divided into three or four phases. The standards in the first phase (1987-1990) were chosen so as to avoid the production of surplus manure in the country as a whole (to avoid export of manure). This phase only achieved a nation-wide spreading of manure and a consequent reduction of environmental damage in concentration areas. While setting these standards, the government took account of 'the tension between what is desirable from environmental and hygienic viewpoints, the possibilities of finding practical solutions to the surplus manure problem and the financial and economic consequences for the agricultural sector' (VROM 1986).

The Soil Protection Act conferred on the provinces the competence to mark out groundwater protection areas, for which a provincial groundwater regulation must have been passed by 1989. This competence enabled provinces to establish a supplementary, specific level of protection for vulnerable areas in which groundwater is used for the production of drinking water. For the provincial regulation of pesticides, the previous competence,

based on the Pesticides Act, was maintained (Meijden 1988; Brauw & Naaijkens 1989).

Table 8.1 National standards for the use of phosphate in animal fertilizers

Phase	Pasture	Cornfield	Arable Land
1987-1990	2501	350	125
1990-1995	200	250 (in 1991) 200 (in 1992/93) 150 (in 1994)	125
1995-2000	175	125	125
from 20002	110	75	75

Source: VROM (1986).
1 Figures are phosphate in kg/ha/y.
2 Final standards based on 'balanced manuring'.

In 1989, most provinces introduced standards for ground water protection areas that are close to the national standards for the third phase. So, for the period from 1989 until at least 1995, a difference was created between the regulation for farmers inside and outside the protected areas (Geleuken 1991).

The Soil Protection Act states that farmers within the protected area should be financially compensated for the losses (costs of disposing of the surplus manure) they suffer as compared to farmers outside the protected area. Requests by farmers for compensation will be dealt with by the provinces, which can collect funds for this by means of a charge paid by those who abstract groundwater (mainly the water supply companies). The levy is related to the amount of water abstracted. Water supply companies can charge the consumers of drinking water for this levy. In fact, the consumers of drinking water pay for the production of a collective good (according to the profit principle).

The reason for the compensation provision was to prevent protests by farmers in groundwater protection areas who would be faced with more restrictions than farmers outside those areas. Legislators feared that the more restrictive standards in groundwater protection areas could not be enforced without compensation. Left wing political parties opened the discussion on a motion to reject the provision because it would implicitly acknowledge a 'right to pollute'. The provision was felt to contradict the 'polluter-pays-principle'. In the event, the 'equality principle' supervened. The consumers of drinking water seem to have had no voice in this political debate. They pick up the costs of pollution caused by farmers, as they do in other countries, such as England and Germany (Kuks & Neelen 1991).

The Fertilizers Act. By setting manuring standards, the Soil Protection Act creates a disposal problem. The greater the restrictions on the spreading of

manure, the more difficult it is to dispose of the surplus manure in a responsible manner. The Fertilizers Act provides, again through a series of implementation orders, a supplementary policy which is intended to offer a solution to the surplus problem. The most important objectives of regulation by the Fertilizers Act are:

1. the determination and registration (manure accounting) of the surplus manure produced by the farming community;
2. the disposal of manure surpluses (manure banks);
3. expansion of manure production is forbidden (reference quantity); and
4. division of the costs of combating the problem between the farms with manure surpluses (surplus levy).

Keeping account of the quantities of manure is compulsory for those producing manure (livestock farmers), for managers of manure storage plants and manure processing installations, and for manure traders. The manure accounts are kept as unofficial forms. This bookkeeping should show whether a farm has a surplus of manure and, if so, how large this is. If there is a surplus, the accounts, the consignment notes accompanying loads of manure sent for disposal, and the actual amount of manure kept in storage, should proof that the surplus has not been spread on the farmer's own land. The General Inspection Service (AID), an agency of the Ministry of Agriculture, checks whether the accounts have been correctly administered.

The Manure Act also provides for the introduction of manure banks, which serve to promote the efficient disposal of manure. Manure banks mediate in the transaction, processing or destruction of manure. They are obliged to take over a surplus on request by a member of the farming community, and they will try to dispose of the surplus to arable farmers or market gardeners. If they cannot get rid of the surplus, then it must be processed or destroyed. The costs of storage, marketing, and processing are charged to the owner of the surplus manure.

As long as there are insufficient solutions to the manure problem in the Netherlands, it is imperative that a continued increase in the production of manure is avoided. An expansion ban has been introduced to combat this problem, which entails that the farmers producing over 125 kg/ha/y of phosphate may not increase their production. To determine whether a farm has increased its production of manure, the reference situation of each manure-producing farm was set at December 31, 1986 (reference quantity). Farming land is therefore subject to not only a milk quota (in accordance with the EC 'superlevy'), but also to a manure quota. Both quotas are tradable in conjunction with the land.

The livestock holding farmer who produces more than 125 kg of phosphate will be subject to a surplus levy. The proceeds from this levy will

be used to finance measures, which contribute to solving the manure surplus problem. This applies in particular to long-term solutions, such as the creation of provisions for efficient disposal, transportation and processing of manure surpluses, and financing of the manure banks. The surplus levy is progressive: no levy is charged on a production of less than 125 kg phosphate; however, production of more than 200 kg phosphate will result in double the normal levy charged. Furthermore, discounts may be granted on certain conditions, for instance, if a low-phosphate fodder is used, or if the manure producer him/her self has found a more or less permanent way of disposing of the manure. The discounts have been introduced as an incentive for farmers to find their own solutions for the surplus manure.

8.2.2.2 Manure policy (third phase) and the European Groundwater Directive for nitrates

In 1994, the national government was hesitant to pass legislation for the implementation of the third phase. It argued that a tightening of the manure standards would not make the targets for the environmental quality more feasible. They expected a delay in the policy's effectiveness of about 15 years (2015 instead of 2000), because of the problems with handling manure surpluses in the Netherlands. They also argued that the manure standards, as planned for the third phase, only regulate the amount of phosphates in animal fertilizers. Emissions to the groundwater due to the use of artificial fertilizers containing nitrogen, are not affected by these standards. And the introduction on the market of cattle fodder containing less phosphate created an imbalance in the ratio between phosphates and nitrogen in animal fertilizers.

The government has greater expectations of a 'mineral policy' instead of a 'manure policy', which means that they prefer standards that regulate the loss of minerals (including phosphates, nitrogen and other minerals) at a farm. Such a policy should affect the total use of fertilizers (animal as well as artificial). A crucial part of this policy is that farmers have to work with an accounting system, called a 'mineral balance', in which they record the input and the output (including losses) of minerals at their farm. Encouraging the prevention of and search for mineral losses can make farmers more aware of the seriousness of the manure problem than a new tightening of the standards. Such a mineral policy should include a policy settlement in which the agricultural sector commits itself to reduction targets for the coming years. The implementation of these reduction intentions should be left to the sector itself, which could be effective (looking to the effectiveness of the settlement which aims to reduce the use of pesticides). The target group will be moved by this policy in the direction of more self-regulation (VROM 1993-1997).

Meanwhile, in June 1991, the EU Council of Environment Ministers passed a directive for nitrates in groundwater. The purpose of the directive is to reduce the agricultural emission of nitrates to ground- and surface water. The directive prescribes, that nitrate concentrations in the upper groundwater should not exceed a level of 50 mg/l, which corresponds to the drinking water standard. To guarantee this, the EU wants to impose a manure standard of at most 170 kg nitrogen from artificial or animal fertilizers per ha, to start in 1999. In the period 1995-1999 a maximum of 210 kg/ha should be realized, unless it can be proved that a higher concentration would not harm the quality of the environment. A member state that wishes to deviate form the standard, has to propose its arguments to the European Committee. Enforcement is not based on the actual loss of nitrogen as found in the groundwater, but on the loss as recorded in the farmers' administration.

As a consequence of this directive, the Netherlands as a whole have been considered to be a vulnerable area since 18 December 1993. This means that not more than 50 mg/l of nitrate is allowed in the upper groundwater throughout the country. The EU directive should be implemented in the Dutch manure and mineral policy for the third phase by means of a tightening of the standards for the use of animal and artificial fertilizers. The implementation should have been in place before 18 December 1995. The Dutch government has given an explanation to the European Commission as to why it expects problems with the implementation of stricter standards. It also has explained that the Dutch government wishes to introduce a mineral policy, although they believe that it cannot be passed as legislation before 1997. The Dutch government stated that, in its view, there were three implementation problems: firstly, the necessary policy instruments would not be available before 1997; secondly, the capacity for handling manure surpluses is still too small; and thirdly, the gap between what is needed for the environment and what is feasible from an agricultural point of view can hardly be bridged.

In Brussels, the Dutch government stated that it preferred a system of mineral accounting with a compulsory declaration to achieve a reduction in nitrates losses. This system uses standards for the spreading of manure are used, but standards for the loss of minerals. Initially these standards would be more relaxed than the standards required by the EU. However, after a period of time the standards proposed by the Dutch might be more successful (effective in reaching reductions). The EU still doubts the effectiveness of the proposed Dutch instruments. In the Netherlands both the agricultural sector and the national and provincial governments feared that the EU would obstruct the Dutch proposal.

The Dutch policy makers realized that balanced manuring - with the implication that farmers would apply more minerals to the soil than

necessary for crop growth - is not feasible. In the Netherlands, with its unstable weather patterns, specific soil structure and intensive agricultural production, this would lead to a serious production loss. Yields of twelve tons of raw materials per ha per year cannot be achieved without an excessive supply of minerals. The idea of balanced manuring was amended to allow a certain loss of minerals (LNV 1993; VROM 1993-1997).

In the end, in October 1995, the Dutch government presented its proposal for the third phase of the Dutch manure policy. The policy in this proposal is aimed at farms who pose the greatest risks to the environment (farms with high stocking densities). The government wants these farms to start with minerals accounting. Minerals accounting is an input-output bookkeeping system, that relates total applications of fertilizers to production. If the losses, which must be reported yearly, exceed the standards for phosphate and nitrogen set for that particular year, a fine is levied on the surplus. Legislation aimed at the introduction of minerals accounting, is being prepared. It is to enter into force on 1 January 1998. From then on, farms with stocking rates of more than 2.5 LU (Livestock Units) must report their mineral losses. In 2002, the threshold will be lowered to 2 LU.

When minerals accounting is introduced in 1998, the loss standard for nitrogen will be 300 kg/ha. In 2005 it will be set at 200 kg/ha, and in 2008/2010 at 180 kg/ha. In other words, the government will not tighten the standards before 1998. The European Union standard will not be met before 2010 (LNV 1995).

The Dutch government's proposals provoked a storm of protests, not only among the farmers, a large group of which were opposed to the rigor of the proposed regulations, but also among the environmental movement and the water supply companies. The water supply companies, unified in Vewin, think that these proposals are quite insufficient to meet the European directive for nitrates in groundwater and, in fact, allow groundwater pollution for an extended period. The Vewin fears that water supply companies in the near future will have to invest heavily in nitrate purification systems, which might cost at least 200 million guilders per year. If that is the case, farmers should partly compensate the costs, in Vewin's view, for example by paying a levy on nitrogen losses which could be destined to reward farmers, if they sanitize the loss of nitrogen. Water supply companies believe the drinking water consumer cannot be the one to pay for the purification costs as a consequence of the excessively weak manure policy. Otherwise the water price in the provinces with intensive agriculture, like Limburg, Noord-Brabant, Gelderland and Overijssel, would rise to two or three guilders per 1,000 liters. For an average household the extra costs due to the manure policy, could be 150 Dutch guilders a year, according to calculations done by the water supply sector. The water supply companies

advocate advancing the implementation of the European directive and no longer waiting until 2005 to meet the standard for nitrogen use.

The environmental movement expects that the European Commission will not approve the Dutch proposals for a manure policy, since they do not meet the European nitrate directive on 60 to 70% of the sandy areas, which is 20% of the total agricultural land in the Netherlands. More than half of the groundwater well fields are in this area. If the Dutch government will not comply with the European directive, Brussels can impose a penalty, and every other interested party (environmental organizations or water supply companies) can even go to court to appeal for compliance (VROM 1993-1997).

Almost 600,000 farms, or 13% of the total number in the European Union, do not meet the requirements of the European directive for nitrates in groundwater, and have to modify the way they farm. In the Netherlands, 63% of the farms do not meet the standard. These conclusions are contained in a report by the Dutch Agriculture Economic Institute (Landbouw Economisch Instituut, LEI) to the European Commission (November 1995). Only the former twelve member states were included in this study, not Austria, Sweden and Finland. On average, the 600,000 farms that do not meet the standard are producing 350 kg/ha of nitrogen. The average production for all farms in the EU amounts to 70 kg/ha. The differences among farms, as well as among member states are huge, and member states with the highest nitrogen surpluses are Belgium, Denmark, Germany, France (Brittany), Luxembourg and the Netherlands. With 321 kg/ha the Netherlands head the ranking of member states, with Belgium at 170 kg/ha following, while lowest in this ranking is Portugal with 6 kg/ha. The number of farms in the Netherlands that do not meet the Nitrate Directive is about 60,000, or 63% of the total number, while in Belgium this number amounts about 50%. Together with France (Brittany), Spain (Galicia) and Italy (Lombardy), these member states also have the highest livestock density. In contrast to the Netherlands, Belgium, Denmark and a large part of Germany, high livestock densities and high nitrogen losses in the other member states are concentrated in rather small regions (VROM 1993-1997).

8.3 Regulating pesticides as a source of groundwater pollution

8.3.1 How serious is the problem of pesticides, looking at the European standard for drinking water?

Two types of norms are available for the quality of drinking water. On the one hand substances like nitrates or arsenic are not allowed to exceed certain concentrations in the water, while on the other hand just absolute standards are used for substances like pesticides, referring to the daily intake, regardless of their concentrations in drinking water or food. For a lot of known substances, toxicologists have assessed the amounts in which they will be toxic to the human body. In case of toxic substances, maximum concentrations are set at the level of one hundredth or one thousandth of the safe amounts for a daily intake without harm to one's health. For all pesticides that are applied to consumer products, these limits have been very accurately assessed. A pesticide only will be approved, if the residue on the product stays below the safety limit, which is why it is possible for us to eat an apple from a tree, although it might have pesticide residues on its skin. Besides the toxicology of consumer products, like fruits and vegetables, pesticides can also be toxic to the environment. To review a pesticide on this property, one has to know how long the pesticide might be active or resistant underground, how harmful it might be to underground organisms, and how much of it is allowed to leach to the groundwater.

In the 1970s, a standard for pesticide residues was introduced in the Netherlands at a maximum of 0.1 µg/l drinking water. This standard was chosen after some utilities had found pesticides in the groundwater used for drinking water production, which made consumers and water suppliers very nervous. Their immediate conclusion was, that pesticides should not be allowed in drinking water at all, which seemed to be a logical conclusion in those circumstances. The standard has been fixed on the basis of the detection limit, which is the smallest amount that can be measured. Lower values than 0.1 µg/l were not measurable, given the state of the art at that time, which in fact made it a zero-base standard. This is called the 'precautionary principle'.

After the concern expressed by the water supply companies, this new standard brought action from the producers of pesticides and the Dutch trade association Nefyto. In their opinion, the setting of this standard strongly reduced the variety of pesticides that could be brought onto the market, since the standard indicates that many of the pesticides on the market are leaching in greater or lesser quantities to the groundwater. Nefyto reasoned that, even if some pesticides were no longer to be used, they would still show up in the

groundwater since they are already underground. Nefyto then concluded, that it would be better to develop standards for each pesticide separately, since it is not the presence in water, but the concentration that sets the toxicology.

In 1980, the European Commission fixed the standard at 0.1 µg/l in a European directive for drinking water. Since then the chemical industry has been permanently exerting pressure on the European Commission to change the directive. The industry complains that in fact they are paying for the production costs of drinking water, causing them to lose billions of money, while the standards are quite arbitrarily chosen. An alternative would be to set differentiated standards according to the toxicology of each type of pesticide, based on the WHO Guidelines. Such toxicity based standards would mean a considerable relief of the restrictions for many pesticides.

By contrast, environmental organizations and water supply companies oppose to the idea of having differentiated standards for 700 different types of pesticides, which would be too complicated to enforce, in their view. Dutch water supply companies prefer to adhere to the precautionary principle, as do consumers' organizations. Some people even suggest being more strict than cautious, since technical progress has provided more precise measurement devices nowadays. In 1993, an audit by the Dutch Consumers' League found residues of the pesticide atrazine in the drinking water on three locations in the Netherlands. Although the residues were below 0.1 µg/l, the Consumers' League reasoned that substances like atrazine should not be present in the drinking water at all, if one adheres to a precautionary principle (VROM 1993-1997).

In the meantime, both Dutch and European authorities have been very pragmatic in enforcing the 0.1 µg/l standard. Violations of the standard do not always result in legal action, as they are reviewed first for their toxicological relevance, and the adoption of enforcement measures is considered only thereafter. In 1993, research by the National Institute of Public Health and the Environment (RIVM) showed that 65% of the agricultural land in the European Union is polluted with pesticides.

In the Netherlands, groundwater is investigated for pesticides only incidentally. There are not enough data available for a national survey. In recent years excessive high concentrations of about 19 different pesticides have been found in the shallow groundwater, while excess concentrations of six pesticides have been found in drinking water (RIVM 1991).

To work with a 0.1 µg/l standard for pesticides, is also troublesome for the water supply companies. They are responsible for purifying water to the point where pesticide concentrations are reduced to the standard level. They have to incur great purification costs to do that, which is reflected in the price of drinking water. The increasing possibilities for the detection also

have the effect, that even more substances are being discovered, and that, as a consequence, increasing investments in purification techniques are required. The European Commission estimates that investments in the drinking water supply in Europe will increase by 9% per year (8% in the Netherlands). By 2000, it is expected that investments in the drinking water supply sector will be twice the amount spent in 1993, according to a speech by EU Commissioner Paleokrassas at the EU Conference in September 1993 on the revision of the Drinking Water Directive. 'We have to investigate the relation between public health and the costs of drinking water, although public health will be in the first place. It is more a matter of who is going to pay for the costs,' the Greek Commissioner explained. He also emphasized, that there is no doubt that consumers in the future will have to pay more for their drinking water. To show how inexpensive drinking water is, he emphasized that the European consumer still gets 1,000 liters of water for the price of one liter of beer.

In June 1994, the European Union passed a revised directive for pesticides in drinking water, in which it was opted to apply in most cases the enlarged toxicological standard for the leaching of pesticides into groundwater. The standard of 0.1 μg/l was to apply only in areas where water is used for the production of drinking water. As a transitional arrangement, the member states are allowed to apply the enlarged toxicological standard until 1999. In special cases, member states are allowed to designate areas in which the drinking water standard has to be applied, although groundwater in those areas is not directly used for the drinking water production. This is an arrangement that fits quite well with the principles of Dutch environmental policy, and the Dutch government made use of it. It was a great surprise to the organization of pesticides producers, Nefyto, to see that within a few hours after the European ministers in Brussels agreed on the directive in Brussels, the Dutch government in The Hague came out with a legislative proposal to designate the entire Netherlands, because of the enormous amount of water, as an area where groundwater should be of appropriate quality for the supply of drinking water. In July 1995 the Dutch government incorporated the EU directive for drinking water into the Drinking Water Decree of 1984.

Meanwhile, the Nefyto fears that the Dutch government has let itself in for a lot of enforcement problems. As Nefyto put it, how can the Dutch government be that stringent, while there is free trade within Europe? While the Dutch drinking water standard bans specific pesticides, they might be allowed for use in other member states. The European directive implies, that a producer of a pesticide that is forbidden in the Netherlands, but has been approved in Greece, should also be allowed to use such a compound in the Netherlands. However, a spokesman of the Dutch Ministry of Agriculture,

which is responsible for the approval of pesticides, stated that this would not mean that such a fact would oblige the Dutch government to approve that pesticide. Member states can have their own approval policies, related to specific circumstances. The Dutch Ministry of Environment thinks that about 20% of the already registered pesticides have to be reviewed and might be banned. In the context of the approval policy, they will consider which substances will be indispensable for agricultural practice, and which might be remained for that reason (VROM 1993-1997).

About 700 different sorts of problematic pesticides exist, that need regulation. The discussion is about their admissibility. In contrast to nitrates, pesticides are not allowed at all in the groundwater, not even in a certain amount. Therefore, regulation of pesticides needs to provide precautionary measures.

There is a large variety of pesticides. Many of them are still not detectable. So water suppliers are anxious, that they may be unaware of their presence in the groundwater. Not even all the effects of the detectable pesticides are known, which is why water suppliers adhere to the principle that pesticides are not allowed to be in the groundwater (VROM 1993-1997).

8.3.2 What regulatory framework for pesticides is available at the national level in the Netherlands?

8.3.2.1 Pesticides policy: general structure

Groundwater protection first gained attention in the Netherlands at the beginning of the1970s. The Provincial Administration Act conferred on the provinces the competence to take care of the protection of groundwater. Since then provinces have to mark down 'water extraction areas', called 'ground water protection areas' since 1987. The regulatory consequences of this provincial competence concentrated on point source pollution, like leaking oil tanks and crashed tank trucks. No one was thinking at that time of regulating agricultural pollution, except for pesticides. From the early 1970s on, the 1962 Pesticides Act already banned the use of certain pesticides in water extraction areas. This had to be enforced by the provinces.

The Pesticides Act prescribes the approval and use of pesticides. A pesticide may only be stored, used or placed on the market after it has been evaluated for damaging side-effects to humans, animals, plants and the environment. A series of regulations issued under the Act laid down various specific requirements, such as the permissible level of residues, safety instructions pertaining to sale, storage and use, and the procedure to be followed in approving a pesticide. The competent authority for approving pesticides is the minister of agriculture (or another minister if the preparation is for use in another sector). Technical advice on pesticides submitted for

approval is provided by the Pesticides Approval Commission, a body consisting of representatives from the Ministries of Agriculture, Welfare, Public Health, Environment, and Social Affairs. Approval is for a maximum of ten years, though in most cases a shorter period is specified - typically between three and five years - and the uses to which a pesticide may be put are specified. The approval can be withdrawn instantly, if it transpires that the pesticide does indeed have damaging side-effects. This has happened on several occasions.

For a long period of time, the approval or registration policy based on the Pesticides Act functioned as the crop protection policy. As a result of the increasing criticism of the negative effects of pesticide use (on the environment and the drinking water supply), the government developed a crop protection plan in which the negative effects of pesticide use are discussed. The development of this 'Long term crop protection plan' (MeerJarenPlan Gewasbescherming) took a long time, due to the many conflicts that occurred between the departments involved. The government commenced drafting the plan in 1987. Finally, in 1990 a draft was issued and was sent to all the parties involved. The final draft was submitted to Parliament in June 1991. The Committee on Agriculture and Environment discussed the plan in April 1992. As a result of a hearing, the committee asked the government to come to an agreement with the agricultural interest organizations and the industry. In July 1993, the Dutch government signed the negotiated agreement concerning crop protection with the agricultural sector to regulate the use of pesticides. The settlement aims at a decrease in the structural dependence of crop protection on pesticides, and at a general reduction in the use of pesticides. Besides these generic goals, more specific goals were set for the year 2015. Firstly, the use of pesticides should generally be reduced by 50% by 2000 (compared to the amount used in 1987). Secondly, the use of harmful pesticides should be sanitized. Indicators for the predicate 'harmful' are the 'underground mobility', the 'persistence' (degradability), and the toxicity (how harmful they are in a water system). In fact, pesticides that have the potential to leach to the groundwater should be due for review and re-registration. It has been left to the sector itself to determine how to reach these goals (LNV 1991).

The main goals of the pesticides policy can be identified as follows:

1. acquiring more knowledge of the environmental and health risks of pesticides use;
2. improving the efficiency of crop protection, in order to achieve reductions in use;
3. creating better alternatives for the pesticide products that are already available; and
4. prohibiting specific pesticide products.

The pesticides policy mainly targeted at the production of and trade of pesticides and their use or application. Looking at the use of pesticides, there can be effects in two ways: on the residues of pesticides in agricultural products for human consumption; and on the residues of pesticides in the groundwater, which are harmful to the environment in general and to drinking water production in particular.

Pesticides are used by farmers in order to benefit the growing crops. Farmers' participation in the policy making process is driven by the objective of preventing any restrictions on crop protection that may affect the yield. On the other hand, it is in the interest of environmental actors (authorities as well as NGOs) to restrict or prevent the environmental and health effects of pesticides use. A third party in the policy process is the chemical industry. Their main interest is to safeguard the trade in pesticides. This does not imply that they are opposed to the participation of environmental actors. In general the industry is sensitive to matters of reliability, and motivated to work on the prevention of environmental and health effects for which it could be held responsible in the future.

To farmers the use of pesticides is part of their economic activity. Pesticides are regarded as being essential means to reach a certain degree of productivity. Therefore, the pesticides policy is not based on prohibiting the use of pesticides, but on their careful handling. Inasmuch as pesticides may be prohibited, this is done through restrictions on the approval of pesticides which affects the production and trade in pesticides in the first place, with the industry as a target group rather than the farmers. Policy makers consider it to be the producer's responsibility to instruct farmers as how to handle pesticides in order to prevent environmental and health effects as far as possible.

To farmers it is important also to get information about the effects on crop revenues of different ways of pesticides use. In the negotiated agreement on crop protection it is agreed that farmers will reduce the use of pesticides in general on the condition that this will not harm the protection of crops. Central instruments in this policy strategy are education and training activities. It is assumed that farmers will only cooperate, if they can be sure that alternative practices of pesticides handling (for example crop rotation, using more resistant crop types, using pesticides with lower risks) will not harm crop benefits.

The traditional pesticides handling practice shows, that farmers in general are not very knowledgeable about the effects of pesticides, and that they commonly apply more pesticides than necessary to be sure of the crop protecting effect.

Looking at the production and trade of pesticides, the registration procedure sets standards for the approval of pesticides. It therefore has the character of a policy instrument based on prohibitive steering. Through registration the policy makers try to regulate the availability of alternatives for crop protection. The aim of this instrument is not only the prohibition of harmful pesticides, but also the encouragement of the production of new and better alternatives. In that way, the registration procedure also works as a communicative incentive, as well as a financial incentive towards the pesticides producing industry (the target group). The procedure requires that producers investigate all the effects a pesticide may have, before they are allowed to introduce it on the market. In this way it works as a communicative incentive: the procedure generates more knowledge on the effects of pesticides. Related to this, producers are motivated to invest in innovations in crop protection. In that way, the procedure works as a financial incentive. As an effect of the pesticides policy, a new generation of pesticides is beginning to make its way on to the market. A number of companies are investing heavily in the development of low-risk pesticides.

The pesticides policy recognizes the reliance of farmers (and market gardeners) on the availability of technical means (the state of the art). This explains why a policy leaning on optimization of pesticides use can only be partly successful. Pesticide management by farmers themselves assumes that farmers are able to completely control the pollution of groundwater by pesticides. However, to a great extent the industry producing the pesticides can be made responsible for the effects of pesticides application. They are expected to have more expertise than farmers concerning the environmental and health effects of pesticides. Therefore, the registration procedure is still a crucial element of the policy. It motivates the producers as a target group to invest in research and development for the production and marketing of better products.

Farmers' organizations are aware of the importance of the producers as a target group. It is in the interest of the farmers to shift the discussion about pesticides effects to a discussion about the production of pesticides, instead of a discussion about their use. As long as this discussion does not harm their incomes, farmers' organizations are very cooperative in the policy making process. They accept agreements on self-regulation - as made in the 'Long term crop protection plan' - to avoid policy instruments that will intervene more stringently in the application process. In other words, it is in the interest of the farmers that the policy makers' attention will remain focused on the industry (Smeets 1990; Reus 1991; Brand 1994).

8.3.2.2 The use of pesticides and the 'Long Term Crop Protection Plan'

As described before, the Dutch 'Long term crop protection plan' aims at a decrease in the structural dependence of crop protection on pesticides, and at a general reduction in the use of pesticides. Besides these generic goals, more specific goals were set for the year 2015. Firstly, the use of pesticides should generally be reduced by 50% by 2000 (compared to the amount used in 1987). Secondly, the use of harmful pesticides should be sanitized. In fact, pesticides that have potential to leach to the groundwater should be due for review and re-registration. It has been left to the sector itself to decide how to reach these goals.

As far as the first goal is concerned, the plan has been quite successful, in that a reduction in use of the amounts of pesticides (in kilograms) has been achieved. In 1995, the annual emission of pesticides to the soil and the groundwater had been reduced by 80% compared to 1986. The target was a reduction of 40 to 45%. The effect of the remaining pesticides on the environmental quality has not been reviewed (LNV 1996). Environmental organizations think this achievement can be explained in terms of the enormous reduction in the use of soil disinfectants, while the use of other harmful pesticides has not actually been reduced. Meanwhile, new more concentrated and more harmful pesticides have also entered the market, making the result in terms of reductions in kilograms less laudable (Vereniging Milieudefensie 1996). In 1995, the Centre for Agriculture and Environment (CLM) and the Agriculture-Economic Institute (LEI), in a preliminary evaluation, recognized the achievement of reductions, although they warned that fewer kilograms used do not automatically imply improvements to the environment. The government would give a misleading signal to the agricultural sector, if it were only to count kilograms and ignore the results in terms of environmental quality (VROM 1993-1997).

As far as the second goal of the 'Long term crop protection plan' is concerned (sanitation of harmful pesticides), environmental organizations do not believe that a reduction has been achieved; instead there has been an increase of 2% (Vereniging Milieudefensie 1996). This has been explained in terms of delays in the European harmonization of pesticides policies, and the fact that producers of pesticides went to court to appeal against the sanitation of their products. The illegal use of pesticides stayed outside the statistics. Assessments of the amount of illegal pesticides in the Dutch market vary from 2 to 10%.

For the sanitation of harmful pesticides the approval policy is important. The European Union is working on the revision of a substances list, as a base of allowance of pesticides in the EU in future. Probably only 89 of the 700 pesticides in use will meet the new requirements. Pesticides that are no

longer necessary, or pesticides that are evidently harmful to humans or the environment will be banded or restricted in their use on the basis of Directive 91/414/EU on the marketing of phytosanitary products. According to the European environmental movement, consumers' organizations, and labor unions in the agricultural sector, this will not necessarily enhance environmental protection, as there is no guarantee that the 89 remaining pesticides are less harmful. They want the EU to consider more closely the environmental effects of pesticides when revising its list of pesticides (Verdonk & Velders 1996; VROM 1993-1997).

8.3.2.3 The registration of pesticides and the 'Pesticides Approval Commission'

Until 1993, the approval of pesticides was in the hands of the four responsible ministries that participated in the Pesticides Approval Commission. Because of ongoing interdepartmental conflicts about what environmental and public health criteria should be applied, and the consequence that pesticides were neither approved nor banned, the Parliament intervened, and in 1993 it established a new, independent Pesticides Approval Commission. At the same time, Parliament passed the 'Long term crop protection plan', while also approving the requirement that 90 environment critical pesticides should be sanitized before 1995. Three years later (in 1996), the result is that those 90 pesticides have not been sanitized and that even 70 new pesticides have been approved without reviewing them on environmental criteria. Some of the newly approved pesticides are very persistent and toxic substances. This could happen because the ministries involved in the previous commission did not establish any criteria for the newly established commission and they also neglected to supervise the work of the new commission. An evaluation report on the approval policy since 1993 by a task force of departmental officials, makes it clear that obvious standards and criteria were missing in some cases where the commission was forced to make a balanced consideration of the interests involved. The task force writes, that the consideration of interests should not be a matter for the commission, and should be left to the political arena. The responsible minister for agriculture concluded, after reading the report, that the approval policy had failed with respect to the involvement of politics in the implementation work of the Pesticides Approval Commission. The discretion of the commission needs to be restricted as much as possible, he judged. By contrast, the Agricultural Board and the producers of pesticides think, that the Pesticides Approval Commission has insufficient discretionary competence (Brand 1994; VROM 1993-1997).

8.4 A policy network point of view: the dynamics of agricultural issues in the water supply sector

8.4.1 Water supply sector growing into a policy community

Environmental interests have only recently gained attention within Dutch groundwater management. Initially, groundwater was managed only to supply drinking water and for the related health care aspects. That was why the Ministry for Public Health introduced the Water Supply Act in 1957, not only to make demands on the quality of drinking water, but also to institutionalize the organization of the drinking water sector. This act formalized an already existing practice by which provinces could permit or forbid the establishment of new or the expansion of existing water supply companies.

Until the turn of the 19th century into the 20th, most of the water supply companies were local and private initiatives. The beginning of the twentieth century saw the establishment of companies covering a wider area, often with the participation of municipalities. Municipalities and private persons were not willing to cooperate in all cases, however. To guarantee the efficiency of water works all over the country, several provinces developed regulations governing the water supply on their own initiative, a practice that later found support in the Water Supply Act.

Since 1975, most of the provinces have made plans for a further concentration of water supply companies. The number of companies has been reduced: from 102 in 1980 to 73 in 1988, to 49 in 1990, to 41 in 1993, and to 28 in 1997. But there are plans for a further reduction still, to about 30. The provinces and the drinking water sector itself, as represented by the Vewin (National Association of Water Supply Companies), agreed that the structure of the drinking water sector in its present form does not fit the demands for securing clean water supplies in the future. They believe that the water supply companies can only fulfill their tasks, if they have a strong organization, which implies adequate technological know-how and financial capacity (Vewin 1991a; 1993; VROM 1993-1997; VROM 1995b).Those supply companies that use surface water for the production of drinking water, are faced with greater problems in guaranteeing good quality than those who use groundwater. The latter consider themselves to be relatively invulnerable, which is why they offer a lot of resistance to reorganization plans. They argue that they have never had problems with the supply of water, and that they have always had a good quality, that their charges are reasonable, and that their customers are always satisfied (Van der Knaap 1987). The smaller companies, in particular - most of which do not have the provincial authorities participating as a shareholder - try to maintain their

autonomy. But the burden of proof lies with them to demonstrate, that they can still operate in an efficient way. The Vewin is very cautious in taking a stand (Vewin 1989). Actually, they support the idea of developing more professionalism and efficiency in the drinking water sector. But the Vewin tries to avoid a confrontation with the smaller companies, since it wants to be an organization that represents the entire drinking water sector (Achttienribbe 1993; Langendijk 1994).

We may conclude that, until the 1950s, the water supply sector can be qualified as a fairly fragmented network. Though the companies shared a common purpose, they acted individually. Water supply came into being due to local initiatives, and for a long time they sought to maintain their autonomy. After 1957, the sector became more integrated due to two developments. First, reorganizations and mergers between companies led to scale enlargements in the sector and an increasing interrelatedness. Second, the interrelatedness and commitment within the sector increased as a result of the rise of national organizations which were intended to promote the interests of the entire sector, such as the Vewin and the KIWA (a research institute for technological innovations in the water supply sector). The need to increase efficiency in the sector encouraged a strong policy community with a strong technocratic approach to the problems the sector was faced with. Thus, these institutional changes were generated from inside the policy community, based upon a common perception of the way forward.

8.4.2 The water supply sector encountering the agricultural sector in an issue network

The presence of nitrates in groundwater poses a serious threat to the drinking water supply. More than 50% of Dutch water extraction locations (especially those in the east and the south) are likely to become unsuitable as drinking water sources in the near future. They are situated in areas with a sandy soil and many intensive cattle farms. Although there were already indications that excess manure was being produced in some regions in the Netherlands as early as the mid-1960s, it took until the 1980s before the government began to deal seriously with the manure problem. The delay was due to a demarcation dispute between the Ministries of Environment and Agriculture. The Soil Protection Act, which came into effect in 1987, is the first Dutch legislation that aims at integrated protection of the soil and groundwater. It is primarily aimed at preventing excessive manuring, by intervening in the spreading of manure on agricultural land. The Act contains a number of standards to fix the amount of manure which is allowed to be spread on the land. These standards apply nationally.

As described in section 8.2.1.1, the Soil Protection Act provides additional protection for areas in which groundwater needs to be withdrawn for the supply of drinking water. Provinces are authorized to enforce more restrictive manuring standards in these areas. Farmers within the protected areas should be financially compensated for the losses by means of a charge paid by those who abstract groundwater (mainly the water supply companies). The reason for the compensation provision was to prevent protests from the farmers in groundwater protection areas, who are faced with greater restrictions than farmers outside those areas.

The drinking water sector was thus confronted by a very strongly organized opponent from outside the sector - the farmers. Although the agricultural sector constitutes only five percent of the active labor force in the Netherlands, it has had considerable influence in Dutch politics. Since 1954, the agricultural sector has been nationally organized in the Agricultural Board. The agricultural lobby was very effective, which is, for example, reflected by the fact that it usually is consulted at a very early stage of policy making. The Agricultural Board also has regional boards in each province, that consult with the regional or local authorities, particularly about planning and land use. The regional boards played an important role in determining the manure policy for groundwater protection areas. They negotiated with the provincial authorities and the water supply companies about the manure restrictions that are to be applied in these areas, the disposal of the resulting manure surpluses, and the compensation payments for farmers (Dekker 1988).

While the agricultural sector is strongly developed at all levels - national, regional, and local - the drinking water sector was for a long time not so well organized. Traditionally, water supply companies are proud of their autonomy. The Vewin always played a modest political role, being only active in emergency situations, such as the ‘bentazon affair’ in 1988, while fulfilling its main task of providing service to the drinking water branch. At the end of the 1980s, the Vewin became more politically involved and responsive, although the political discussion on the Soil Protection Act had already been concluded. When the presidency came into the hands of the governor of the province of Zuid-Holland, the Vewin succeeded in moving the negotiations concerning the compensation in groundwater protection areas from the regional level (with one negotiator from the Agricultural Board representing the whole country negotiating with each water supply company separately) to the national level. Since then, the framework for regional negotiations is the state level.

We conclude that external interests and pressure on the water supply sector in some sense strengthened the sector as a policy community. It became a more tightly organized policy community, especially in terms of

an increasing commitment between the members of the community. In the meantime, however, the issue of agricultural pollution of groundwater confronted the water supply community with another strong policy community, the agricultural sector. This sector is very experienced and has a long tradition in lobbying and negotiating strategies. The agricultural sector as a network is not only characterized by a strong commitment, but also by a strong interrelatedness. This strong interrelatedness forced the water supply sector to participate in negotiations on a more aggregated (regional and national) level. In fact, it strengthened the interrelatedness within the water supply sector (Kuks 1988; Den Breejen 1991).

8.4.3 Consultation between water supply companies and farmer's organizations as the most promising strategy

The discussion of the compensation payments shows, that the regulatory strength ('control capacity') of the authorities is very limited in the case of groundwater quality management. Although they try to regulate by means of ordinances and prohibitions, the enforcement of these rules is difficult. Therefore, a system has been chosen in which private organizations (water supply companies) have to participate in the enforcement of the rules.

The drinking water sector is beginning to define its role, however. In 1990, the director of Vewin stated:

> This is a considerable change for organizations which traditionally are engaged in pumping and presenting the bill. However, if you want to create groundwater protection areas, then others may have fewer opportunities to use the soil in these areas. If that is the case, groundwater protection can only be realized by offering compensation to them. This is not a new phenomenon: the drinking water sector already contributes one third (about 20 million Dutch guilders) of the costs of the Rhine Salt Treaty. In the Third National Policy Document on Water Management this is called 'paying for quality'. (Jehae & Van Soest 1990 [translation by the author])[3]

The compensation provision formally implies that farmers can claim their losses against the province, which in turn may charge the water supply companies that withdraw groundwater in that area. Water supply companies prefer to settle the matter in a friendly atmosphere. They also want to control the disposal costs of manure surpluses and to avoid unnecessarily high bills. For both reasons, several water supply companies have started to act in the matter of disposal of manure surpluses, which in itself is a very unusual task for a water supply company. An increasing number of companies are also attempting to buy out farmers in their most vulnerable areas.

[3] See also V&W (1989) and Van der Schot (1995).

Although methods exist for the purification of groundwater that is polluted with nitrates, the drinking water sector strongly opposes this option as long-term solution. The director of Vewin explains:

> If the water supply companies started with complete purification tomorrow, the polluters could no longer be forced to change their behavior. We want to use the drinking water, and with that the consumer, as a crowbar for improving the environment. (Velema, Boer & Verheul 1989 [translation by the author])

The strategy of consultation, chosen by the water supply companies to deal with agricultural pollution of groundwater, had already been tested by the companies which use surface water from the large rivers for their drinking water production. Those companies are mainly located in the western part of the Netherlands. They have huge problems in maintaining a good water quality. A great part of the pollution in these rivers stems from foreign industries, which means that they are dealing with extra-territorial actors. The director of Vewin indicated that Vewin is reluctant to develop new techniques for analyzing water for the purpose of tracing polluters. However, the data can often be used to exert pressure on polluting industries. For example, the City of Rotterdam has chosen to consult with polluting industries, even when they are located abroad, rather than taking judicial action. In 1990 a spokesman of the City of Rotterdam stated:

> We try to handle the collected data very carefully, just because we want to get in conference with the discharging industries. Negative publicity will be applied only when the polluter is really unwilling. However, threatening publicity has proved to be a very strong instrument. (Jehae & Van Soest 1990 [translation by the author])

This demonstrates that the drinking water sector realizes that it has its own role to play in water management, and that it can often reach further than any other authority. This seems to be true for the case of point source pollution. But is this also true for non-point source pollution? Consultation with polluters was regarded to be the only solution to the problem, since the national and provincial authorities were unable to guarantee strict enforcement of regulations. However, the case of groundwater protection areas also demonstrates that the possibility of using a consultation strategy depends heavily on the extent to which non-point source polluters are organized. The agricultural industry is very well organized, and that may be one of the reasons why they became the first target group to be addressed by the Soil Protection Act in 1987.

In practice, the approved approach seems to have been based largely on self-regulation. Thus, the secretary general of the Ministry of Agriculture, when he signed the negotiated agreement on the use of pesticides, argued

that the target group was also consulted on the reduction of the use of pesticides by farmers.

> One can prohibit the use of pesticides, but the need for them won't disappear. Such a measure has hardly any effect, because the farmers would use other or illegal means which could be worse on a large scale. Actually, the reason for using excess pesticides nowadays is that farmers have too little knowledge about how to use them and they won't take risks. A policy strategy should be more directed to an increase in expertise by means of the branch itself. (NRC Handelsblad, December 23, 1988 [translation by the author])

However, it remains very difficult for authorities and water supply companies to address the problem of non-point source polluters in less organized branches. One of difficulties of tracing polluters is that pollution reaches the groundwater only after a long period. Even if farmers entirely ceased manure spreading, it would still take fifteen to thirty years before all the current nitrate pollution has come out with the groundwater that is used for the production of drinking water.

Finally, we may formulate some conclusions on the way in which the water supply community dealt with external threats. On the one hand, water supply companies reacted in a very technocratic way by searching for technological innovations to satisfy the demand for drinking water of an acceptable quality. On the other hand, they tried to react against the Soil Protection Act which ignored the polluter-pays-principle. They did not succeed in their opposition, although they were strongly supported by environmental groups. The water supply sector and the environmental groups are united in their support for the polluter-pays-principle. In this sense, the strong relation between the water supply sector and environmental groups can be conceived as the existence of a broader policy community. However, the interrelatedness in this community is weak: no strong or intensive interactions exist between both sets of actors. In the end, the polluter-pays-principle was not applied due to a successful lobby by the agricultural sector and due to the lack of political organization and influence of the drinking water consumers. It appeared that the best feasible political outcome was to saddle the consumers with the costs of pollution prevention.

Another indication for the existence of common interests of the water supply sector and environmental groups, is that they both stress the importance of strict enforcement of the rules. However, water supply companies realize that it is very difficult to control the spreading of manure. The control capacity of the regulatory agencies (provinces) is limited in this respect. That is why the water supply sector expects better results through direct negotiations with farmers' organizations. After the settlement of the compensation provision in the Soil Protection Act, 'consultation with target groups' was left as the most promising strategy in the issue network in which

the water supply sector and the agricultural sector both participate (Kuks 1988; Bressers, Huitema & Kuks 1995; Van der Schot 1995).

8.5 Another policy network point of view: the dynamics of environmental issues in the agricultural sector

8.5.1 The traditional agricultural network

This section analyses the policy network which is traditionally involved in the formulation of agricultural policy. We call this the traditional agricultural network. In fact, we describe the network as it existed in the Netherlands until the 1980s, before the development of the manure policy. In our analysis of the relationships in the agricultural network we make use of the 'interrelatedness' and 'commitment' concepts (cf. Bressers & Kuks 1992). In the following section we examine what changes the network has undergone as a direct result of the manure problem, and the consequences this has had, and may have for the choice of policy instruments. In that section we actually handle the agricultural network and the related environmental policy in the 1980s and 1990s.

Three aspects of interrelatedness may be distinguished in the network relationships. In the first place it should be noted, that the discussion between policy makers and the agricultural target group is highly institutionalized. The Agricultural Board consults frequently, and on a more or less regular basis, with the Ministry of Agriculture and the agricultural specialists in Parliament. Each month, formal talks take place between the Agricultural Board and the minister. This way, the Agricultural Board is able to formulate timely responses to policy initiatives, or to initiate policy itself. The permanent committees for the agricultural sector are in the habit of first consulting with the Agricultural Board before any parliamentary debate on agricultural policy begins. This practice is described by a Member of Parliament: 'When the minister returns from Brussels he spends the entire day in discussion with the Agricultural Board. The permanent committee is sometimes only informed a week later.' (Dekker 1988)

In the second place, it is notable that a considerable number of personal ties exist in the agricultural sector. Many administrators in the agricultural sector simultaneously occupy different positions in other organizations, and therefore represent the interests of the sector on a number of different fronts. Personal ties exist not only within the agricultural interest group (particularly between the Agricultural Board and its five component organizations), but also between the agricultural interest group and other organizations in the agricultural sector (such as trade cooperatives, industrial cooperatives, the

banks and insurance companies with a strong tradition in the agricultural sector). Many agricultural administrators also occupy positions in political organizations at different government levels, or in Government management boards and semi-state institutions.

Thirdly, we have observed that the agricultural sector has an extensive infrastructure at its disposal which serves to support the farming industry. The sector has its own educational institutions, an impressive information network, a considerable number of renowned quality control institutions, an extensive research and development department, and its own daily and weekly newspapers with a wide readership in the agricultural sector, which are considered to be an important source of information. However, the question we must ask ourselves is, whether this can be considered as indicative of interrelatedness or of commitment. On the one hand the infrastructure increases the intensity of interaction, for instance, from the point of view of communication structures. On the other hand, this infrastructure deepens the understanding between policy makers and target group as an example of commitment at network level.

One reason for the strong interrelatedness in the agricultural network is, that the target group consists of a large number of small, self-employed entrepreneurs, who form a relatively homogeneous group with respect to the way they carry on their businesses. As this concerns small enterprises (family businesses), the need for interest groups is considerable. The agricultural market has to be protected and the industry needs support in order to increase its productivity, reduce its costs, and be in a position to exploit export opportunities. The homogeneity of this industrial sector means, that it can be successfully represented by one umbrella organization, the Agricultural Board. However, mutual dependence is an essential factor. The Ministry of Agriculture is expected to represent the interests of the agricultural sector in the Dutch council of ministers and in the European council of agricultural ministers. Therefore, the ministry is dependent on the target group to obtain information on administration in this sector, and on the interest group, as far as disciplining its members is concerned.

The strong interrelatedness in the agricultural network has led to what is known as corporatism. Policy formulation in the agricultural sector is in the hands of three actors: the Ministry of Agriculture, the agricultural commissions in Parliament and the Agricultural Board, which are also referred to as the iron triangle, who form a united, consensual front before taking a standpoint. The representation of agricultural interests is institutionalized in the Agricultural Board, whose authority is recognized by both target group and policy makers, and that has been granted civil authority to implement policy, and discipline its policy field autonomously. It is very difficult for outsiders (such as the Ministry of Environment) to

break through this corporatism (Bressers & Kuks 1992; Frouws 1993; Termeer 1993).

We can also recognize forms of commitment in the agricultural network. The policy makers have a strong positive attitude to the target group of the policy. They clearly consider the representation of the interests of the target group to be the reason for their existence.

This strong commitment has two main sources. In the first place most of the actors in the agricultural network have remarkably similar backgrounds. Many actors (and officials of the Ministry of Agriculture) grew up in an agrarian family, have either had an agrarian education or have studied at the only agricultural university in the Netherlands, which has always maintained strong ties with the agricultural sector. Anyone who has found access to the agricultural network, transfers easily from one function to another. Administrators are generally recruited from the sector's own ranks. Top administrators in the agricultural sector generally have occupied other positions in the agricultural network. Until recently, this also applied to the officials who have successively filled the post of minister of agriculture.

Another reason for the presence of this strong commitment, is that policy formulation is very dependent on information generated by the agricultural sector itself. The Agricultural Boards, as well as the various research institutions (which form part of the infrastructure) ensure that the policy makers are well informed on the concerns of the target group of the policy.

The strong commitment in the agricultural network means, that considerable resistance is offered by policy makers to product restrictions in the agricultural sector. Maintaining a strong agricultural sector has become their own interest. Necessary changes are generally sought in technological innovations in this industry. Policy makers have absolute confidence in the self-governing ability of the agricultural sector (Bressers & Kuks 1992; Frouws 1993; Termeer 1993).

8.5.2 Changes in the traditional network and consequences for the choice of instruments

From about 1980 on, the agricultural network has been under pressure because of the manure problem. In this section we describe which new actors have been trying to gain access to the agricultural network, the response of the existing network to these 'newcomers', and the consequences this has had for the way in which policy has been pursued in respect of the manure problem. At least three phases can be distinguished in the history of dealing with the manure problem (Bressers & Kuks 1992).

8.5.2.1 First phase (1972-1984): the network tries to deny the existence of the policy problem

As early as the end of the 1960s and the beginning of the 1970s it became clear that a manure problem existed, and that it would be necessary to tackle this problem nationally. However, publications with facts concerning the size of the problem, collected by the national statistical bureau (CBS), were kept back by representatives of the Ministry of Agriculture. Members of Parliament received insufficient information about the seriousness of the problem. They gained the impression, that the growing pace of the intensive cattle breeding would diminish, and that the main problem consisted of malodors, distribution and fodder composition. It would be possible to develop technical solutions to these problems (Frouws 1990: 38). Apart from the Ministry of Agriculture, the Agricultural Board, as well as the target group itself played down the manure problem during this phase. Even at the end of the 1980s 35% of the farmers interviewed denied the existence of a manure problem; 57% denied that manure could threaten the fertility of the soil (Vermeulen 1992).

Using delaying tactics, the Ministry of Agriculture tried to block the introduction of manure policy measures. An interdepartmental struggle was going on. Although the Ministry of Environment started to formulate the Soil Protection Act in 1980, the Ministry of Agriculture initially disputed the range of this act. As they did not succeed, they suddenly introduced a draft for a new Manure Act in 1981. The Ministry of Agriculture, as well as the Agricultural Board feared losing the traditional role of initiator, which they used to have within the agricultural network. Moreover, they used the delaying tactic of establishing research committees, which were assigned the mission to study the seriousness and size of the manure problem, as well as the possibilities for its solution.

It is typical of this phase, that both ministries developed distinct regulations with respect to the manure problem in the Netherlands. The regulation prepared by the Ministry of Environment was characteristic of a situation of weak commitment and weak interrelatedness. The Soil Protection Act initially contained very ambitious objectives, which could only be realized by means of directives. By contrast, the Manure Act of the Ministry of Agriculture showed the characteristics of a situation in which a strong commitment and a strong interrelatedness exist. A preference can be seen for policy instruments stimulating self-regulation. While the Ministry of Agriculture has its own target group, which can be identified very clearly as a homogeneous group, the Ministry of Environment lacked such clear identifications with any specific target group until at least the middle of the 1980s. Because of a weak interrelatedness and a weak commitment with target groups, the Dutch environmental policies in the 1970s and the

beginning of the 1980s are characterized by: a sectored approach to each environmental sector; a restricted role for target groups in the policy making process; optimistic and therefore ambitious, but mostly unrealistic objectives; and a preference for regulation by standards and permits as the dominant policy instruments.

8.5.2.2 Second phase (1984-1989): the network tries to delay the policy formulation process

In 1984 the then ministers of agriculture and environment reached the compromise, that the formulation of both acts would be attuned to each other, and that they would be signed by both ministers. At least this 'condemned' both ministries to cooperation, although it did not imply the end of the existing interdepartmental struggle. This was an initiative of the former minister of environment Winsemius, who wanted to 'unfreeze' the cold relationship that had existed for years. He also conducted a sort of 'tour', explaining his objectives to agricultural organizations and farmers all over the country. The double responsibility arrangement changed the struggle from a demarcation dispute into a debate about the contents of both regulations. The use of delaying tactics continued. Because both regulations were arranged as a framework regulation, it was possible to delay the decision making concerning the filling in of the framework. In this way the agricultural network gained time to look for technical solutions to the manure problem.

Because of the 'condemnation to cooperate' issued at the ministerial level, the traditional agricultural network became confronted in the second phase with new actors. Those new actors were trying to enter the traditional network, or to 'open the iron triangle'. First of all the Ministry of Environment announced its entry as a new policy maker in the agricultural sector. It is typical of this ministry, that its access to important target groups in environmental areas (agriculture, industry and transport) depends on other ministries, that are traditionally responsible for policy concerning these target groups. External integration is pursued by the Ministry of Environment as a means of compensating for its lack of power. Attending to environmental issues should become an integral part of every ministry dealing with environmental matters. Ministries and interest organizations of non-environmental policy sectors have reacted to this initiative by consulting their own environmental experts (Frouws 1988: 47-48). Since the beginning of the 1980s, the Ministries of Agriculture and Environment have been engaged in interdepartmental talks on a collective approach to the manure problem. In addition to the ministry, new interest groups also announced their entry in the traditional agriculture network. From the beginning, the environmental interest groups proposed a reduction of the livestock numbers

in the Netherlands, as a permanent solution to the manure problem. They wanted to urge the policy makers not to underestimate the manure problem.

The entry of new actors to the policy formulation network has sparked off two distinct reactions. The first was that the traditional actors tried to keep their 'iron triangle' closed. Although the Ministry of Environment tried to draw the initiative for the manure policy to itself, the agricultural sector has been successful in ensuring that the Ministry of Agriculture functioned as co-policy maker. By means of the iron triangle, the Agricultural Board has been able to exercise a powerful influence on the manure policy. The Ministry of Agriculture has continually sought to avoid direct contact between the Ministry of Environment and the agricultural target group. It wished to be solely responsible for determining which information is received by the target group, and when. In this context, it is noteworthy how an official has described the reaction of the Ministry of Agriculture to the plans of the Ministry of Environment to instigate an investigation into the consequences of a possible reduction of the numbers of livestock:

> Agriculture had serious doubts (...). They feared, and not without grounds, that the outside world would blame the Government for planning to reduce the numbers of livestock. The only purpose of this investigation, however, was to establish the consequences of a reduction. To pursue a good policy you have to know what the consequences of reduction might be. (Logemann 1990 [translation by the author])

A second reaction to the entry of new actors to the policy formulation network was that a gradual division occurred in the traditional agricultural network. On the one hand there were signs of disagreement within the iron triangle. The manure legislation had already led to an open conflict between the minister of agriculture and the Agricultural Board. Members of Parliament no longer relied solely on advice from the Agricultural Board, but also included advice given by environmental groups in their decision making (Termeer 1990: 99). The policy formulation process in the agricultural sector no longer occurred in isolation, and consequently it became politicized. Meanwhile, farmers' interest groups were dealing with a problem of legitimization (Frouws 1990). Since policy makers were asking their advice on burdensome and restrictive measures, they feared that their legitimacy would decrease in the eyes of their members. This blocked the cooperation with the policy makers within the iron triangle. Completely against the corporatist tradition, the Agricultural Board came out with discordant advice, especially in reference to the allocation of production rights (as was the case with the advice on the so-called Verplaatsingsbesluit).

On the other hand, there were indications of a divergence between the iron triangle and the agricultural target group, particularly in respect of relaying information to the target group on the seriousness of the manure

problem and the need for change. Different actors in the agricultural sector feared, that both the Ministry of Agriculture and the Agricultural Board had continually delayed providing information, with the result that adjustments achieved in the sector would probably be inadequate and would make a reduction in the numbers of livestock inevitable in the end. These actors believed that the policy makers should be clearer about the investments to be made by the target group, in order to maintain production levels in the future (Klep 1989; 1990; Termeer 1990). Numerous stock breeders were keeping more animals than they themselves considered necessary, reasoning that if the livestock percentages have to be reduced in the future, it would be better to have as many animals as possible on the census date (Klep 1989). The formulation of a manure policy made it difficult for the iron triangle to keep its ranks closed. However, it did not mean a total break with the rules of corporatist decision making. The agricultural network still was in existence, and it unmistakably placed its mark on the manure policy.

The formulation of policy for the manure problem has ultimately led to a division into three major solutions: restriction on the spreading of manure, relocation of manure surpluses, and the encouragement of innovation. The solution that requires restrictions on the spreading of manure is the result of an initiative of the Ministry of Environment. The Agricultural Board was successful in attaching a rider to this solution, to the effect that the existing size and organization of the stock breeding industry may not be affected. This limiting condition also created a basis for compensation claims in areas where, as a result of the special protection requirements, stricter manuring standards were enforced than those that applied nationally. The option of reduction of the agricultural sector, advocated by the environmental movement, had to be considered more seriously, when the minister of agriculture imposed a deadline of 1994 to the solution of the problem of the manure surpluses. If this attempt failed, then volume measures (reduction of livestock numbers or closure of certain farms) would have to be taken (Termeer 1990: 99).

The solution requiring the relocation of manure surpluses is an initiative of the Agricultural Board. This organization insisted that the problem of manure surpluses should not be viewed as a regional, but as a national one. The manure surpluses are then treated as a problem of logistics, which can be solved by transferring the surpluses to areas without surpluses. To support this solution, the Agricultural Board took the initiative of setting up a National Manure Bank, whose task was to establish an infrastructure to deal with the relocation of manure surpluses. Later on, the minister of agriculture gave this National Manure Bank a legal status (Doorewaard 1990: 67, 69).

The solution that mandated the encouragement of innovations is also an initiative of the Agricultural Board, yielding a varied set of instruments. For

example, the Board achieved a progressively stricter phasing of the manuring standards over a time span of thirteen years. In comparison with the target standard, which will be valid in the year 2000, the initial standards are very flexible. The phasing was considered necessary to develop technological options for the prevention, disposal and processing of manure. This solution also resulted in a surplus tax. On the one hand this tax has a regulatory function by encouraging a reduction in manure production; the less manure produced the less tax one has to pay. On the other hand, the proceeds from this tax are used to finance innovations in the agricultural sector intended to solve the manure problem.

The agricultural sector itself has played a very important role in implementing policy in the first two solutions. A manure accounting system has been introduced, to ensure that the rules for manuring are being adhered to. The cooperation of the traditional institutions is required to implement this system. These institutions are the responsibility of the Agricultural Board. To relocate manure surpluses, manure banks have been created, administered by participants in the agricultural network. As a result of personal ties, the administration of these manure banks is firmly in the grip of the agricultural network.

Another point worth mentioning is the strengthening of the infrastructure in the agricultural sector, which is a result of the third solution. The agrarian industry itself has also gained in strength, as a result of this solution, and it is precisely this group which is exercising political pressure to prevent reductions in the agricultural sector. As the stimulation of innovations has proofed to be successful, it will be more difficult to make reduction of the agricultural sector a policy target in the future.

8.5.2.3 Third phase (1989-1993): the network tries to recover its balance

Because of the growing criticism concerning the agricultural pollution of the environment, and influenced by a new wave of environmental attention at the end of the 1980s, the agricultural network developed a more offensive strategy. The Ministry of Agriculture is trying to regain the initiative on the formulation of agricultural environmental policy, which means that it wants to play a role at an earlier stage of the policy formulation process. In an interview with us, the head and an officer of the General Environmental Policy Sector stated: ‘As Ministry of Agriculture we should stop adopting a reactive and defensive approach and make our input in an earlier phase’. Furthermore, it was observed by the respondents, that the attitude to environmental affairs is shifting within the Ministry of Agriculture. The external pressure creates more opportunities than before for ‘reformers’ within the organization. Attitudes do not change as much on all

environmental subjects. The Ministry of Agriculture has taken more initiative on manure policy than, for instance, the introduction of environmental management systems in farming, according to our respondents.

The year 1989 is a landmark, as important documents were delivered both by the Agricultural Board ('Integraal Milieu Actieplan voor de Land- en Tuinbouw') and the Ministry of Agriculture ('Structuurnota Landbouw'), in which self-regulation by the network through the development of sustainable production methods was the central element. Both documents advocated the use of such policy instruments such as covenants. The advantage of such instruments for certain agricultural areas would be, that the implementation of environmental policy could be temporized (soft-pedaled) and financially better supported. Besides that, the publicity effect of covenants was recognized, as a lot of criticism concerning agriculture could be parried this way.

Meanwhile, at the end of the 1980s the Ministry of Environment started to focus on the agricultural target group. Of the 800 officials employed in the Directorate General for Environmental Protection, approximately 50 are directly involved in agriculture. A management team was created to implement the target group policy for agriculture. Its task is, in conjunction with the agricultural sector, to seek policy measures which promote ecologically sound production methods (Logemann 1990). In an interview with us, the 'target group manager' stated, that his task was two-sided: he also had to aim at improving the understanding of the agricultural sector within his own ministry.

The environmental interest groups developed a much more tolerant attitude to the target group. In an interview a spokesman of the environmental movement put it like this:

> We shouldn't think about it, but nevertheless it remains a real possibility that the entire agricultural sector might suddenly decide to collectively ignore the rules which apply to manuring. If we take a radical standpoint this will only create ill-feeling on a regional level.

The agricultural target group is viewed as an unruly group in which moderate solutions, which leave the future prospects for agriculture unchanged, have the most chance of success (Van Duinhoven 1991).

With respect to the policy network in the third phase, we can perceive at least four reactions. At first, the Ministry of Environment became accepted as a network participant by the ministry of agriculture. Since 1984 both ministries consult each other frequently with respect to the manure policy. An interdepartmental manure project group assembles monthly, while about 10 to 20 working groups within the scope of this project group meet much more frequently. Demarcation disputes still exist, especially as the Ministry

of Environment initiates the further detailing of the manure policy, and it also happens that two separate policy proposals are presented to both ministers. But in the end, policy making is integrated and, with respect to the relation between agriculture and environment, this will be stated in the same way in separated official documents from both ministries. In an interview with public officials of the Ministry of Agriculture it was observed, that 'sitting at the table, it turns out that both parties agree much more than might have been expected beforehand'. Disputes mostly concern the pace and the scope of the policy. The environmental section wants to go faster and further, which can be explained by the fact that, although the interrelatedness between the Ministry of Environment and the farmers has increased, the commitment is still weak. There is still little resistance of these policy makers to ambitious objectives.

Secondly, the ministry of environment has been accepted as a network participant by the target group. In spite of the reserved attitude of the Ministry of Environment in this respect, a lot of consultation with the Agricultural Board does take place. In an interview with us, the agricultural target group manager at the Ministry of Environment puts this as follows:

> The farmers realize that they won't make it with the Ministry of Agriculture alone. Their experience is that they don't have enough influence on the environmental minister through their own minister of agriculture. That is why they want to contact the Ministry of Environment directly. A recent image study has shown, that farmers attach a more positive image to the Ministry of Environment than they do to the Ministry of Agriculture. Farmers experience the Ministry of Environment as a more client-oriented and flexible organization.

Thirdly, the iron triangle still exists, although it functions more openly than it did. Expertise from outside is more welcomed. 'The environment' has become a daily issue, for example in the farmers' daily newspaper. The admittance of external expertise has been made easier because of external pressures on the function of the agricultural network and particularly its ministry. Organizational problems have speeded up the opening of the iron triangle. Environmental as well as agricultural intermediaries initially entered the Ministry of Agriculture separately to do their lobbying. At the moment they are invited to enter the ministry at the same time for consultation. Also, several organizations within the agricultural network are becoming more and more environmentally oriented. The commodity board for cattle fodder, for example, is promoting the introduction of a mineral balance within cattle breeding industries. An important role is played by the Centre for Agriculture and Environment (CLM), an organization started by environmental campaigners who recognized that a 'trench war' against the farmers would not make sense. This center tries to develop solutions to the manure problem which leave room for self-regulation by farmers.

Fourth, we still perceive in this phase, as in the phase before, that the division between the target group and its interest organizations still exists. Because of the one-sided attitude of the agricultural intermediaries, that prevented an early and adequate solution of the manure problem, the farmers are now surprised now by the rapid pace of current policy making (Doorewaard 1990: 89). The agricultural sector is faced with a dilemma, also known by other target groups of the environmental policy, such as industry and transport: as a result of successful representation by its interest group, the target group itself is given the opportunity to arrange matters and to avoid drastic measures; at the same time, however, the target group runs the risk of achieving too few results in the environmental area, which means that more severe measures will be unavoidable in the future. If the agricultural sector does not succeed in finding a permanent solution for the manure surpluses, then a reduction of the sector will become inevitable. The paradox of this situation is that successful representation of interests in the short term may injure the target group in the long term. Representation of interests will only be successful in the long term, if it is attended by a strong discipline among the target group in respect to self-regulation.

At the beginning of the 1990s, some starting points of the manure policy were already beyond discussion. Consensus had been reached between most actors involved, that the manure problem required strong intervention. Consensus also existed with respect to the building up of a sustainable cattle-breeding industry, to be realized through technological solutions (reduction of the percentage of minerals through adjustment of cattle fodder, spreading of manure through transportation, and industrial processing up of manure). However, disagreement still existed on the kinds of intervention to be applied, on the pace and intensity of solving the manure problem, and on the division of financial burdens related to interventions. As a result of a strong interrelatedness and a strong commitment, the interest group and some of the policy makers of the Ministry of Agriculture are not prepared in general to make harsh, short-term demands on the target group to solve the manure problem (Klep 1990; Bressers & Kuks 1992; Frouws 1993; Termeer 1993; Bloemendaal 1995).

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LIST OF ABBREVIATIONS

AID Agricultural Inspection Service
CLM Centre for Agriculture and Environment
DLV Agricultural Extension Service
IPO Netherlands Association of Provinces
KIWA Institute for Certification, Inspection, Research and Consultancy on Water Supplies
LEI Agricultural Economics Research Institute
LNV Ministry of Agriculture, Nature Conservation and Fisheries
Nefyto Netherlands Foundation for Phyto-Pharmacy
RIVM National Institute for Public Health and the Environment

Vewin Netherlands Waterworks Association
VROM Ministry of Housing, Spatial Planning and the Environment
V&W Ministry of Transport, Public Works and Water Management

Chapter 9

Groundwater governance at the regional level in the Netherlands

9.1 Introduction

In this chapter we discuss the capacity of water suppliers to control the prevention of pollution. This 'control capacity' specifically concerns the relationship between water suppliers and farmers. Although water suppliers have no regulatory competence in this relationship, regulations do play a background role. On the one hand, water suppliers are regulated by drinking water quality standards, which force them to produce drinking water above a specified quality level. On the other hand, farmers are regulated by the Dutch national and provincial government, which impose restrictions on the use of fertilizers and pesticides in agricultural operations. In Chapter 8 we described how developments in the environmental regulation of farmers - in particular the manure legislation since 1987 (regulatory context) - as well as increasing groundwater pollution - in particular an expected rise of nitrate levels (problem context) - provoked dynamics in the network context and the way in which water suppliers and farmers regard each other. Despite the regulatory gap in the relationship between water suppliers and farmers, we want to know whether water suppliers do try to bridge this gap by encouraging the prevention of agricultural water pollution by other means. And if they do so, how successful are they? Or, to put it in other words, what is their control capacity?

In our study of the Netherlands, we assume that an actor - a water supplier - has 'control capacity', if on the one hand he is making efforts to gain control over the behavior of another actor - a farmer - and if, on the other hand, these efforts appear to be successful. An attempt to gain control over the behavior of another actor will be operationalized by the actual transfer of resources from a water supplier to a farmer, the water supplier's aim or motivation being to diminish agricultural pollution of drinking water

sources. We are specifically interested in the types of resources that are most successful.

A measure of success can be found at several levels. At first, we can say that an attempt is successful if it achieves better quality groundwater. This can be proved by measuring the quality of the upper groundwater, just below the ground level, or the deeper groundwater as pumped by a water supplier, and by finding a relationship between the attempt and the improvement in the water quality as an effect.

Secondly, we can say that an attempt is successful if it changes farmers' behavior and moves them to take preventive actions which they would not have undertaken in the absence of the attempt. More generally, a preventive action can be each environmental innovation within a farm (for example, an action that reduces the amount of manure produced), or more precisely speaking, an innovation that is directly related to improving the groundwater (such as an action that reduces the application of nitrogen in a groundwater protection area).

Thirdly, we can say that an attempt is successful if it motivates farmers, causing them to consider preventive action. In other words, an attempt can be seen as successful if it changes the willingness or motivation of a farmer. This kind of success can be measured by looking at the participation of farmers in prevention oriented projects or by looking at farmers' reactions to the water suppliers' invitation to consider preventive action.

In our study the measure of success is a combination of the second and the third criteria. We conclude that an attempt by a water supplier to move a farmer towards prevention is successful, when the farmer shows a willingness to work on prevention, making commitments to specific preventive actions. The water supplier's attempt is considered to be the independent variable, with the water supplier's motivation to encourage prevention and to transfer resources as necessary elements. The farmer's behavior is considered to be the dependent variable, with the farmer's willingness or motivation to work on prevention and an investment of his resources in preventive action as necessary elements. We also try to formulate statements on specific types of resources that can be successful and therefore helpful to a water supplier if they are transferred to farmers to encourage prevention. In our opinion, an indicator of the success of a specific resource is not the only proof that it works; this can also appear from the susceptibility of a farmer to that resource and the potential influence of a resource on a farmer's consideration of preventive behavior.

In this chapter we will start in the next section by describing what strategies were undertaken in the five selected provinces by water suppliers in co-operation with provincial authorities, in order to encourage farmers in groundwater protection areas to take preventive action. In another section we

will take a more detailed look at the motivation of water suppliers, what they expect from their work on prevention, and how these motives are related to the motives of the other actors involved (provincial authorities, farmers and farmers' organizations). We will consider both the willingness of water suppliers to encourage prevention, as well as the responsiveness of farmers to these attempts. In the following section we will analyze the resources that were transferred during the water suppliers' prevention oriented actions. Again, we will consider each of the resource types in two ways. On the one hand we look at the extent to which water suppliers are dependent on a resource if they want to encourage farmers to take preventive action. On the other hand we look at the extent to which farmers are susceptible to a resource when they consider preventive action. At the end of the chapter we try to formulate conclusions about the control capacity of water suppliers, its relationship to the motives and resources of water suppliers as well as farmers, and on the background role played by the problem context, the regulatory context and the network context, as described in Chapter 8.

9.2 Preventive strategies on the provincial level

9.2.1 Period 1988-1991

The Soil Protection Act, which lays down the basis for groundwater protection policies in the provinces, was passed in 1987. It required the provinces to designate groundwater protection areas before 1989, and to provide legislation for these areas in order to achieve adequate groundwater protection. The provinces have the competence, by means of ordinances, to regulate the use of fertilizers and pesticides and, in doing so, to be more stringent than the standards adopted under the national manure and pesticides policies. Such additional regulations mean that farmers within groundwater protection areas will be more stringently regulated than farmers outside these areas. Provinces have an interest in bringing about an accelerated protection in groundwater protection areas, since groundwater protection policy, over and above a national policy, is their constitutional and political responsibility. On the other hand, provinces do not feel any responsibility to go further than the final standards that were set by the national government as a long term goal for the Netherlands as a whole. The provinces also choose to use the same basis for regulation as the national manure standards, which is the amount of phosphates applied per hectare per year. The specific protection level, created by the provinces, should have a function as long as the general protection level, created by the national government, does not provide sufficient protection to groundwater sources

that are used for drinking water production. Because of the present state of the groundwater quality, the national legislators who passed the Soil Protection Act believed they could not effort to wait for a national protection level in order to provide adequate protection to drinking water resources. They wanted to enable the provincial authorities to bring this about as soon as possible.

The Soil Protection Act also created the provision to compensate farmers in groundwater protection areas for the disadvantages they are faced with due to the more stringent regulations. Such disadvantages are considered to be the extra surplus of manure that farmers have to discharge and the extra costs they incur in respect of alternative means to fertilize the soil and protect their crops. Formally speaking, farmers should be compensated for their financial losses by the provinces, and the provinces should in turn be compensated by those who abstract groundwater and who profit from groundwater protection, i.e., the water supply companies, or rather the consumers, who pay the compensation, in the end, as part of the drinking water price.

The creation of this compensation provision was not just a political choice to weaken the resistance of farmers in groundwater protection areas to more stringent standards, it is also considered to be a logical continuation of a practice in some provinces, in which water supply companies were already compensating farmers for the dehydration damage to crops due to the abstraction of groundwater and the lowering of the groundwater level in water abstraction areas. Since the beginning of the 1980s, the water supply companies in some provinces were even giving subsidies to farmers to reduce the amount of manure spread on the land in water abstraction areas. So it seemed to be a logical consequence to continue the paying role being played by the water supply companies.

In the provinces of Drenthe, Overijssel, Gelderland, and Limburg the compensation provision has caused the water supply companies most closely involved to start informal negotiations with farmers organizations (in all cases the regional department of the national Agricultural Board) on direct arrangements for compensation payments, bypassing the formal route via the provincial authorities. These negotiations started around the same time that the provinces were preparing their ordinances (in the period 1987-1989). The provinces had no objection to these informal arrangements. On the contrary, they considered that it would be better for the acceptance of the more stringent standards if the water suppliers and farmers could achieve a satisfactory mutual understanding. So the provinces tried to encourage such negotiations. These were especially concerned with standardizing the types of costs that would be allowed in the compensation of the farmers. Such standardization also gives the farmers the advantage of having greater

certainty in advance about payments, rather than having to wait and see what they would get paid after action had been taken. Furthermore, an informal arrangement would have the advantage of keeping administrative costs as low as possible. In the informal construction, the water supply companies would not have to pay the administrative costs of the provincial bureaucracy. In 1989, compensation arrangements were available in all four provinces, having been set up by the most closely involved water supply companies. The other smaller companies followed the agreements and signed them, too. Farmers in these provinces appealed to the provincial authorities on less than five percent of the damage claims, because they could not finally agree with the water supply company about their right to compensation payments. In those cases, the provinces were advised by an expert committee to adjudicate on the proposed damage claim. Exceptionally, in the province of Noord-Brabant the relevant water supply company did not wish to negotiate, giving preference to the formal way of handling the farmers' financial claims, which means that farmers will be compensated by the province, and that the province will thereafter be compensated by the water supply company.

In 1991, the water supply companies and the provinces started to come to the conclusion that the specific protection level in groundwater protection areas was having an effect in terms of reducing the agricultural pollution of the soil, but that hardly any effect could be found on the groundwater quality. In 1994, an evaluation study by the Dutch Ministry of Environment on five years of groundwater protection policies confirmed this conclusion. A first explanation for this result is that the manure legislation did not relate standards to the use of nitrogen, but to the use of phosphates, while nitrogen in artificial fertilizers was not included when the standards were set. Secondly, a large amount of historical pollution is still making its way underground and this is distorting the effects of policy measures on the groundwater quality. Improvements are difficult to measure if unknown amounts of underground pollution will affect the quality of groundwater for many decades to come. This obscures the policy makers' short-term intentions to achieve improvements in the groundwater quality. Thirdly, the geographical delimitation of groundwater protection areas was based on geohydrological assumptions which, the passage of time revealed, had not always been correct. It could happen that a water supply company, after some years, had to say to a farmer 'sorry, we made a mistake, your land is not part of a groundwater protection area any more.' So the weakness of some geohydrological assumptions also weakened the effects of the policy (VROM 1994).

Looking at the policy mix of standard setting and financial compensation, the water supply companies concluded that this mix scarcely encourages farmers to work on prevention of agricultural pollution. Water supply

companies do not like to spend their money this way, mainly helping farmers to get rid of their manure surpluses. They prefer to spend this money on environmental improvements in farming practices, with a more sustainable effect on the groundwater quality. On the other hand, water supply companies realize that they gained a lot of confidence among farmers, by being cooperative in compensating farmers, and that this confidence base helped the enforcement of the provincial standards in groundwater protection areas. However, this is only the case in provinces where the water supply company negotiated about a compensation arrangement. The compensation arrangements helped to weaken the resistance to provincial standards, although this resistance was originally massive and turbulent, especially during the period 1987-1989, when the farmers first had to become accustomed to the introduction of national manure legislation and then to more stringent provincial standards which, in their experience, made matters even worse for them. After five years of experience with groundwater protection policies, evaluation studies in the four provinces with a compensation arrangement, showed that about 70% of the farmers involved were satisfied with the way the provinces and the water supply companies handled the groundwater protection measures. These farmers considered the water supply companies to be reliable partners in business.

The water supply companies have also concluded, that the instrument of compensation payments offers them more information about the way in which farmers in groundwater protection areas are operating their farm and how this might affect the groundwater quality. The compensation payments to farmers enable water suppliers to ‘buy’ information about ‘non-point source pollution’, and such information is normally hard to get. In the end, this information will help water suppliers to improve the geohydrological models they use to predict the future quality of their drinking water sources.

9.2.2 Period 1991-1995

In 1991, the way in which provinces and water supply companies approach farmers in groundwater protection areas gradually started to shift towards another policy style. It was learned that the 1989 ordinances generated hardly any effects on the groundwater quality. The standards set in these ordinances are not related to the nitrate pollution of groundwater, but only to the phosphate contents of manure. To protect groundwater it is necessary to regulate the application of nitrogen directly. This means that even the use of nitrogen in artificial fertilizers should be regulated. Moreover, the sanitation of harmful pesticides is not proceeding fast enough, mainly because of a delay in the implementation of the national pesticides policy. Most compensation arrangements, which have a term of six years, will end in

1995. In all, about 1,000 farmers in the Netherlands are involved in a compensation arrangement with a water supply company. It is not only the setting of standards that has been criticized by the water supply companies, but also the compensation provisions. Water supply companies think they do not achieve adequate results (in terms of groundwater quality improvements) for the money they spend on compensation payments. They prefer to spend this money on investments in more prevention oriented farming operations, to achieve a more lasting effect, instead of spending the money on the discharge and manufacturing of manure surpluses.

In the interim, the Centre for Agriculture and Environment[1] started a pilot project in the province of Overijssel, in which pilot farms account for their nitrogen losses through minerals book keeping, trying to decrease these losses by optimizing their farming practices. The participating farmers are meeting each other in study groups, in which they discuss and will be informed about possibilities for reducing the use of nitrogen and pesticides. The Agricultural Extension Service (*Dienst Landbouw Voorlichting* or DLV) has also been involved in these study meetings, partly because of their expertise, but also to increase the acceptance of study meetings by involving an information service that farmers are already familiar with. The pilot project turned out to be very successful, partly because the participating water supply company was offering a financial contribution to innovative measures with a demonstrable effect on the groundwater quality. This pilot project was an initiative of the CLM in collaboration with the Vewin, the national association of water supply companies, which since 1991 has tried to encourage other water supply companies to start comparable projects for farmers in groundwater protection areas (Vewin 1993).

From that time on, the water supply companies in the provinces of Overijssel, Drenthe, and Gelderland, encouraged by the Vewin, started their own stimulation policy, which gradually came to replace the compensation policy. For that matter, the national compensation provision in the Soil Protection Act arranged that compensation payments should be only temporary and should only be offered for as long as there was a difference between the protection levels offered by the national legislation and the provincial legislation. Because of the progression in national standard setting, the difference is gradually reducing to zero (with a target of the year 2000). The water supply companies in Drenthe, Overijssel, and Gelderland decided to restrict the compensation payments to a minimum, in order to give the new stimulation policy a more prominent place. The resulting minimum compensation payments are at least available to farmers that are not willing to do something more, while farmers participating in the projects

[1] *Centrum voor Landbouw en Milieu* (CLM), an institute funded by the national government for studies on environmental innovations in farming practices.

might get payments for measures with a broader environmental scope than only improving the groundwater quality. A difference from the compensation policy is that the stimulation policy is related to the whole farming process, while the compensation payments are related only to those parts of a farmers' land that are located in a groundwater protection area. Another difference is that the stimulation policy activates farmers to do more than is required by the existing legislation, on a voluntary the basis. Monetary encouragement does not conflict with the polluter-pays-principle, because farmers are encouraged to do more than they need to do, compared with farmers outside groundwater protection areas.

Water supply companies are sending the message to farmers in groundwater protection areas, that they can be leaders in prevention compared to farmers outside these areas by means of temporary subsidies. This message is received as a positive one by the farmers, who are tired of the process of manure legislation that has been ongoing for almost ten years now. The farmers' interest in the stimulation policy is growing and their participation in such projects is estimated by the respondents in the water supply companies to be about 20 to 40 percent of the total farmer population in those groundwater protection areas where a stimulation policy is available.

On the other hand, one could ask why it is still difficult to encourage the rest of the farmers. One explanation mentioned by the respondents is, that after all the discussions about environmental problems in the agricultural sector, a large part of this sector has lost confidence in public policy in general. It is difficult to motivate these farmers to do more. The step from external regulation towards self-regulation is difficult to communicate to this group. Another explanation mentioned by the respondents is, that many farmers calculated that the water supply companies' stimulation policies are unattractive to them. There are more costs than revenues in their case. A third explanation mentioned by the respondents is, that many farmers are reluctant to provide the commercial information about their own firms, as required by the stimulation policy, since such information will be made public. Participation in a stimulation project requires, that a farmer is willing to provide precise data on his farming methods and his minerals accounting. Water supply companies have to guarantee in the negotiated agreement with agricultural representatives, that they will treat this information confidentially, without passing it on to the provincial or national authorities. Water supply companies have to make clear that they are not public controllers for the enforcement authorities.

But even the water supply companies are not completely satisfied with their new policy. After three years of experience with this policy in the provinces of Overijssel, Drenthe, and Gelderland, the respondents from the

water supply companies in these provinces conclude, that a lot of study groups do not come up with measures that might be effective for the protection of the groundwater. The agricultural sector is too much interested in subsidies and demonstration projects, and too little in getting results. Besides, many farmers do not realize that the water supply companies are only interested in financing measures that improve the groundwater protection, and not in financing other environmental measures. Intermediary organizations in the agricultural sector and agricultural advisers give the advice to farmers, that it is important to do something, while caring too little for the results of what is being done.

The agricultural sector expects that the support for this stimulation policy can be increased by leaving the implementation of the policy to the intermediary organizations of the agricultural sector itself. That would counter the reservation that farmers have about providing information about their own business. An intermediary of the agricultural sector would not be regarded as part of the government. This could increase the confidence of the farmers in the policy.

On the other hand, the water supply sector does not have enough confidence in the intermediaries of the agricultural sector. Besides that, the acquisition of information from the farmers, as well as the building of confidential relationships with farmers through direct contacts, are essential parts of the policy. In the experience of the water supply companies, individual farmers are often more receptive than intermediate agricultural organizations.

In 1994 the Vewin started to stimulate a new type of policy instrument that might generate more precise effects on groundwater quality. This instrument is termed 'payment by results' (*resultaatbeloning*) and can be characterized as a 'performance subsidy'. Again, this instrument has been developed in collaboration with the Centre for Agriculture and Environment (CLM), and is a more elaborate form of minerals accounting and stimulation policy: only results for the groundwater quality will be subsidized. The Vewin has created this instrument in collaboration with the water supply companies of Drenthe, Overijssel, and Limburg (CLM 1994).

9.3 Comparison of the five selected provinces

Agricultural water pollution in the Netherlands is especially a problem to water suppliers in the northern, eastern, and southern parts of the country. It shows up in areas where groundwater is used for the production of drinking water and where farmers make intensive use of a vulnerable soil (sandy loam). This combination of circumstances is most evident in five (Drenthe,

Overijssel, Gelderland, Noord-Brabant, and Limburg) of the twelve provinces that make up the Netherlands. For the Dutch study we have chosen to focus on these five provinces.

9.3.1 Water supply companies

For this study we looked at one specific water supply company in each selected province (some statistics on these provinces are presented in table 9.1). All the selected companies use groundwater as their main source for drinking water production. Also they all pump groundwater in predominantly agricultural areas. Given these criteria, we interviewed the largest companies, supposing that they are the leaders in taking preventive actions on agricultural water pollution.

– *Drenthe* has two water supply companies, both of which serve cities as well rural areas. Some communities along the borders of the provinces are served by water supply companies in the neighboring provinces (Groningen and Overijssel). For this study we looked at the *Waterleiding Maatschappij Drenthe* (WMD), which is the largest water supply company in the province. This company has 14 pumping sites.

Table 8.1 Some Statistics

	Total area		**Inhabitants**		**Inhabitants/km2**
The Netherlands	33,900 km^2	100%	14.9 mln.	100%	439
Gelderland	5,000 km^2	15%	1.9 mln.	12%	360
Noord-Brabant	4,900 km^2	14%	2.2 mln.	15%	442
Overijssel	3,300 km^2	10%	1.0 mln.	7%	306
Drenthe	2,700 km^2	8%	0.4 mln.	3%	166
Limburg	2,200 km^2	7%	1.1 mln.	7%	509

Source: EU (1990)

	Agricultural area	**Agricultural livestock**	**Livestock/ha.**
Gelderland	257,000 ha.	1,382,000	5.4
Noord-Brabant	275,000 ha.	1,915,000	7.0
Overijssel	210,000 ha.	948,000	4.5
Drenthe	166,000 ha.	275,000	1.7
Limburg	112,000 ha.	564,000	5.0

Source: EU (1990)

Drinking water price per 1,000 liter in Dutch guilders	
Waterleiding Maatschappij Limburg (WML)	Hfl. 2.81
Waterleiding Maatschappij Overijssel (WMO)	Hfl. 2.41
Waterleiding Maatschappij Oostelijk Gelderland (WOG)	Hfl. 2.23
Waterleiding Maatschappij Oost-Brabant (WOB)	Hfl 1.79
Waterleiding Maatschappij Drenthe (WMD)	Hfl. 1.79

Source: Consumentenbond (1997)

- *Overijssel* has three water supply companies, one of which serves an urban area (Enschede), the other two serving larger regions. For this study we looked at the *Waterleiding Maatschappij Overijssel* (WMO), which is the largest company in the province. This company has 28 pumping sites.
- *Gelderland* has four water supply companies, which all serve on a regional scale. Two of them are purely water supply companies, while the two others are combined water and energy utilities. For this study we looked at the *Waterleidingmaatschappij Oostelijk Gelderland* (WOG), which is large, but not the largest water supply company. This company is not involved in energy distribution. Gelderland has 54 pumping sites in total.
- *Noord-Brabant* has six water supply companies, three of which serve urban areas (Den Bosch, Eindhoven, Tilburg), the three others serving on a regional scale. For this study we looked at one of the regional companies, the *Waterleidingmaatschappij Oost Brabant* (WOB), which is the largest company in the province and which has 18 pumping sites.
- *Limburg* has two water supply companies, one of which serves an urban area (Maastricht). The other one is called the *Waterleiding Maatschappij Limburg* (WML) and it serves ninety percent of the province of Limburg.

9.3.2 Agricultural pollution of water sources

Agriculture in the province of *Drenthe* is predominantly potato cultivation, for which large amounts of pesticides are needed. Pesticides constitute the main problem of agricultural water pollution in this province. A lot of groundwater is polluted with a soil disinfectant that has been applied in potato culture since 1968. On the other hand, farming in this province is less intensive than elsewhere. Therefore fertilizers are much less a problem in Drenthe. Groundwater is abstracted from quite shallow levels at moors. Most pumping sites of the WMD (Drenthe) are rather vulnerable.

The provinces of *Overijssel* and *Gelderland* have predominantly intensive livestock farming. Most problems are caused by the spreading of (animal as well as artificial) fertilizers on the sandy grounds. Pesticides are a less serious problem in these provinces. Groundwater is abstracted from sandy soils from quite shallow levels. Most pumping sites of the WMO (Overijssel) and the WOG (Gelderland) are rather vulnerable.

The province of *Noord-Brabant* is also notorious for its intensive livestock farming - the most intensive of all the Dutch provinces - but it has only a few vulnerable areas. Most of the soil in this province consists of clay, which offers a sound protection to the groundwater, that is abstracted from very deep levels. There are only two shallow pumping sites in sandy

areas (Boxmeer and Vierlingsbeek) where the groundwater is highly vulnerable to agricultural pollution (both fertilizers and pesticides are a problem there).

The province of *Limburg* also has a culture of intensive cattle farming. Especially the northern and middle parts of Limburg have the highest manure production in the country. Groundwater is only withdrawn from the deeper aquifers in these areas, so pollution effects of excessive manuring will not become apparent within 50 to 100 years. Only a few well fields are vulnerable in a short run perspective, because they have to abstract from shallow water layers. Although the nitrate standards are exceeded in some water wells, mixing with water from cleaner wells helps to keep the nitrate level in the water down. It is also planned to close some of these polluted wells and to start using surface water sources instead for the production of drinking water.

Half of the drinking water produced in Limburg originates from groundwater sources in the southern part of this province. These sources are very vulnerable to nitrate pollution, because they are not covered by underground protection layers. Although farming in the south of Limburg is not very intensive, a lot of historical pollution is still on its way underground. It is expected that the first of the twenty water wells in this area will not show too much pollution before 2000. Many more water wells will follow after that. For the time being, problems with nitrates are solved by mixing water instead of using purification techniques. Pesticides play a role in Limburg, although a modest one compared to Drenthe. Limburg has relatively much more arable land and horticulture than Overijssel, Gelderland and Noord-Brabant.

We may conclude that in all the provinces studied, the water supply is highly dependent on groundwater as a source for drinking water production. However, this dependency will diminish in the future, because more surface water will be used for the drinking water production to prevent problems with the dehydration of nature reserves. In Limburg, the provincial authority planned to increase the amount of surface water sources from 10% up to 40% within eight years. In four out of the five provinces in this study, the groundwater is rather vulnerable to agricultural pollution. Noord-Brabant is an exception, as most of the groundwater is quite well protected by clay layers.

All provinces have some water wells in which nitrate pollution is a problem, since nitrate levels in the pumped water exceeds the nitrate standard for drinking water. Until now this has not occurred on a large scale and water suppliers succeed in bringing down nitrate levels by mixing with water from less polluted wells. Only a few water wells had to be closed,

because other solutions would be too costly. There are barely any violations of standards in water wells (VROM 1996).

To conclude, agricultural pollution of groundwater seems to be manageable for the moment and for the near future, especially as the result of avoidance strategies (mixing water or abstracting from deeper layers or surface water). By contrast, in the longer run pollution might leach to the deeper groundwater layers and cause problems on that level. Meanwhile, an unknown amount of historical pollution will show up in the future and will cause problems of an unpredictable extent.

9.3.3 Policy approaches towards agricultural pollution of water sources

Drenthe. In 1989, the provincial government designated groundwater protection areas and passed an ordinance with standards for these areas to restrict agricultural operations. The ordinance offers the option of compensation payments. Originally the Water Supply Company Drenthe (WMD) rejected the possibility of initiating negotiations with farmers' organizations on compensation arrangements. The WMD hardly had any contacts with farmers, partly because there was no existing practice of compensating farmers for dehydration damage. The first contacts with farmers' organizations were very formal and difficult. Through mediation of the provincial authorities collaboration with the farmers' organization was finally established, negotiating a compensation arrangement in which standard types of costs are identified for reductions in the use of fertilizers and pesticides. The largest part of the compensations paid is related to reductions in pesticides use, mainly in relation with the intensive potato farming. The other water supply companies in Drenthe followed the arrangements negotiated by the WMD. The agricultural sector in Drenthe is very satisfied about the arrangement with the WMD and the way in which it has been implemented.

In 1993, the WMD started to develop a stimulation policy, following the example of the largest water supply company of the neighbor province Overijssel, where a pilot project appeared to be successful in 1991. The Vewin encouraged the WMD to develop its own stimulation policy. At the end of 1994, about 100 out of 250 farmers in groundwater protection areas, were participating in stimulation projects. The regional department of the national Agricultural Board is playing a modest role in the policy implementation by communicating the policy to the farmers, although the WMD recognizes them as an important partner in creating support among farmers for such projects. The province itself prefers to be a partner at a

distance and leaves the initiative as much as it can to the water supply company.

Overijssel. In 1989, the provincial government designated groundwater protection areas and passed an ordinance with standards for these areas to restrict agricultural operations. The ordinance offers the option of compensation payments. Shortly after the presentation of a draft of the ordinance, the Water Supply Company Overijssel (WMO) and the regional department of the national Agricultural Board started negotiations on a compensation arrangement, which were very soon successful. Although the arrangement also applies for pesticides, such compounds are not much of a problem in this province, certainly not compared to nitrates. The quick establishment of an agreement on the compensation payments between the water suppliers and the farmers' organization can be explained by the already established practice in Overijssel of compensation payments to farmers for dehydration damage. Both parties actually preferred to keep the provincial government at a distance, since they did not need a mediator due to that earlier relationship. In the end, the other water supply companies in Overijssel also signed the agreement negotiated by the WMO. The agricultural sector in Overijssel is very satisfied about the arrangement with the WMO and the way in which it has been implemented.

In 1990, Overijssel was the first province where a water supply company started a pilot project to experiment with a stimulation policy. This experiment was set up by the Centre for Agriculture and Environment (CLM). The first experiences in this pilot project were very good, and at the end of 1994 about 100 farmers out of 600 farmers in groundwater protection areas, were participating in such projects. Although the regional department of the Agricultural Board would have liked to play a more central role in the implementation of the stimulation policy, the WMO argued that its own contacts with individual farmers were good enough to do most of the implementation work on its own. So the agricultural organization was not needed as much as it was in other provinces to build up a basis of support among farmers for the new policy, although the WMO still recognizes their role in building support if that is needed. At that time, the historically good relationship between WMO and farmers motivated the Vewin and the CLM to start a pilot project in this province. As in Drenthe, the province itself prefers to be a partner at a distance and leaves the initiative as much as it can to the water supply company.

Gelderland. In 1989 the provincial government designated groundwater protection areas and passed an ordinance with standards for these areas to restrict agricultural operations. The ordinance offers the option of compensation payments. Very shortly after the presentation of the draft

ordinance, an agreement on compensation payments followed between the Agricultural Board and the Water Supply Company of Eastern Gelderland (WOG). Gelderland was the first province where a water supply company signed a negotiated compensation arrangement. At that time, other water supply companies and the Vewin heavily criticized this agreement, which was too generous in their view.

Initially (in 1987) the Agricultural Board was trying to negotiate with the Vewin on a national model for compensation settlements in the provinces. The Board planned to impose such a model on the regional agricultural boards and the water supply companies in the provinces. However, the Vewin did not want to commit itself to such a model, since this would deny the autonomous position of water supply companies, which is quite characteristic of the water supply sector in the Netherlands. The Agricultural Board concluded that such a model would only be viable if the national associations involved are strong enough to give a lead to their own sectors. For example, negotiations on a national model for a compensation settlement between the agricultural sector and the energy sector were very successful, because the Gas Union, the representative of the energy sector, controls 80% of Dutch gas distribution.

In 1987, the national Agricultural Board started to negotiate on the provincial level. It chose to start in the province of Gelderland, where a generous compensation scheme for dehydration damage was already in place. The Boards high expectations, based on the reputation of the WOG, proofed to be right when the first negotiated agreement on compensation payments was established in Gelderland. It was so favorable to farmers, that the water supply companies in other provinces were alarmed about the tough negotiators of the Agricultural Board. The WOG, on the other hand, had opted for a favorable settlement to build up a good relationship with the farmers in order to create guarantees for effective groundwater protection. It was aware of its dependence on the farmers. Manure standards are difficult to enforce, and one has to rely a lot on the willingness of the target group to cooperate. Further, the WOG considered it a matter of prestige to be the first one in the country with a compensation settlement for groundwater protection. Not long after, the other provinces followed suit. In all cases the national Agricultural Board assisted the regional boards. Although the presence of a previous compensation settlement for dehydration damage was favorable to the success of the negotiations, the large water supply companies in the other provinces were more reserved during the negotiations.

After the agreement was reached in 1989, it still took two to three years before the other water supply companies in this province agreed to endorse it, which they did in the end. Since then, all the water supply companies of

Gelderland and the regional department of the Agricultural Board meet twice a year, with WOG acting as chairman. The compensation arrangement applies to fertilizers as well as pesticides, although, as in Overijssel, fertilizers are much more of a problem in Gelderland.

In 1993 the WOG started a stimulation policy, initiated by the Vewin and following the successful example of the neighbor province of Overijssel. As in Drenthe and Overijssel, the province itself prefers to be a partner at a distance and leaves the initiative as much as it can to the WOG. It only participates through a financial contribution to the stimulation projects. The introduction of the stimulation policy has led to a modification of the compensation agreement, as is the case in Overijssel and Drenthe: compensation payments will be reduced to a minimum, while farmers can receive a larger subsidy, based on their contribution to groundwater quality improvements, instead.

Noord-Brabant. In 1989, the provincial government designated groundwater protection areas and passed an ordinance regulating the use of fertilizers in these areas, but not the use of pesticides. As an experiment, the ordinance was only applied to the two most vulnerable areas. The proposed standards were very strict and they included a total ban on the use of artificial fertilizers. As the standards were not established in agreement with farmers or farmers' organizations, they provoked tremendous resistance among the target group. The heavy protests forced the provincial government to withdraw the ordinance and return with a revised version, which was much weaker in its approach to the groundwater pollution problem. The new standards have been bargained down and the ban on artificial fertilizers has been annulled. In a 1995 evaluation of the revised ordinance of 1989, the province concluded that it has had too little an effect on the groundwater quality, partly due to the lack of support for it (Provincie Noord-Brabant 1995).

The lack of policy support might be explained by the absence of a compensation agreement in Noord-Brabant. The relevant Water Supply Company East Brabant (WOB) refused to negotiate with farmers' organizations on this. The involvement of the WOB is much less than its colleagues in the other provinces under study, especially because the WOB does not depend to any great extent on vulnerable water well fields. The official opinion of WOB is that they do not expect much effect from a protection level in groundwater protection areas additional to the national protection level. Therefore they do not advocate area specific protection. They also advocate that the national government should not walk away from its responsibility to provide an adequate, nation-wide groundwater protection level.

Besides that, the relationship between the WOB and the agricultural sector has always been difficult. The dominating culture inside the WOB organization is to keep the agricultural sector at a distance and they are not pragmatic in that attitude. In a manner of speaking, they are capable of spending 100 guilders to prove that they spent one guilder too much on compensation payments to farmers. For that reason the WOB also disapproves of compensation payments for pesticides, since they don't think in terms of pesticides as crop protection but only in terms of pesticides as despicable polluting materials. Among farmers this attitude provokes reactions like 'water supply companies are our opponents, like governments, creating obstructions that make it even more difficult to survive in these hard times, so we have to get rid of both of them.'

At the beginning of the 1990s, the province realized that it would have to change its policy style towards farmers. The groundwater protection ordinance of 1989 considers groundwater protection too much as a technocratic issue, denying the political aspects. An important motive for changing the provincial policy style is that high level governmental officials and high level representatives of influential agricultural organizations in Noord-Brabant have started consultations to come up with a political reaction to the extensive debate in society on manure policy, which took place at the end of the 1980s. The heat of this debate was especially fierce in Noord-Brabant, since this is the province with the most intensive agriculture, but also with very extended nature conservation areas (forest). The spreading of manure and the resulting ammonia emissions, as well as the withdrawal of water from agricultural lands and the resulting dehydration, are serious problems that threaten the survival of forests in Noord-Brabant. The provincial government realized, that the unique combination of intensive agriculture in an important natural environment needs strong political attention to farmers as well as environmentalists. The consultations that were started, aimed to consider all political matters that relate to the interaction between agriculture and the environment.

Consultations were also strongly advocated by the agricultural organization *Noordbrabantse Christelijke Boerenbond* (NCB), which is very active in the province and which is known in the Netherlands as the best organized and most influential regional farmers association. While in other provinces a regional department of the national Agricultural Board acts as the main agricultural representative, here the strong position of the NCB made it impossible to set them aside. The NCB is heading in its own direction, to a large extent independent of other farmers' organizations.

The strong ties between the provincial government and the NCB are more or less keeping the water supply company WOB out of the game. The province prefers to be the leading player, and the agricultural sector is in

favor of a leading role for the province. Therefore, in 1992 it was the province which initiated a policy to encourage preventive actions in the agricultural sector. This policy not only applies to groundwater protection areas, but also to all areas where environmental values need protection. The WOB prefers to be a partner at distance and only provides some financial contributions, although they do not expect much effect from this on the groundwater quality. They see it more as a matter of creating some goodwill.

Just before the province initiated a stimulation policy, the WOB tried to set up a policy itself for the vulnerable groundwater protection areas of Boxmeer and Vierlingsbeek, mainly because Vewin asked them to take such an initiative. However, the resistance among farmers was so great, that only five farmers showed any interest. This might also be explained by the enormous delay in the payment of compensations for dehydration damage in these areas. In some cases farmers have already been waiting for twelve years for compensation. The WOB is much more formal in its handling of such claims. Neither does the WOB incorporate agricultural expertise into its own organization, unlike other water supply companies in our study. In dealing with the agricultural sector, the WOB prefers to leave matters to the province.

Although the agricultural organization NCB is playing an influential role on the level of consultations with high level government officials, their role in the implementation of stimulation policies is more restricted. Provincial officials at the implementation level believe, that they have good direct contact with farmers. They think that direct consultations with farmers are often easier than consultations with their representatives. Many times representatives have opinions that are too much on principle and not sufficiently pragmatic, while individual farmers might be much more flexible and co-operative. Despite that, provincial officials recognize the importance of agricultural mediators in gaining support for provincial projects among farmers.

Limburg. Since 1989 the province of Limburg, like the other provinces, has had an ordinance for groundwater protection areas. In that ordinance a distinction is made between legislation for the southern part of Limburg, where standards are more stringent because of the vulnerability of the whole *Mergelland* region, and legislation for the middle and northern parts of Limburg. Originally, the province made the mistake to present a draft ordinance (although not without consultations with the water supply company and the regional department of the Agricultural Board), without the option of compensation payments. As in Noord-Brabant, this raised strong protests among farmers, who got the idea that the agricultural organizations had already given their commitment to the ordinance without discussing it

with the farmers involved. Especially the stricter standards for the south of Limburg provoked a lot of resistance. People were speaking in terms of 'the Margraten war' and 'the battle of Gulpen' (after villages located in Mergelland in the south of Limburg).

This was a signal to the province to get the large Water Supply Company Limburg (WML) and the regional department of the national Agricultural Board around the table, to prepare an agreement on compensation payments. The province took the initiative and not long afterwards the WML and the agricultural representatives had come to an arrangement. The implementation of the arrangement is in the hands of the WML. In practice, 99% of the claims made by farmers are covered by this agreement. The rest is handled by the province, which has an advisory committee to deal with them. The WML adheres strictly to the principle that, if they have to pay, they also want control over the implementation of the agreement, without delegating this to agricultural organizations. The agreement does not apply to pesticides, since the provincial ordinance does not regulate the use of pesticides in groundwater protection areas. In this respect the Limburg ordinance differs from the ones in Drenthe, Overijssel, and Gelderland, although pesticide use in Limburg is higher than in Overijssel and Gelderland. In general the compensation settlement in Limburg has been quite well accepted by the farmers.

In 1995, in an interview, provincial officials stated that they noticed that the style of co-operation between the province and agricultural representatives had changed a lot. They attribute this to new national ideas about policy styles, like 'network steering', which have had an impact in the provinces. Provincial officials think that the opinion about regulations and their feasibility has changed:

> Nowadays, everyone talks about network steering and win/win situations. Although many people don't know what it means, they strongly feel that it will bring about a cultural change in the way we deal with each other.

In Limburg the regulatory climate changed around 1990/1991, after the last round of negotiations about final arrangements for standards in Mergelland, the most vulnerable region in the south. The solution there was that the national government was willing to provide a fund with subsidies for farmers who are co-operative in meeting standards that are more stringent than everywhere else in the Netherlands. 'From that moment on, maybe because the last regulatory barrier had been removed, the diametric oppositions were over', as the officials involved concluded.

In 1991, the province started initiatives for a stimulation policy. For that purpose, it created a Task Force on Agricultural Emissions, and invited representatives of the province, the agricultural sector and the water supply company WML to participate. Agricultural organizations are invited to

propose projects, or the province can come up with projects itself. Since 1991, about 100 project proposals have been submitted for the province as a whole although, as in Noord-Brabant, these projects are concerned with a much broader variety of environmental improvements than only improvements in the groundwater quality. The WML has not initiated its own stimulation policy, because it is mainly using deeper groundwater, and does not expect groundwater quality to improve due to temporary measures. The results will not be visible within 50 years, and that is too long a period to be an appropriate argument for providing money now. Despite this, the WML has invested in incorporating agricultural expertise within its own organization, and in that respect the WML differs from the WOB in Noord-Brabant. Reacting to an initiative from Vewin and CML, the WML also showed itself to be interested in experimenting with performance subsidies that guarantee a more direct relation between financial incentives to farmers and results in terms of groundwater quality.

9.4 Motives of water suppliers

In this section we will look in greater detail at the motivation of water suppliers, their expectations of working on prevention, and how these motives are related to the motives of the other actors involved (provincial authorities, farmers and farmer's organizations). We will consider both the willingness of water suppliers to encourage prevention, as well as the willingness of farmers to react to the water suppliers' attempts at encouragement. An analysis of motives is important to learn more about the control capacity of water suppliers. In particular this analysis will tell us about the conditions under which water suppliers might be motivated to choose prevention of agricultural water pollution as their strategy and to choose to transfer resources to farmers as part of this strategy.

9.4.1 Motives of the water supply companies

Providing drinking water of good quality is what water supply companies see as their main task. Water abstraction (pumping), water production (purification), and water delivery are their core business. They do not consider preventing agricultural pollution to be their task, and they do not view drinking water directives or standards as an incentive for water supply companies to get more control over groundwater polluting activities. On the other hand, water supply companies are aware that the presence of pollution in drinking water resources is in fact an incentive for them to think about alternatives for water purification and treatment. Thus, agricultural water

pollution is forcing them to become active in encouraging prevention, since this might be more efficient than curative solutions. In particular, the extent to which they need to invest in complicated or expensive purification techniques, is seen by them as an indicator of the success or failure of groundwater protection.

A first principle of the water supply sector as a whole concerning groundwater protection, is that the national government should be responsible for the general protection of the groundwater in such a way groundwater should be fit for the production of drinking water throughout the entire country. Secondly, additional protection of groundwater in areas with water wells should always be a temporary measure to solve crisis situations. The general level of protection should meet the specific levels of protection as soon as possible in order to prevent extra costs of additional protection (in terms of financial compensation).

These principles reflect how water supply companies think about governmental responsibility towards groundwater protection: national and provincial governments are not allowed to walk away from their responsibility in providing adequate protection levels. However, since the Soil Protection Act (1987) in the Netherlands created a legal construction in which those who profit from additional groundwater protection have to compensate those who incur losses because of this, water supply companies are prepared to pay for additional protection, on the conditions that additional protection will be temporary and will anticipate provisions for general protection.

The compensation payments in groundwater protection areas are considered to be temporary, and the Soil Protection Act supports this idea since it indicates that compensation will no longer be necessary after 2000, in which year the general protection level should replace the specific level of groundwater protection needed for drinking water purposes throughout the country. In this context, it is quite understandable that water supply companies have problems with the third phase of the Dutch manure policy, which does not guarantee such protection before 2010.

In the end, water supply companies are not completely satisfied with the results of the provincial ordinances of 1989 and the related compensation settlements. Although they realize that it was a learning experience, which made the water supply sector more adaptive towards the way in which the agricultural production sector operates and is affecting drinking water sources, they also think that it was not a very efficient way of handling agricultural groundwater pollution problems.

Water supply companies prefer to apply the compensation money for the encouragement of innovations that optimize the use of minerals and pesticides. Such a policy might relieve the use of excessive amounts of

minerals and pesticides. With respect to the use of nitrates, water supply companies think they have succeeded in gaining some reduction with their own strategies to encourage farmers to take preventive actions, in combination with the provincial ordinances, although this has not had any immediate impact on the groundwater. With respect to the use of pesticides, they think they depend heavily on the national pesticides policy, especially the implementation efforts of the 'Long term crop protection plan'. In the short run, regional policies will not achieve the required effects on groundwater quality. These are spoiled by a delay in the implementation of national policies and by the historical pollution that will show up for decades to come. On the other hand, stimulation policies might provoke a better awareness and understanding among farmers of how their farming operations might harm the groundwater quality. It is the experience of the water supply companies, that a considerable group of farmers became interested in the prevention of groundwater pollution. Water supply companies like to achieve a change of mentality in the agricultural sector, through which farmers will see that agriculture and drinking water production can get along hand in hand.

Despite the creation of a better level of support among farmers, water supply companies are still reserved about spending money on innovations in farming operations. It is the requirement to operate the water supply efficiently, as supervised by the provincial governments according to the Water Supply Act, which provokes a paradoxical situation. On the one hand, provinces require that water supply companies deliver good quality for the lowest price. On the other hand, provinces try to shift the burden of additional groundwater protection to the water supply companies. Water supply companies try to avoid subsidizing measures that improve the environment in general without improving the quality of drinking water sources. They keep advocating that national and provincial governments should remain responsible for environmental policy in general. Besides that, they work on the fine-tuning of policy tools for water supply companies to stimulate only agricultural innovations that have a demonstrable effect on the quality of drinking water sources.

Inasmuch as water supply companies want to activate farmers in preventing agricultural water pollution, some companies (in Drenthe, Gelderland, and Overijssel) prefer to contact farmers directly on their own, allocating a very restricted role to intermediate organizations in the agricultural sector. In other provinces (Noord-Brabant and Limburg) the water supply companies do not want spend too much time on activating the farmers, and try to leave this to the provincial authorities and the agricultural sector itself. Where water supply companies are active on their own and build up agricultural expertise within their own organization, in general we

can say that these companies have to deal with drinking water sources that are much more vulnerable to agricultural pollution. These companies do not like to rely too much on actions by the provincial government.

9.4.2 Motives of the provincial authorities

Provinces have an interest in bringing about accelerated protection in groundwater protection areas, since groundwater protection policy, additional to a national policy, is their constitutional and political responsibility. On the other hand, provinces do not feel responsible to go beyond the final standards that were set by the national government as a long term goal for the Netherlands as a whole. So, if water supply companies seek more stringent regulation, the provinces do not want to provide it. They consider this as a specific interest that should be striven for by the interested parties, according to the profit principle.

Provinces also consider the costs of additional groundwater protection. They believe that additional protection standards will suffer from severe enforcement problems if they lack support among the target population. Provincial ordinances for groundwater protection areas were only politically feasible in combination with compensation arrangements. Since provinces will not be able to provide the money for this, they rely heavily on the water supply companies (and in fact on the drinking water consumers, who pay the price in the end) to create the required financial support for additional protection measures. Provinces even have problems in finding other partners in society with a financial interest in environmental protection, and therefore they have not come up yet with provincial regulations in other areas, where environmental protection is needed for other reasons than protection of drinking water resources. For example, the Soil Protection Act also asks the provinces to indicate ‘soil areas’, but there is no social actor with a financial interest in this kind of protection, and therefore no provincial legislation for this type of protection has been passed.

Provincial authorities are very enthusiastic about stimulation policies. They think that these fit quite well with the national tendency to activate ‘partners in society’ that are able to give environmental policy incentives to target groups (like farmers). Water supply companies are seen as such, since they have a control capacity through their strong interest in groundwater protection, and since they have the financial means to pay for it.

In this context, the provinces see their own role as one of initiating stimulation policies and bringing partners in society together, such as the agricultural sector and the drinking water sector. Provinces try to facilitate such meetings by creating a task force for the integration of environmental issues into agriculture, as has been done in the provinces of Noord-Brabant

(*Landbouw-Milieu Overleg*) and Limburg (*Werkgroep Landbouwemissies*). In these provinces, the provincial government created a more central role for itself than the governments in the other provinces (Drenthe, Overijssel, and Gelderland). This is a consequence of the fact that the water supply companies involved in Noord-Brabant and Limburg are less motivated to initiate stimulation policies, since they are less dependent on vulnerable drinking water resources in the short term.

Insofar as provincial governments are active in setting up a stimulation policy, they all are motivated by the results of pilot projects, undertaken through concerted action of the Vewin and the Centre for Agriculture and Environment (CLM), since these results testify to an active participation of farmers in study meetings on environmental innovations. Provinces are convinced that this is the way to activate farmers, and they also participate financially in stimulation projects together with the national Ministry of Environment, which also furnishes money such projects. In general, the province, the Ministry of Environment, the water supply company, and the participating farmers each contribute 25% of the costs of environmental innovations that are approved in the context of a stimulation project.

9.4.3 Motives of the farmers

Despite the farmers' strong resistance to the national manure policy in the 1980s and 1990s, and the provincial standards for groundwater protection areas as laid down in the provincial ordinances of 1989, farmers in general feel comfortable with compensation payments and stimulating policy instruments. The national tendency towards tightening manure standards makes them feel relatively lucky to have land in groundwater policy areas, which offers them the advantages of getting payments for environmental innovations, while farmers outside these areas have to pay for environmental innovations themselves, albeit somewhat later.

Also more realism is growing among farmers in general that not all of them will survive in a business climate where environmental innovative actions are becoming inevitable. Environmental policies do have a tremendous impact on how farmers judge their future. Only those will survive who can integrate environmental standards into their farming, and are able to manage and control their mineral streams and water use. Currently, 3% of the Dutch farmers go out of business every year, including those who have no successor or insufficient land to exploit. In ten years 30% will have dropped out and experts predict that only 60% of the farmers will be able to continue farming.

It is expected that stimulation policies will reach not more than one third of the total population of farmers in groundwater protection areas, since they are based on voluntary actions. Participants are mainly the more intensive

and larger farms, as well as the more innovative farmers. Innovative farmers are less characterized by age and more by their willingness to accept risks. They are the pioneers within the agricultural community and enjoy authority among their colleagues; farmers about whom others will say: 'if he is doing it, then I might be able to do it too.'

9.4.4 Motives of the farmer's organizations

The main principle of the agricultural sector concerning groundwater protection is, that the competitive position of the Dutch agricultural sector in general (compared to other countries), as well as the competitive position of individual farmers (in groundwater protection areas) may not be harmed. As far as the specific and more stringent standards for groundwater protection areas are concerned, they adhere strongly to the principle of financial compensation for the losses due to differences between the general and the specific level. In terms of the international competitive position of the agricultural sector, they are concerned about the - in their view - progressive character of the Dutch legislation. The Dutch government is trying too much to be 'the most decent boy in the international class'.

The Agricultural Board is generally accepted by the farmers in groundwater protection areas as being the sole negotiation partner for the water supply companies. This exclusive position of the Agricultural Board has been established in previous negotiations with the water supply sector on dehydration damage, as well as negotiations with the energy sector on damage due to underground gas mains, in which the board was very successful in making financial deals which were profitable to the farmers.

Although the Agricultural Board initially acted in a very defensive way, nowadays it is increasingly going over to the offensive in being co-operative in thinking about preventive solutions for agricultural (water) pollution. While they still oppose manure and pesticide standards that restrict farming operations, agricultural organizations and their representative managers are also aware, that something has to be done and they are trying to make the best of it. They strongly advocate policy instruments that encourage environmental innovations in agricultural operations. They also strongly advocate a position for the agricultural intermediary organizations in the implementation of environmental policies for farmers. They like to have a key role in the communication between water supply authorities and farmers, for example by running pilot projects, by taking over communicative campaigns and information services, and by taking over the distribution of moneys for subsidies.

9.5 Resources of water suppliers

The control capacity of the water suppliers can not only be explained by their motives, one also has to consider the resources that are available to them for exercise control. In this section we consider different types of resources and we analyze the extent to which they are important for water suppliers who want to control agricultural water pollution. On the other hand, it is important to know under what conditions farmers will be susceptible to steering activities. In other words, the different types of resources can also be considered from the perspective of the farmers and the extent to which they are interested in receiving resources from the water supply companies. So, on the one hand resources play a role in the choice of a preventive strategy by water suppliers, and on the other hand they play a role in the success of this strategy through the susceptibility of farmers.

The first resource we consider is 'organizational capacity'. The question is whether the size of a water supply company matters in the choice or success of a preventive strategy. For example, the size of a company might influence the ability of the company to incorporate agricultural experts and in general the ability of an organization to get on speaking terms with farmers. A hypothesis might be, that smaller water supply companies pay less attention to the behavioral aspects of pollution prevention, and therefore are more oriented to the engineering aspects of water production. Smaller companies might be less able to set up steering activities.

A second resource we consider is 'financial capacity'. If water supply companies want to move farmers towards prevention, they probably will consider whether the costs of preventive action compensate for the alternative of remedial expenses. From a farmer's perspective, we need to know the conditions under which they are willing to change their agricultural operations, if they were to get money for preventive action.

A third resource we look at is 'information'. Do water supply companies have the right information necessary to change farmers' behavior? Are the assumptions about the relation between changing agricultural patterns and possible effects on the groundwater quality stable enough? What information do water suppliers need to be sure, that farmers have been complying with the standards for preventive behavior? Under what conditions are farmers willing to be more open about the way they farm?

A fourth resource that might be worth some consideration, is 'confidence'. For negotiated agreements on preventive action it is important that some basis of confidence exists between farmers and water suppliers. If water suppliers provide money (compensation payments) to farmers, they want to be sure, that they will get results in terms of groundwater quality, while changes in agricultural operations are generally difficult to enforce. Agricultural water pollution is considered to be a kind of non-point-source

pollution. Also, farmers in general are critical of the public authorities and environmental regulations. It is difficult to gain their confidence and to be seen by them as a reasonable and reliable stakeholder.

A fifth resource we consider is 'authority'. If one is to make farmers comply with rules or to steer them in some direction, it can be important to have authority. Do water suppliers have formal or informal authority? To what extent do water suppliers depend on public authorities and to what extent are they hindered by a lack of authority? Are farmers susceptible only to authority, or are more resources necessary, in combination with authority, to make farmers change their behavior?

The last resource type we consider is 'time'. The main question from this perspective is whether the water suppliers are in a hurry to get farmers to change their behavior? Does the problem context (the soil type, the size or seriousness of pollution, etc.) require quick action? And the farmers themselves, do they feel the 'heat' of problems of pollution?

9.5.1 Organizational capacity

Water supply authorities in the Netherlands are in general public utilities, not fully privatized, like in France or the United Kingdom. Provincial governments have to supervise water supply companies to guarantee the delivery of drinking water at a reasonable price and of good quality. In 1997, the Netherlands had 28 water supply companies, some of which operate on a scale of almost an entire provincial territory (such as the WMO in Overijssel, and the WML in Limburg) and others on a regional scale within a provincial territory (such as the WMD in Drenthe, the WOG in Gelderland, and the WOB in Noord-Brabant). The Netherlands numbers a total of twelve provinces. The smaller water supply companies are in general the older ones, started in times (19th century) when public water delivery was organized only in urban areas. Most of the larger companies started in the first half of the 20th century, serving both urban and rural areas. They have grown because of an increasing connection rate. By now, almost all households in the Netherlands are connected to a water main. By Dutch standards, a viable water supply company serves at least 100,000 connections, and abstracts water from at least two well fields which are mutually connected. The provinces have used their supervisory powers to reorganize the water supply sector by enforcing provincial reorganization plans. The national government is supporting this action, since government policy is in favor of a strong water supply company sector, with a restricted number of viable companies. For reasons of consumer protection and the protection of public health, the government prefers to avoid full privatization (Achttienribbe 1993; Langendijk 1994; Van der Schot 1995).

The efficiency requirements imposed by the provincial governments helped the water supply companies to build strong organizations, able to resist agricultural pollution by investing money in purification techniques. Due to this, scarcely any cases can be found where drinking water standards have been violated in the water delivered to the tap. Such cases as were found, were not so serious as to pose a problem to public health. So, one could say that a viable organization can help a water supply company to prevent violations of drinking water standards.

With respect to water supply companies active in preventing the agricultural pollution of drinking water sources, this study has shown, that those who are heavily dependent on vulnerable sources, are most active in negotiating with farmers on prevention measures, WMD in Drenthe, WMO in Overijssel, and WOG in Gelderland. WOB in Noord-Brabant, and WML in Limburg were less active since they do not feel so much pressure from increasing pollution of drinking water sources in the short term. The active companies do have many well fields in areas with intensive farming, while the groundwater sources in these areas lack the natural presence of covering layers, like the natural clay layers in Noord-Brabant and in the northern and middle parts of Limburg. Unlike the WOB in Noord-Brabant, the WML in Limburg has negotiated with farmers on a compensation arrangement, which cannot be explained by some interest in the short-term protection of groundwater. It is more plausible to search for an explanation in the active role of the province, which wanted to have the water supply company at the table, in order to preserve the credibility of the provincial ordinance.

This study also shows that in general the larger water supply companies were most active in participating in consultations with agricultural organizations, while the smaller ones were more followers, only playing a role at the end of negotiations by signing an agreement as an additional partner on the water supply sector side. Nevertheless, it was not the largest water supply company in each province that lead the negotiations with farmers' organizations. An exception is the WOG in Gelderland which, while it is not the largest, it is the company that is most involved in the problem of agricultural water pollution of drinking water sources.

Further, this study shows that larger companies are better equipped, which enables them to incorporate agricultural expertise within their organization. This is the case for all the water supply companies studied, except for the WOB in Noord-Brabant, where a predominantly production oriented organization culture appears to be a barrier for organizational change in this sense. Although neither the WOB in Noord-Brabant, nor the WML in Limburg have a strong interest in consultations with farmers, the latter shows that, despite this, a water supply company may have an interest in developing its own agricultural expertise. Personal factors, like the

personality of the manager, are also important in this context. In general, it is assumed that managers who have already been in service for a long-time are more traditional in their thinking, still emphasizing 'pumping and billing'. They don't feel comfortable with negotiating about changing polluting behavior.

A very important role in motivating water supply companies to consult with farmers, was played by the national union of water supply companies (Vewin) and the Centre for Agriculture and Environment (CLM). Since the Vewin incorporated agricultural experts (some of whom had previously worked for the CLM), this tendency had a considerable impact on the individual water supply companies as well. The ideas developed by the CLM to integrate environmental innovations into agricultural practices were essential demonstrations for the water supply companies that something could be done by them.

9.5.2 Financial capacity

Water supply companies are financially self-supporting. No tax revenues are needed from the government. The prices charged for drinking water are low throughout the country. The choice for low prices and the reduction of profit is based on a concern for greater efficiency in the water supply sector. Groundwater is considered to be a collective property, and therefore water supply companies may not be regarded as profit making industries selling a marketable product. The provincial governments are authorized by the Water Supply Act to control the efficiency of the water supply sector. As long as water supply companies perform well, no interventions will be made by the authorities. Most water supply companies are organized on a partnership basis, the majority of the shares being in the hands of the provincial authority. Provinces are authorized to impose reorganization plans on the water supply sector.

In general, the national government is very satisfied with the performance of water supply companies, in terms both of finance (i.e., their efficiency) as well as their environmental performance. In the National Environmental Policy Plan, the water supply companies are held up as an example of industries in which environmental thinking is largely internalized. Provinces depend very much on the water supply sector as far as the effectiveness of the provincial groundwater policies is concerned. Provinces are aware of the fact that the standards for specific protection can only be enforced with financial investments. The provinces are not able to provide the money on their own, and therefore they treat the water supply companies as their 'policy partners', while farmers' organizations are considered to be representatives of a target group. This offers water supply companies the opportunity to participate in the policy formulation process.

By contrast, the water supply companies believe that the national and provincial governments are shifting the financial burden too far in their direction. Delays in the implementation of pesticides and manure policies force the water suppliers to make large investments in purification techniques, and maneuvers them into a very uncertain position in which they do not know what kinds and amounts of agricultural pollution that will emerge from their wells. As far as the national pesticides policy is concerned, the sanitation of harmful pesticides is not proceeding fast enough, in part due to a delay in the European harmonization of pesticides policies in the Member States. As far as the national manure policy is concerned, there is too little regulation of nitrates use. Until 1995 nitrates were not regulated at all, because all manure standards were related to the use of phosphates, while artificial fertilizers were excluded. Furthermore, the implementation of the European directive for nitrates in groundwater, which is very important to the water companies, has also been delayed, since the government believes that the Netherlands cannot meet the European standard before 2010. The water supply companies are not satisfied with this situation, in which governments are forcing the water suppliers to meet drinking water standards for public health purposes, while on the other hand they do not offer sufficient support to the water suppliers in preventing drinking water sources from being polluted.

Another case, in which water suppliers see a shift of the financial burden, is the introduction of a groundwater levy. Since 1995 the Dutch government has imposed a levy to finance nature protection activities, and to make drinking water consumers more aware of water scarcity. Water supply companies pay 34 cents per m^3 of drinking water (1000 liter), while industrial users who extract groundwater from their own sources, pay half this amount. The water supply companies fix the levy on the drinking water price that consumers pay. In 1994, when the Dutch government presented its plan to impose a levy, the water supply sector protested fiercely. The director of Vewin spoke of ‘opportunist politics’ and considered it to be a veiled taxation measure to create money for environmental policy at the cost of drinking water consumers. The real problem for water supply companies is that the national and provincial governments are on the one hand forcing the water suppliers to operate as efficiently as possible, while on the other hand, they allow drinking water prices to increase in order to finance all kinds of environmental policy measures. This is the case with the compensation payments, with the stimulation policies, and with the imposition of the groundwater levy (VROM 1993-1997).

According to the water supply companies, in addition to the national and provincial governments, the agricultural sector also regards them too much as an industrial sector able to pay for groundwater protection. Although the

water supply sector is willing to pay for extra groundwater protection on a temporary basis, they prefer investments in sustainable protection of groundwater sources. Performance related subsidies are strongly preferred over compensation payments that offer too little encouragement to farmers to act to protect the groundwater. In that context, water supply companies and the Vewin prefer to further develop the idea of 'payment by results' (*resultaatbeloning*), which is a policy instrument that can work as a regulatory incentive, a performance subsidy. It might become a self-supporting instrument if expanded with a regulatory levy system, in which farmers pay money for the amount of pollution in the groundwater and earn money for the amount of pollution they can sanitize (CLM 1994).

In general water supply companies are anxious to lose control over the money they spend on preventive measures in groundwater protection areas. They prefer to implement the compensation arrangements, as well as the stimulation policies themselves. This attitude of the water suppliers can be explained in terms of the strong incentives from the national and provincial governments to operate in an efficient way. 'If we have to pay, then we also need to have the control,' is what the water suppliers say. They fear that provincial agencies will create excessively high bureaucratic costs, if they were to do the implementation work. In the case of the agricultural organizations, they are more concerned about a possible target shift, brought about by inventive farmers coming up with proposals that would optimize farming operations but which would have no result on the groundwater quality. 'They are just trying it on,' stated a spokesman of a water supply company, that has rejected many proposals for stimulation projects. If the implementation were to be in the hands of agricultural intermediaries, water supply companies fear that these agricultural officials would not be sufficiently critical about the contributions of proposals to the groundwater quality.

The Vewin calculated that the actual price of drinking water in the Netherlands will increase by half within ten years, and may even double in some parts of the country. The main reason for the price increases is the strongly fluctuating quality of the groundwater and surface water input. To be able to deliver drinking water of good quality, water supply companies have to incur greater personnel costs, to expand their expertise and have to invest in research and development for new, complicated and expensive purification methods. Also, the discharge of the pollution removed from the groundwater is quite costly. All these environmental costs are considered to be an important reason why the number of water supply companies is reducing in the Netherlands.

9.5.3 Information

It is very important for the water supply companies to gain information about the type and amount of pollution that is on its way through the soil to the water wells. Information about historical pollution is hard to get, and water suppliers have to await what is coming up with the groundwater. Predictions are rather uncertain, depending on the sophistication of the geohydrological models used, and the reliability of the data on the biodegradation rates and mobility of nitrates and pesticides. Differences in soil condition, may lead to differences in residence between one year and more than a century. For water supply companies depending on relatively unprotected sources, it is very important to get information about present farming operations, and even to control future farming operations as far as these are affecting the water that is flowing underground into the direction of their well fields.

The compensation arrangements have increased the water supply companies' knowledge about non-point-source pollution. The compensations helped them to learn about the amounts of nitrogen and pesticides applied, since farmers have to submit their bookkeeping in order to receive payments. This has increased the control of water suppliers over the groundwater protection areas, because the information enables them to start consultations with farmers on their farming operations, which encourages farmers at least to become more aware of the direct relationship between their operations and the difficulties of drinking water production. The water supply sector is even coming to regard its stimulation policy as a better way to gain access to the books of individual farmers. A part of the farmer population is prepared to provide the water supply companies with information about their farming in exchange for subsidies. This enables water suppliers to anticipate potential agricultural threats to the groundwater.

On the other hand, many farmers are reserved about providing information to water suppliers, since they fear too much control by these companies, which many farmers experience as an 'extended arm' of the government. As part of the agreements, the water suppliers had to assure that the information would be treated as confidential, and would not be passed on to government or public agencies. Nevertheless, water suppliers still have to explain to farmers, that enforcement of legal standards is nor their task. Gaining confidence is very important for the water suppliers, if they are to get the information they want. Although about 70% of the farmers in groundwater protection areas are satisfied with the way compensation arrangements were handled by the water supply companies, the participation rates in the voluntary stimulation projects are limited to only 20 to 40%.

Water supply companies have to deal with conflicting role expectations. On the one hand, the national and provincial governments want them to act

as partners in helping to create a better environment by reporting pollution and cleaning up water sources, which means that - in the farmers' eyes - they are acting as government agencies. On the other hand the water suppliers have to show the farmers, that they are independent producers, like the farmers themselves, who are able to handle confidential information in the same way as partners in business would do. The mutual confidence between water suppliers and farmers is a crucial factor in this.

The difficulty of this mission also depends on the accuracy of the geohydrological assumptions used in the consultations with farmers. For water suppliers it is very difficult to be sure about underground patterns in the soil, the basis of their assessment of the effects of agricultural practices on groundwater quality. It has happened that assumptions used in 1989 to designate groundwater protection areas, had to be changed five years later. Some farmers had to be told that they are no longer in a groundwater protection area, while others had to be told that they were now in one. It is hard to identify the exact borders of a water catchment area, and water supply companies want to feel free to change policies if their models change. Another example: in 1989/1990 a study of the soil in an area in Noord-Brabant showed that the amount of pyrite in the soil was sufficient to allow higher concentrates of nitrogen to be applied in that area, since the pyrite would prevent a large amount of nitrates from leaching into the groundwater. Although it was good news for farmers to tell them that the manure standards could be relaxed, it did not create a very reliable impression.

Cases like the one described above provoke statements by farmers that the administrative standards are often too unrealistic and too ambitious. Even water suppliers sometimes have problems with the lack of flexibility of the legal standards. They do not like the regulatory rigor of governmental agencies, and prefer a more flexible approach to groundwater protection as their own policy style. Water suppliers think that the way they deal with stimulation projects is valued by farmers, as being more flexible and realistic, since the operationalization of standards in agricultural practices is discussed in study groups. Pilot projects are important for them to demonstrate how practical changes in agricultural operations can bring about visible results and improvements of the groundwater quality.

9.5.4 Confidence

The degree of mutual confidence between water supply companies and farmers differs from area to area in the Netherlands. Although the parties are still not on speaking terms in a few groundwater protection areas, in most areas mutual confidence has grown due to the compensation settlements. Most farmers (by respondents estimated at about 70%) are satisfied with the compensations paid. This also increased the willingness of farmers to think

in terms of the prevention of agricultural pollution. The majority of the farmers is aware, that the water supply sector is serious in its willingness to pay for sustainable solutions. This study shows that the mutual confidence is at higher levels in provinces where water supply companies play an active and leading role in consultations with farmers about preventive measures in groundwater protection areas. This is especially the case in Drenthe, Overijssel, and Gelderland, while in the province of Noord-Brabant and (although to a lesser extent) in the province of Limburg, provincial officials are taking the initiatives, and more distance appears to exist between water suppliers and farmers. Although farmers are also participating in stimulation projects in Noord-Brabant and Limburg, they don't have the specific purpose of improving the groundwater quality, as they rather aim at sustainable farming in general. Where water supply companies are involved in stimulation projects and take a leading role, farmers are more motivated to work on specific improvements for groundwater quality.

The mutual confidence is an important factor for creating receptiveness among farmers to preventive measures. Water supply companies have to make clear, that they are not environmental controllers, but partners who want to do business on a confidential basis. The separation in the Netherlands between the regulatory role of the provinces in setting standards, and a more consulting and consensual role for the water supply companies doing business in buying innovations in farming operations is rather well chosen in that respect. It works as a kind of double play in which the one is carrying the stick, while the other carries the carrot. Water supply companies that were active in negotiating compensation arrangements, like the ones in Drenthe, Overijssel, Gelderland, and Limburg, have broken down a lot of resistance to groundwater protection measures, as they were introduced in provincial ordinances in 1989. The combination of provinces handling compensation payments in a strictly formal and economic way, and the water supply companies handling compensation payments in a more generous way is also important in this respect.

The way in which the parties involved deal with each other has changed since the beginning of the 1990s, after the negotiations on provincial ordinances and compensations arrangements ended. Nowadays, many of them perceive a more consensual approach on each side. Farmers' organizations are tired of all the conflicts that arose during compensation negotiations. They are tired of doing battle for more peanuts. Provincial officials feel that the change to a new policy style, started in the Hague, with ministries increasingly thinking in terms of 'network steering', 'consensual steering', 'working together with target groups and partners in society' and 'win/win situations'. Although many are unaware of the actual meaning of these paradigms, they embrace them as something new and interesting.

Representatives of water supply companies are changing their style, since the national union of water supply companies (Vewin) in collaboration with the Centre for Agriculture and Environment (CLM) is encouraging them in initiating more co-operation based projects with the participation of farmers, water suppliers, and provinces. Many of the participants involved also think that the entrance of a new and younger generation of representatives on all three sides has made it easier for them to talk with each other. Many of the larger water supply companies were represented by newly recruited officers who had just completed their higher education in agricultural and environmental issues. They also meet with younger farmers with higher education and different attitudes than the older generation. They think less in terms of conflict models, and are more willing to work on a consensual basis.

Water supply companies also perceive among the farmers in groundwater protection areas, that they are beginning to see the advantage of getting subsidies for environmental innovations on their farms, while their colleagues outside these areas have to pay for most innovations themselves. Although there is a different time schedule for farmers inside and outside the protected areas, in the end they both have to end up observing the same standards. For the younger farmers who still have a long time ahead of them in farming, it is just an investment in the future, while it is more a burden for those older farmers who do not have the perspective of a successor for their farm.

9.5.5 Authority

The authority to provide regulation for groundwater protection standards lies exclusively in the hands of the provincial governments within national and European regulatory frameworks. They have the competence to issue legal standards for their areas. The water supply sector would not be happy to have such a competence itself. They even interpret the lack of having a regulatory competence as an advantage. Complaints about unclear or severe regulations are now addressed to the provinces. This guards the water supply companies against an unpopular image. The unpopularity of manure standards is attributed to the national and provincial authorities.

Further, the water supply companies have low expectations of solving the problems by regulation alone. Other types of policy instruments should also be used to encourage farmers to prevent groundwater pollution. On the other hand, water supply companies are concerned about the tendency of provinces to rely too much on the stimulation policies which are developed by the water suppliers, meanwhile forgetting that such a policy leaves their own regulatory duty undisturbed. Although provincial governments are declaring that stimulation policies are a central pillar in the environmental

protection by the provinces, water suppliers emphasize, that provinces cannot give way to low expectations of regulation and enforcement.

Water supply companies do not consider the prevention of agricultural pollution to be their task, and they will not accept that drinking water directives or standards should be seen as an incentive for the water supply companies to take over control of groundwater polluting activities. On the other hand, the water supply companies are aware that the presence of pollution in drinking water resources is an incentive for them to think about alternatives to water purification and treatment. Thus, agricultural water pollution is forcing them to become active in encouraging prevention, since this might be more efficient than curative solutions.

Besides that, water supply companies emphasize that the national government should be responsible for the general protection of the groundwater in such a way that, nation-wide, it should be possible to use groundwater for the production of drinking water. Additional protection of groundwater in areas with water wells should always be temporary to solve crisis situations. The general level of protection should meet the specific levels of protection as soon as possible, in order to prevent extra costs of additional protection (in terms of financial compensation).

9.5.6 Time

The idea behind the designation of groundwater protection areas was to speed up the protection of groundwater sources that are used for the production of drinking water. The time offered to farmers outside protection areas was considered to be too long to achieve the protection levels that are required in areas were groundwater is used for the production of drinking water. In 1994, a national evaluation of the provincial groundwater ordinances concluded, that they did not produce the improvements in the groundwater quality that were needed. In most areas the standard setting came too late, since a lot of pollution from the past was already moving underground towards the water wells. Although the standards will have an effect in the long run, they will have no meaning in the short run, and they do not prevent water supply companies investing in purification techniques.

Only in areas without considerable historical pollution, the water supply companies may profit from the more stringent standards in the provincial ordinances of 1989. This is, for example, the case in the Mergelland region in the south of Limburg, where the rather extensive agriculture will be prevented from intensifying the application of manure. However, a weakness in the provincial standard setting, as well in the national one, is that nitrogen was not regulated until the mid-1990s, and many pesticides are still not subject to regulation. In the province of Limburg, the provincial groundwater ordinance does not even apply for the use of pesticides in groundwater

protection areas. So, in fact the provinces were not really leading in providing a better protection level for groundwater protection areas, and therefore farmers in protected areas did not have the same start as farmers outside these areas as far as improving the groundwater quality is concerned.

9.6 Conclusions on the control capacity of water suppliers

Our leading question in the case study on Dutch groundwater governance has been: *To what extent are water supply authorities in the Netherlands trying to prevent agricultural water pollution and to what extent do they succeed in that?* In this section we want to answer that question and summarize in what way the three contexts we distinguished in chapter 8 have influenced the motives and resources of water suppliers. In the beginning of chapter 9 we remarked that an attempt by a water supplier to move a farmer towards prevention is successful when the farmer shows a willingness to work on prevention, making commitments to specific preventive actions. In other words, the control capacity of water suppliers not only depends on their own motives and resources, but also on the farmer's motives and susceptibility to resources (see figure 8.3 in chapter 8). The water supplier's attempt is considered to be the independent variable, with the water supplier's motivation to encourage prevention and to transfer resources as necessary elements. The farmer's behavior is considered to be the dependent variable, with the farmer's willingness or motivation to work on prevention and an investment of his resources in preventive action as necessary elements. In this concluding section, we will also formulate statements on specific types of resources that can be successful and therefore helpful to a water supplier if they are transferred to farmers to encourage prevention.

9.6.1 Influence of the problem context

In the Netherlands, the agricultural pollution of drinking water sources is mainly a problem of nitrates and pesticides. Violations of European standards are not found in the drinking water delivered to consumers. And even as far as the deeper groundwater sources are concerned, where the public utilities get their water for drinking water production, still only few violations of the standards are found. Treatment of water from these deeper wells is a matter of engineering by applying purification techniques, which water supply companies do not really see as a problem. Many more problems with nitrates and pesticides appear in the upper groundwater levels, just beneath agricultural fields, especially in the sandy areas, where the upper groundwater is rather unprotected, and where there are no protecting

layers of clay. In the Netherlands, 70% of the agricultural fields on sandy grounds are facing a violation of the European groundwater directive in the shallow groundwater. In the long run this pollution might also affect the deeper groundwater, although it is uncertain in what time span and to what extent this can be expected. This complicates the task of water suppliers and provincial authorities as regulators to quantify how great a reduction of pesticides and nitrogen use is required for the protection of drinking water sources. The debate between farmers and water suppliers on the relationship between agricultural operations and their effects on groundwater, sharpens into some sort of scientific discussion on the extent to which nitrogen from manure spreading will be absorbed by the crops that grow on the soil, and the fraction of nitrate that will leach through the soil into the groundwater. Farmers advocate that for good crop growing results, a certain amount of nitrogen is needed, while water suppliers argue that the nitrogen loss during manuring is much greater than the farmers assume. The time span in which effects will occur not only makes it difficult for farmers to come up with strong arguments, it also raises the question of whether it makes sense to encourage the farmers inside protection zones more than farmers outside these zones for a relatively short period of 10 to 15 years.

Water suppliers expect that it will take many more years before they will face much more severe problems with agricultural water pollution. This also means that it might take more than 100 years before present changes in agricultural operations will generate effects on the groundwater quality. A lot of historical pollution is already present and is still on its way. Although pollution levels and the variety of polluting substances might increase, water suppliers also expect that adequate purification techniques will be available to treat polluted groundwater used for drinking water production. However, with an increasing need for purification, the costs of drinking water production will rise, as will the price to the consumer. An important question is whether society will consider this acceptable. Do we want to pay a higher price for drinking water, knowing that the price increase is related to the purification of polluted water? The water supply sector, in common with the Dutch authorities and the European Union, adhere to the polluter-pays-principle, and that prevention should be preferred over the application of remedial techniques.

9.6.2 Influence of the regulatory context

In the Netherlands, groundwater protection has its origins in the national manure policy. Central to this policy is that a regulatory instrument has been chosen (standards for the maximum allowable levels of manuring). The strength of this instrument, which is still in force, might have been that the government sparked off a national discussion on the role of the agricultural

sector as a polluter of the environment, while until that time the sector had mostly been seen as one of the driving forces of the national economy. This discussion paved the way for the gradual acceptance of restrictions on agricultural operations for environmental purposes. At the same time the national Ministry for Environment gained access to the traditionally closed 'iron triangle' of the agricultural sector.

Although a weakness of the regulatory instrument seemed to be its enforcement and its dependency on a system of manure bookkeeping by the farmers themselves, the bookkeeping system made farmers accustomed to logging the input and output of minerals on their farm, which is nowadays (1997), ten years after the introduction of the manure legislation, accepted as a normal management practice in the agricultural sector. Filling out a mineral form, which has to been sent to the authorities, has become as familiar as completing a taxation form.

Because the national manure standards, as introduced in 1987, would not provide sufficient protection to drinking water sources underground, a compromise was reached at the national political level, which allowed the provinces to come up with additional standards for specified groundwater protection areas or zones. The farmers in these areas became entitled to compensation payments from the water supply companies for the losses in productivity they experience in comparison with farmers outside the protection zones, who are only regulated by the national and not by provincial standards.

This initially led the water supply companies to place their principal reliance on this strategy. Somewhat reluctantly, they accepted this approach to control. Further, four of the five provinces that we investigated went in the direction of settling claims for damages directly by negotiation with the farmers. Since the water supply companies in general had little experience of engaging with farmers on the groundwater pollution issue, the initial result was not much more than a combination of regulations, drafted by the province, and a system of compensation payments, which some water companies were used to, since they had been paying farmers for drought damage in agricultural areas where water extraction had led to a lower water table, thus damaging the agricultural crops.

9.6.3 Influence of the network context

Right from the start, the coordination of groundwater protection was set at the provincial government level by the Soil Protection Act of 1987. The assignment of groundwater protection areas is a more appropriate task for this tier of government. The autonomy of the water production companies, which commonly operate on a regional or provincial scale, means that the provincial government has much more contact with them than does central

government. Furthermore, the water companies had only a weak national organization up to late in the 1980s. The agricultural sector is well organized, both nationally and provincially.

The agricultural organization then first attempted to gain a favorable compensation arrangement for the farmers in one of the provinces, and subsequently to use this as a precedent in order to gain a similar ruling in the other provinces. They succeeded in gaining a favorable regulation in one of the provinces, where the regional water production company was faced with an urgent problem with its drinking water and so adopted a willing attitude. The water companies in the remaining provinces resisted this, at the same time attempting to create a uniform, national regulation in cooperation with the Vewin, the IPO (the representative body for provinces at the national level), and the national farmers' union. This, however, was frustrated by differences between the regional water production companies.

The drinking water sector has no tradition of 'social engineering'. The sector's expertise has always been strongest in the areas of geohydrology, civil engineering and water economics. When the Soil Protection Act went into force in 1987, most of the companies did not have any agricultural expertise in their employ. However, the regulation of groundwater protection areas made the water companies more alert to agricultural issues, leading them to recruit agricultural expertise. The presence of the CLM, too, was important in bringing about a change in the attitude of the water companies. This was because the CLM had already played a role in suggesting national solutions to the manure problem by presenting the environment and agriculture, not as conflicting interests, but rather by indicating that the environment should be regarded as an obvious factor that should be integrated into agricultural practice. The CLM set up pilot projects with the water companies to seek ways to protect groundwater quality in exchange for financial support from the water companies for innovative agricultural practices.

There was already some relationship between the farmers and the water companies in a number of provinces, built up since the mid-1980s due to the compensation paid for drought damage. These relations were quite limited, however: there was indeed contact between the two groups, which was viewed positively by the farmers (affective dimension) since payments were made, but there was no extensive exchange of views (cognitive dimension) on common approaches to innovations in groundwater protection in agricultural practice (preventive measures).

In those provinces where a direct covenant between the farmers and the water companies was agreed for the protection of the groundwater, a greater degree of 'interrelatedness' came into existence, since discussions took place between the parties on possible preventive measures. The affective

dimension increased due to the financial support offered by the water companies for environmental innovation. The interrelatedness also increased strongly for those water companies that had recruited agricultural expertise. This relationship is principally cognitive in nature, in the sense of an empathy with each other. The affective aspect is experienced more by the farmers than the water companies, who remain suspicious about whether the farmers actually do apply the financial support they receive to the improvement of groundwater quality. The CLM remains continuously active in suggesting new and innovative ways to collaborate, such as payment by results.

9.6.4 Motives of water suppliers

The mission of the water supply companies is to produce drinking water of good quality and at a reasonable price. The participation of the public authorities means that water suppliers in the Netherlands feel responsible for the implementation of drinking water quality standards. It also suppresses the profit motive in the drinking water production sector. However, water suppliers are increasingly feeling concerned about how to guarantee the levels of drinking water standards in the future. Although they traditionally have a strong orientation to water production as a process of technical engineering, and although they strongly believe that the state of the art of purification technology makes it possible to remove a lot of pollution, they feel uncertain whether technological developments will be able to resist all kinds of pollution that may emerge in the future. They also realize that increasing pollution will make drinking water production increasingly expensive, due to the need for more purification techniques. This is in competition with the intention to produce drinking water at a reasonable price in an efficient way.

Therefore the water suppliers adhere to the principle that, where pollution is concerned, prevention is better than cure. They are even willing to provide money to encourage prevention, on the condition that in a cost/benefit analysis pollution prevention can compete with the alternative of purification. But they do not like to be the only actor to encourage farmers to take preventive action, and therefore they advocate a strong role for public authorities to force farmers, through regulation, towards prevention, too. On the other hand, for enforcement reasons the public authorities (the national and provincial government) do not want to regulate farmers inside groundwater protection areas more strictly than farmers outside these areas without a compensation provision being paid by the water suppliers. In this way they pass part of the responsibility for groundwater protection on to the water suppliers. So water suppliers are forced to make compensation payments, if they want to have farmers inside groundwater protection areas

working harder on pollution prevention than farmers outside these areas. Whether water suppliers are willing to pay for this extra protection depends on what results they expect from it.

In some provinces (Drenthe, Overijssel, Gelderland, and Limburg), where groundwater sources are quite vulnerable, the water suppliers negotiated directly with the farmer's organizations to conclude an agreement on compensation payments. In these provinces, the provincial authorities initiated the negotiations between water suppliers and farmers, but after that they preferred to stay at a distance as far as the compensation payments were concerned. In one province (Noord-Brabant), the largest water supply company involved did not want to negotiate with farmers, mainly because groundwater sources are rather well protected in their catchment area, except for two wellfields only. The small number of farmers involved in groundwater pollution problems in the short run prevented this water supply company from becoming more farmer oriented.

The water supply companies that worked actively on achieving a covenant with the farmers' organizations, have since noticed that a basis of trust has grown between both parties, which appears to facilitate further discussion on preventive measures. In the province where no covenant was signed, it appeared to be far more difficult for the water companies to gain recognition from the farmers as serious discussion partners. In those provinces with a covenant, the relevant water company also commonly takes the initiative in implementing the stimulation policy, that has been common to all provinces since the beginning of the 1990s. In the province of Noord-Brabant, it is the provincial government itself that took the initiative, since attempts by the water company were not accepted by the farmers. The initiation of stimulation policies by water production companies is, by the way, not just the result of the existence of a basis of trust between the companies and the farmers, it is also due to the restrained attitude displayed by the provincial government, emphasizing that the water company must be viewed as a partner in the implementation of provincial environmental policy. The CLM, too, played an important initiating role by starting pilot stimulation projects with pro-active companies in Drenthe, Overijssel, and Gelderland.

Since that time, these water companies enjoy more contacts with the farmers and have a better insight into the relationship between agricultural activity in protected areas and the quality of the groundwater, thanks to their financing of activities that go further, in terms of results, than is demanded by national policy. They are finding an increasing acceptance by farmers, changing from resistance to regulations on fertilizer use to interest in financial support for environmental innovation. The water companies, however, are only interested in environmental innovations, if the can expect

that the assessment of costs as against benefits, in terms of future treatment costs as against current prevention costs, comes down on the side of prevention.

9.6.5 Resources needed by water suppliers

Organizational capacity. The larger water production companies succeed better in guaranteeing the quality of their drinking water. One important advantage of scale is that one has more means to invest in quality research and purification technology. That would appear to ease the pressure to work on prevention. But what is also important, is that the larger companies also have more room to invest in acquiring their own agricultural expertise. While it would appear that a certain company size is a necessary condition (smaller companies are not initiators), it is not a sufficient one. It is also necessary that the importance is acknowledged of working on prevention, which is in turn related to geohydrological conditions, which determine the urgency of the problem.

Financial capacity. The water companies are experiencing an increase in environmental costs, which they justifiably have to carry (scarcity of groundwater, investments in more expensive production from surface water, investments in treatment technology, and payments for prevention in agriculture); on the other hand, they are experiencing increased pressure to produce efficiently at the same cost, and to supply at competitive prices. This means that they adopt a critical attitude towards their preparedness to pay for preventive measures. They only wish to support such measures financially, if they yield the maximum possible benefit to groundwater quality and if a preventive strategy appears more attractive to them than a remedial one. They do not want to pay in advance for any prevention, merely because the government has elevated this to one of the cornerstones of its policy. Here, too, it is true that the availability of financial means is a necessary condition, but it is not sufficient for the maintenance of a preventive strategy. Once again, it is the urgency of the problem that is decisive and, in the second place, the possibility to obtain guarantees on the results of innovations from the information made available by the farmers.

Information. The water production companies are highly dependent on the models available for the prediction of the subterranean behavior of potential pollutants, as well as on the information that is input to the models, which has to be obtained from the farmers in groundwater protection areas. The availability of such models governs the degree to which preventive measures are encouraged. There will be support for only those measures that are known to have a clear benefit to groundwater quality. The dependence on

information from the farmers is a major driving force behind the pursuit of a stimulation policy. As a result, one acquires information that allows a better prediction of the pollution that might be expected in the future, but the acquisition of such information demands a satisfactory relationship with the farmers.

Confidence. It is not necessary for the water companies to have built up a relationship of trust with the farmers prior to steering activity, but one does observe that matters proceed more smoothly in those provinces where a good relationship with the farmers already existed as a result of the drought damage issue. What is important is that they choose an approach that incorporates the building of such a relation. This is crucial if the farmers are to accept it.

Authority. In the Netherlands the drinking water producers do not themselves have any regulatory competence assigned to them by government. They are dependent in this regard on the provinces, which do have such authority assigned to them, within both national and European frameworks. This does not diminish the fact that regulation and the power of authority are important tools in encouraging farmers to take preventive action. The water companies do not expect regulation alone to have much effect. They expect far more from a dual approach, in which the government lays down rules and the water companies use financial stimuli to provide an extra impetus to the farmers to observe the rules by adopting preventive measures. What this does involve, according to the water companies, is that sufficient regulatory pressure must be exerted by the authorities, and they would like more of it. Whether companies maintain a preventive approach, supplementary to regulation, differs per province. This implies that government action, as the regulatory authority, is certainly necessary but not sufficient in getting the water companies to opt for a preventive strategy.

Time. The water companies are generally in no hurry to adopt a preventive strategy, in the sense of expecting considerable results from short-term actions. The application of treatment technology appears to be unavoidable due to the historical pollution that is still on its way underground. Why, then, do they not wait until the government, via its strategy of gradually tightening up the manuring standards, maneuvers the farmers into taking preventive action? It would appear that a number of companies want to seize the opportunity to build up a relationship of trust with the farmers in groundwater protection areas, which means that they will not only be able to exchange a limited amount of purification in the future for prevention today, and which also means that they can obtain more information about, and

possibly more control over agricultural activities in groundwater protection areas as well as possible future threats to groundwater quality.

9.6.6 Susceptibility to resources on the farmer's side

Organizational capacity. The farmers are receptive to innovative expertise, but they are more interested in wider innovations than those specifically concerned with groundwater. What is important is that expertise is coupled with financial support, since expertise can also be gained via their own advisory services.

Financial capacity. A number of farmers are becoming increasingly receptive to financial support, since they believe that innovation will be unavoidable in the long term. They thus have a subsidy advantage over those farmers who are outside protected areas. Financial instruments can thus tilt the farmers' cost/benefit considerations in favor of preventive measures.

Information. The receptiveness to the transfer of information is related to the financial exchange and to the expectation that the water companies will guarantee that, as partners, they will use the information themselves, and not reveal it to third parties, such as government inspectorates.

Confidence. The confidence of farmers in the water companies depends on three factors: Are the water companies prepared to pay up? Can they be counted on in the procedure for allocating financial compensation? And will they preserve the confidentiality of the information that the farmers give them when applying for financial compensation?

This means that financial instruments are not only instruments that will have an influence on the farmers' cost/benefit considerations; they are also a way for the water companies to gain access to important information and whereby they can build up a better relationship with the farmers (investments are made in building up social capital or, in other words, a preparedness to cooperate). Covenants are more readily achieved in areas where the water companies were already active with drought damage. The research has also shown that stimulation policies also achieve a greater measure of penetration in those areas where they water companies were already active with covenants, since a good relationship had already been built up.

Authority. Initially the farmers offered great resistance to authoritative action. Tighter regulations in groundwater protection areas were only accepted with reluctance, in part due to national resistance to the manure regulations. This resistance started to fade in those areas where it became

more certain that there would be a coupling with compensation via covenants, and when it became clear that, with time, the regulations would also unavoidably be tightened outside the protected areas, albeit over a longer time frame. Nevertheless, the authority of water production companies and the regulative government agencies is still a matter of discussion, in respect of the connection they seek to assert between necessary regulation and the improvement of groundwater quality. This discussion is especially pointed in respect of the definition of nitrogen losses and the behavior of nitrogen in the soil. The farmers argue that a certain nitrogen level is necessary for plants, while the water companies argue that this nitrogen level is too high in view of nitrogen losses to the groundwater. Inadequate or changed information and uncertainty in this area damages authority.

Time. The farmers are in no hurry to adopt measures: indeed they are more inclined to delay any policy approach. Nevertheless, things are changing gradually, since a number of farmers see the attitude of those water companies that are prepared to pay compensation as a temporary advantage in implementing unavoidable innovations with financial assistance, in contrast to other farmers outside the protected areas. These pro-active farmers, as they are called, do thus have a certain degree of haste, since they see that such attractive financial measures will disappear in due course.

9.7 Conclusions in terms of groundwater governance

Although in section 9.6 we concluded and summarized with respect to the leading question of the Dutch case study, there is another leading question we have to deal with, which is the fifth central question of this dissertation (see chapter 1): *What institutional lessons can be learned from governance arrangements in which non-governmental actors do play an influential role?* In the introduction of chapter 8 we noticed that although water supply authorities in the Netherlands are formally speaking the national and provincial governments being responsible for public drinking water supply and groundwater management, in practice they have to rely on a public performance delivered by water supply companies as non-governmental actors. While drinking water policy objectives require a certain performance of the water supply companies, these companies are not authorized to regulate farming practices to achieve drinking water sources control. This has resulted in negotiated agreements between water suppliers and farmers to privately bridge the public gap between drinking water policy and farming practice. In fact, this is an example of ‘external coherence’ (see part two of

this dissertation) between the public policy subsystem and the property rights subsystem of the groundwater resource regime in the Netherlands. Drinking water policy has not been designed to redistribute farming rights in such a way that drinking water policy objectives can be met.

Although the research model applied in this case study has been a preliminary framework in the process of constructing an analytical governance framework for this dissertation, as presented in the first part of this dissertation, it covers already most of the governance elements that we distinguished in chapter 2.

The 'levels and scales' aspect is largely covered by the 'regulatory context', which focuses on the various administrative levels involved (European, national, provincial) and their mutual relationships. We learned from the case study that involvement of the European Union by means of the Drinking Water Directive and the Nitrate or Groundwater Directive has been a crucial context factor for the development of negotiated agreements between water suppliers and farmers. While water suppliers as non-governmental actors lack authority resources, they must rely on the provinces, which do have such authority assigned to them, within both national and European frameworks. This does not diminish the fact that regulation and the power of authority are important tools in encouraging farmers to take preventive action. However, the water companies do not expect regulation alone to have sufficient effect on groundwater protection. They expect far more from a dual approach, in which the government lays down rules and the water companies use financial stimuli to provide an extra impetus to the farmers to observe the rules by adopting preventive measures.

The 'actors and networks' aspect is largely covered by the 'network context', which focuses on the dynamics of the agricultural network and the water supply network. We have seen that the Dutch environmental ministry has been able to break the power monopoly held by the 'iron triangle' in the agricultural sector and has been accepted as an influential partner in the administration of agricultural affairs. This also resulted in an improved interrelatedness and commitment between the agricultural sector and the water supply sector. More particular we learned from the case study that the organizational capacity resource and the confidence resource have been affected by these network dynamics. In terms of organizational capacity, the larger companies have invested in acquiring their own agricultural expertise. In terms of confidence, negotiated agreements were more readily achieved in areas where the water companies were already active communicating with farmers.

The 'perspectives and objectives' context is largely covered by the 'problem context', which focuses on the various problem analyses that are

circulating in the policy formulating process and the evaluation process of policy results. We learned from the case study that a strategy of buying over-compliance of farmers not only works as an incentive. It also requires water suppliers to buy "farming practices" information from the farmers. The water production companies are highly dependent on models available for the prediction of the subterranean behavior of potential pollutants as well as on the information that is input to those models. Water suppliers prefer to support only those measures that are known to have a clear benefit to groundwater quality. The acquisition of "farming practices" information demands a satisfactory relationship with the farmers. The receptiveness of farmers to the transfer of information is related to the financial exchange and to the expectation that the water suppliers will guarantee that, as partners, they will use the information themselves, and not reveal it to third parties, such as government inspectorates.

As far as the 'strategies and instruments' aspect and the 'resources for implementation' aspect of governance is concerned, we just discussed already the impact of the three contexts on the control capacity of water suppliers. However, there are a few resources on which we want to make some more concluding remarks. With respect to 'organizational capacity for implementation' we want to remark that the strategy of negotiated agreements in the Dutch case was only initiated by the larger water supply companies, which had approximately at least 800,000 inhabitants connected. So, organizational mass does matter to do more than just 'pumping and billing' water. With respect to 'financial capacity' we have to notice that the strategy of buying information and confidence, and thus compliance from the farmers could only work as far as the European Union allows the polluter being paid, which is in cases of over-compliance where society asks farmers to provide an environmental service beyond the reference level (the minimum standard of environmental care). With respect to the resource 'time' we have to be aware that the water supply companies in the Dutch cases have chosen to follow a groundwater protection strategy that goes further than the objective of just health protection in the short run, which could have been met by means of purification techniques to clean up pollution in drinking water sources. Although an analysis of the time resource learned that water supply companies are not in a hurry to have the farmers complying with target levels, they just expect that they will be better off with a strategy that has effect in the long run, and they are prepared to invest in that.

In chapter 2 we distinguished three mechanisms that are responsible for mutual adjustment between the five aspects of governance: values (objectives), cognitions (information), and resources (power). Mutual

adjustment arises partly from the tendency towards mutual consistency of values, partly from the tendency to fit cognitions into a common framework for interpretation, and partly from mutual dependency on resources. The mutual consistency of values seems to point in the Dutch case at consensus building around the acceptance of restrictions on farming practices to reduce environmental pollution. Despite farmers' protests, the agricultural sector has committed itself to a nationwide approach to reduce the amount of fertilizers and pesticides on agricultural soils to save the environment. The common cognitive reference framework seems to point at the interpretation of groundwater pollution as more than a health problem. There is tendency on the side of water suppliers, although they are non-governmental actors, to understand groundwater protection in terms of long-term sustainability, in search for a lasting, and thus preventive solution. The mutual dependency on resources has its roots in the early 1980s, where the agriculture ministry discovered that the agricultural sector would only survive in an era with increasing environmental protection if it opens up its closed policy community and accepts the influence of environmental policy makers in the administration of agricultural affairs. On the other hand, environmental policy makers, and later on the water supply sector, realized that they would only have such influence on basis of confidence relation with the agricultural sector.

In chapter 10 we compare the Dutch case of groundwater governance with a similar case in the American State of Florida. The reason for comparing the governance structure of groundwater and drinking water protection in both states is that the problems underlying the policies in both states display a number of remarkable similarities. Therefore, our questions are: Do different states that have similar problems develop similar governance structures? Or are there conspicuous differences? And if there are differences, how can these be explained in terms of institutional conditions that determine the stability and dynamics of a governance structure? In the conclusions of chapter 10 we will revisit the three mechanisms of mutual adjustment, which we want to further investigate for the Netherlands in comparison with Florida.

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LIST OF ABBREVIATIONS

AID Agricultural Inspection Service
CLM Centre for Agriculture and Environment
DLV Agricultural Extension Service
IPO Netherlands Association of Provinces
KIWA Institute for Certification, Inspection, Research and Consultancy on Water Supplies
LEI Agricultural Economics Research Institute
LNV Ministry of Agriculture, Nature Conservation and Fisheries
Nefyto Netherlands Foundation for Phyto-Pharmacy
RIVM National Institute for Public Health and the Environment

Vewin Netherlands Waterworks Association
VROM Ministry of Housing, Spatial Planning and the Environment
V&W Ministry of Transport, Public Works and Water Management

Appendix 9.1

List of interviews for the Dutch case study

National	*Vereniging van Waterbedrijven in Nederland (VEWIN)* Mr. L. Joosten
	Landbouwschap (nationaal) Mr. F. Jansen
Drenthe	*Provincie Drenthe* Mr. H. Thije
	Waterleiding Maatschappij Drenthe (WMD) Mr. A. Dries
	Landbouwschap (Drenthe) Mr. C. Udding
Overijssel	*Provincie Overijssel* Mr. J. te Luggenhorst
	Waterleiding Maatschappij Overijssel (WMO) Mrs. S. Leferink
	Landbouwschap (Overijssel) Mr. H. Arentsen and Mr. L. Heitbrink
Gelderland	*Provincie of Gelderland* Mrs. I. Geelen
	Waterleidingmaatschappij Oostelijk Gelderland (WOG) Mr. Th. Reuling
	Landbouwschap (Gelderland) Mr. Weersink
Noord-Brabant	*Provincie Noord-Brabant* Mr. D. Grevink and Mrs. A. Schoenmakers
	Waterleidingmaatschappij Oost-Brabant (WOB) Mr. T. van Alphen
	Landbouwschap (Noord-Brabant) Mr. P. Paree
Limburg	*Provincie Limburg* Mr. R. Spaas
	Waterleiding Maatschappij Limburg (WML) Mr. H. Schouteten
	Landbouwschap (Limburg) Mr. J. Tobben

Chapter 10

Comparing Dutch groundwater governance with Florida

10.1 Introduction

In chapter 2, we developed a model of governance to facilitate comparative research on governance systems. In this chapter, we apply this model to compare the governance systems for groundwater and drinking water protection in Florida and the Netherlands. Specifically, we look at protection against nitrate and pesticides used in agriculture and that, via the groundwater, can cause contamination of the drinking water supply. We ask to what extent different states with similar policy problems develop a similar policy response, to what extent there may be striking differences, and how these differences can be explained by the mechanisms that determine a governance system.

The information on Florida required for this comparison was obtained from 80 interviews with mostly water policy officials across the state of Florida, conducted by the author during the autumn of 1995 while he was a guest researcher at the University of Florida in Gainesville. A list of interviews is added as an appendix to this chapter. Additional information was obtained from reports by other researchers, government documents, and documents produced by other organizations. The comparative analysis is considering the period 1980-1995. Since early 1980s, both states have recognized the urgency of protecting groundwater against diffuse pollution from agricultural sources. In the period up to 1995, this resulted for both states in the adoption of policy programs and legislations to tackle those problems.

The problems underlying groundwater and drinking water policies in both states display a number of similarities. First, both Florida and the Netherlands make significant use of groundwater for drinking water. In Florida, groundwater provides about 90 percent of all the drinking water; in the Netherlands, the proportion is about 66 percent, but in the north, east,

and south of the country, almost 90 percent of drinking water originates underground. Second, the groundwater systems are vulnerable on a large scale, particularly the shallow groundwater. In Florida, this is because the aquifers are covered by a layer of porous limestone or limestone with faults, fractures, voids, and stream sinks ('Karst geology'), or because the surface strata consist mainly of sandy soils (the Central Ridge, which stretches lengthwise through the middle of Florida). In the Netherlands, the groundwater systems in the east and south are most vulnerable; here the upper layers of groundwater lie under porous sandy soils. In both Florida and the Netherlands, the deeper aquifers are better protected.

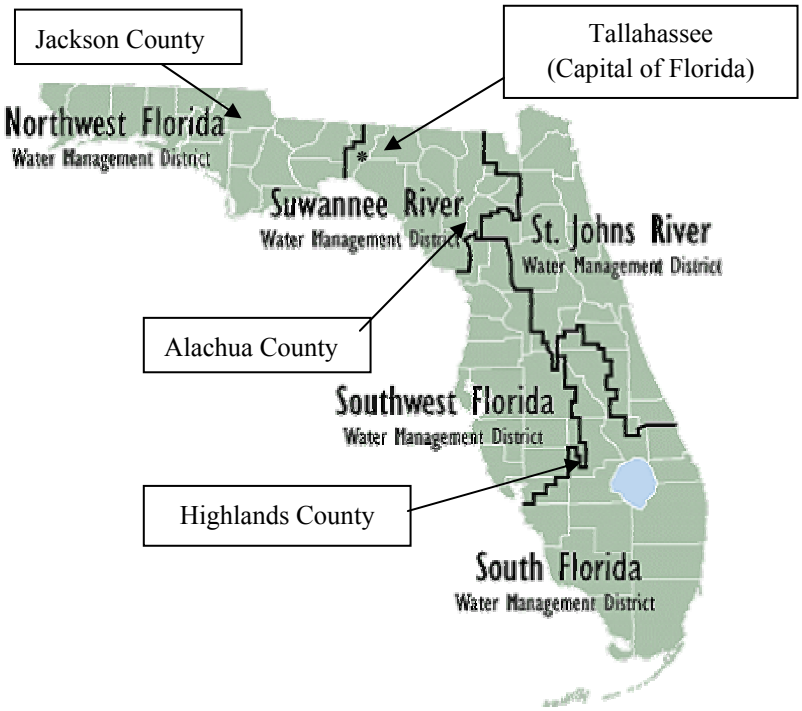
A third similarity is that the supply of drinking water depends on highly vulnerable groundwater systems threatened to a high degree by diffuse sources of contamination from intensive agricultural systems, in particular the application of nitrates and pesticides for crop protection. In Florida, the nitrates are applied as artificial fertilizers; in the Netherlands, the nitrates originate from animal manure spread on the fields. This manure is mainly a by-product of the intensive livestock farms in these areas, which usually have little arable land. This results in the tendency to spread excessive amounts of manure on the land. The arable crops are mostly animal fodder (such as maize). In Florida, the groundwater systems are threatened not by intensive livestock farming but by intensive fertilization and use of pesticides on citrus fruits, fruit and vegetable crops, and tree and fern nurseries. Arable farming is big business in Florida, just as the intensive livestock farms are in the Netherlands.

There are more striking similarities between Florida and the Netherlands, too. Although they differ considerably in size (Florida is more than four times bigger than the Netherlands), they have roughly the same number of inhabitants (about 15 million). Although the average population density in Florida is about 100 per km^2 (in the Netherlands, it is more than 400 per km^2), the Floridian population is concentrated mainly in the coastal areas, where 70 percent of the people live. This part of the population is highly environmentally aware, which distinguishes Florida within the United States. A comparison of states made in 1987 placed Florida seventh in 'commitment to environmental protection'; the state placed eighth in the same survey conducted in 1988 (Ridley 1987; Sapowith & Ridley 1988). In both years, the environmental performance of American states was assessed on the basis of their environmental programs. Florida scored particularly well in the area of groundwater programs but barely passed on reducing pesticide contamination. The Netherlands also has a reputation for a high environmental awareness and for well-developed environmental programs. The Dutch National Environmental Policy Plan of 1988 was the first example in the world of an integrated national environmental plan. In both

states, a powerful agricultural policy community is also politically influential. Furthermore, both states have a special relationship with water issues, and groundwater plays a crucial role in the functioning of their ecosystems. The growth of public awareness of groundwater as an issue and the issue's rise on the political agenda took place in both the Netherlands and Florida beginning in the 1980s, and led within a period of 10 years (1985-1995) to the development of detailed policy programs and legislation. At the regional level, water management has been institutionalized and democratized similarly in both states (water management districts in Florida and the water boards in the Netherlands) under a form of management (functional democracy) that can be considered quite unique internationally.

Figure 10.1 shows the division of Florida into five water management districts and 67 counties. Some counties cross borders between water management districts. The interviews for the Florida case study focused on the State level, the level of water management districts, as well as the level of counties. We selected three counties for a more detailed focus: Jackson County (typical for problems due to cotton and peanut growing); Highlands County (typical for problems due to citrus and fern growing); Alachua County (known for a more progressive county administration).

Figure 10.1 The State of Florida and its five water Management Districts.



10.2 Multilevel groundwater management in Florida and the Netherlands

We now use our governance model to analyze our cases and examine the tenability of our assumptions. Specifically, we examine protection against pollution of the groundwater by nitrates and pesticides used in agriculture. This issue can be broken down into a number of linked subproblems, whereby the fourth precedes the third, the third the second, and the second the first - a chain of interlocking problems. The first subproblem is that contaminated drinking water can damage the health of the consumer. The second subproblem, which precedes this, is the entry of contaminated groundwater into the drinking water supply system. The third subproblem, which precedes the second, is the contamination of groundwater by a certain form of agricultural land use. And finally, the fourth subproblem, the root cause of all this, is that the type of agricultural production pursued requires certain substances in certain concentrations that become problematic when they leach into the groundwater.

In principle, a policy response can be devised to address each of the four subproblems in either country, and each subproblem can be an intervention point for policy. The further down the problem chain a policy is applied, the more effect-oriented (or end-of-pipe) it is considered; policy is more source-oriented the earlier in the problem chain it is applied. The first intervention point revolves around the consumption of drinking water and protecting the consumer using quality standards. The second intervention point revolves around the production and distribution of drinking water, as well as promoting better management of the source and supply of drinking water. The third intervention point revolves around land use (application of pesticides and nitrates), as well as the protection of groundwater against contamination through water quality standards and liability for the type of land use. The fourth intervention point revolves around farm management and promoting better agricultural practices, as well as the production and distribution of pesticides and nitrates. We use these four intervention points as a basis for comparing Florida and the Netherlands as states and also to compare the five elements of governance separately for each intervention point. For each topic, we begin by analyzing the extent to which there is a difference in the distribution of governance between the various scale levels. Taking this difference as our staring point, we examine which differences in other elements of governance are related to this.

10.2.1 Quality standards for drinking water and the purification of groundwater

Regarding quality standards for drinking water and the purification of groundwater, governance over different administrative levels is in many respects the same in both areas.

Scale levels
Both the U.S. government and the European Union (EU) impose minimum standards for the quality of drinking water. These standards are comparable, and global experts, particularly from the World Health Organization (WHO), have played an important role in developing them. In translating these standards to the level of the state (Florida and the Netherlands), there have been no great differences either. In both states, the standards are applied to the drinking water companies.

However, there is a big difference in the way the water companies in each state operate, with important consequences for the pattern of governance. In the Netherlands, all water supply companies have sufficient public support for using a variety of sources of water and, eventually, for making use of advanced water purification techniques so that meeting the standards for drinking water quality is not problematic - at least not in the short term - as long as people are prepared to pay considerably more for their water. In Florida, a distinction has to be made between urban and rural areas. The urban areas are served by large water companies, but in the rural areas, most drinking water is supplied by very small companies, or is entirely decentralized in the hands of small groups of end users; in contrast, the largest water companies in the Netherlands are found in the rural areas. Because of the decentralized production of drinking water in the Florida countryside, it is often impossible to meet stricter quality standards by mixing water from different sources or turning to alternative sources. As a result, the quality standards are not always met.

Consequences
The consequences of the quality standards not always being met in Florida are not to be found in the first instance in the network of actors. We have already seen that within the relevant network, the same type of key actors, including the global WHO, are playing a dominant role. But there are recognizable, clear consequences for the perception of the problem and policy ambition. Because in Florida, meeting the quality standards cannot be guaranteed in all cases, the public debate has stressed the health risks to consumers. It is also seen as a current issue, not a future threat. This perception has been strengthened by revelations from outside the governance

system in the form of incidents of contaminated drinking water that have attracted much media attention. In contrast, in the Netherlands, there is hardly any such concern. The water supply companies do make a case for a preventive approach to dealing with groundwater contamination by predictions that a number of wells will become unsuitable if pollution of the groundwater continues unchanged (Bressers, Huitema, & Kuks 1994: 34). The companies have been successful in getting this problem on the political agenda as one of sustainability rather than of public health. This contrasting perception of the problem has also led to different ambitions regarding policy objectives, which in the Dutch case no longer targeted at the consumers of groundwater but at the polluters.

Of course, the contrasting perception of the problem also had consequences for the *strategies followed and the policy instruments used*. In the Netherlands, the perception of the problem has led to great emphasis on preventive measures geared toward restricting further contamination of the groundwater. Indirectly, there have also been consequences for the network because in a number of cases, their initiative has given the water companies a role in the implementation of this preventive policy. In fact, this policy relates to the next two issues, and is not discussed further here. In Florida, however, part of the strategy has been to fit additional filters at the wells not meeting the quality standards, particularly where pesticides are the main cause of the contamination.

Regarding *the responsibilities and resources for implementation*, based on the information supplied by the counties, Florida's Department of Environmental Protection (DEP) itself visits the water supplier to fit the required equipment. The financial and information costs of this strategy are very high; money and time are sufficient for a systematic monitoring of small-scale drinking water supply systems. This issue is not unique to Florida, and has motivated the federal government to establish a subsidy program to encourage improvements in the quality of small-scale drinking water supplies. Although this involves no formal shift in competence between administrative levels, it nevertheless indicates growing activism at the federal level.

Background

Why have large water companies become established in the rural areas in the Netherlands but not in Florida? We begin with an aspect that lies outside the governance model: the geographical and demographic circumstances. Although Florida is relatively densely populated by U.S. standards, the Florida countryside is considerably more sparsely populated than areas considered rural in the Netherlands. This rural quality is further heightened because a large part of the Florida population lives in the big cities of Miami,

Tampa/St. Petersburg, and Jacksonville. As a result, it is much more common for small communities and some individual farms to be so far from water mains that connection would prohibitively expensive.

We return again to the *actors in the network*. Since 1975, the Dutch provinces have assumed an active role in a series of water company mergers (Bressers, Huitema, & Kuks 1994: 30-31). One reason was the belief that bigger companies would be more able than the many previous small companies to guarantee a high standard of drinking water. The provinces derived their authority to stimulate such mergers partly from private law, as shareholders in the companies. The provinces were also able to influence the water companies in which municipalities held shares through their supervisory role over the municipalities. However, the role of the provinces was mainly to take the initiative and to lead the way in meetings between the parties involved. If a government authority were to assume such a supervisory over a business sector in Florida, it would probably not be readily accepted. In addition to the generally lower level of tolerance toward government authority in the United States than in Europe, and certainly in the Netherlands, perhaps the *perception of the problem* also plays a role. More so than in the Netherlands, many people living in the rural areas of Florida believe that groundwater, by definition, is "purer" than water that has been subjected to all sorts of industrial treatment.

10.2.2 Preventing contaminated groundwater from being used in the drinking water supply

Scale levels

In this respect, the federal/EU level hardly plays a role in either state. In both states, there is a system whereby water source protection zones are defined in relation to the supply of drinking water. In the Netherlands, this task is carried out by the provinces, and these protection zones must be reflected in municipal land-use plans. In Florida, the five Water Management Districts (WMDs) are responsible for delineation of vulnerable areas together with the counties, which visit the small supply systems and advise the WMDs. Generally, there appears to be no significant difference between Florida and the Netherlands regarding the division of responsibilities at the various administrative levels. In both cases, the lower level has quite an important but secondary task, and the emphasis lies with the intermediate level between the state and the local community. The consequences of identifying areas, though, are different in the two states: in the Netherlands, this leads to additional restrictions designed to protect the quality of groundwater; in Florida, this leads to extra restrictions on the use of groundwater.

There may be no objective difference in the distribution of multilevel governance between the various administrative levels in both states, but there is a subjective one. In the Netherlands, it is considered quite normal to draw up physical plans and designate special areas for groundwater protection at the national level, in outline at least, and then to specify these further at the provincial level and finally to complete them in detail at the local level. The distribution of multilevel governance regarding the designation of groundwater protection areas fits into this picture. In Florida, however, the more or less equal division of responsibilities between the various administrative levels is seen as a step toward more centralized control. Here, the basic approach is not top down, but bottom up. In principle, all responsibilities lie at the local level, and interference by higher administrative levels is generally considered inappropriate.

Background

Considering the *actors in the network*, local administrators have to allow increasing influence from the state and the WMDs. Local administrators and local water suppliers in the countryside may not be happy, but the urban administrations and the large drinking water companies accept it. The explanation for this lies in the *perception of the problem*, particularly the interplay between the water quality and quantity aspects. The enormous growth of cities, all on the coast, makes the principle untenable that every local community takes care of meeting its own water needs. Withdrawing groundwater to supply drinking water to urban areas along the coast would quickly lead to falling water tables and intrusion of salt water. To prevent salinization of the groundwater, it is important to be able to import water from inland areas to supply the coastal cities. The import of water requires coordination at a level higher than the local administrations (i.e., coordination at state level) and an approach based on water system boundaries (i.e., implementation by the five large WMDs). Coordination at a higher administrative level is in interest of both the big cities and the continuity of the larger urban water companies.

10.2.3 Emissions to the groundwater and restrictions placed on agricultural activities

Scale levels

Here we focus initially on contamination by nitrates. At the state level, both Florida and the Netherlands have quality standards for groundwater. However, there is an important difference: In the Netherlands, nitrate standards are imposed by EU and can be enforced by the EU. The Netherlands is obligated to implement these standards and to verify that they

are being enforced. In Florida, the drinking water quality standards have been adopted voluntarily. However, the U.S. government is not so silent when it comes to contamination by pesticides.

Consequences

The difference in setting nitrate standards in the United States and the Netherlands has repercussions for the relations between actors who represent the interests of the environment and those who represent the interests of farmers. In the Netherlands, the environmental movement and other actors who defend environmental interests in the national debate can always fall back on externally fixed standards. Those opposing firm measures are forced to make a strong case that more lenient measures can also achieve the stated goal. It proved almost impossible to depart from the goal itself once European standards had been introduced. In Florida, representatives from the farming community were not bound by such limitations because the standards were set at their "own" state level and so could be relaxed.

This brings us to the *problem perception and policy ambition*. Because there is little influence from environmental groups, certainly regarding nitrates in groundwater, occasional excessive use of fertilizers in Florida is not seen primarily as a problem of pollution by farmers but rather as a question of sensible business management. As a consequence, restrictions on emissions do not readily spring to mind when setting policy objectives.

In terms of *strategy and instruments*, this has not resulted in the imposition of emission standards on farmers in Florida the way it has in the Netherlands; instead, Florida has a curious instrument called the "curative liability." This means that if it can be proven that the levels of nitrate in the groundwater are too high as a result of the activities of one or more individual farmers, these farmers can be held liable for the damage. However, it is enormously difficult, in many cases impossible, to trace such cause-effect relationships back to individual farmers.

In effect, this policy requires such a high level of *resources to implement* (information and/or money) that it is generally impossible to apply to cases of nitrate pollution in the groundwater. In practice, therefore, it is a very weak instrument for changing farming practices, and is a mere formality.

Background

If we look into the background of the passive role adopted by U.S. federal administrators regarding the emission of nitrates, we quickly come to the different development stages and metapolicies (transcending the groundwater protection and other policy areas) in the United States and the EU during the 1980s. In the Unites States, the Reaganite "New Federalism" set out to push back the authority of government, particularly at the federal

level; similar developments took place in Europe mainly at the level of nation-state. At EU level, there was an expansive European Commission at work under the strong leadership of Jacques Delors, who was quite successful in encouraging further integration within the European Union. Despite similarities of content, the European principle of subsidiarity is not a counterpart to New Federalism. The principle of subsidiarity is less an expression of firm resolve for decentralization by the 'federal' level itself than a (soft) brake on the integration process, and it was introduced from the bottom up by the member states. At the EU level, there is still a powerful majority in the European Parliament, the European civil service, and the Commission for further integration.

Regarding the *network of actors*, the environmental movement in most American states is in a structurally weaker position than in the Netherlands, particularly when issues other than nature and human health are at stake. The absence of a federal standard for nitrate concentrations in the groundwater reinforces this inequality in this specific case.

A similar situation can also be observed regarding the *perception of the problem and the policy ambition*. Placing restrictions on the use of private property is a much more sensitive issue in the United States than in the Netherlands. In the United States, private property is more than an economic concept that reflects certain benefits and disadvantages; it also has an ideological side. Another aspect that influences perception of the problem within the governance system is that over-fertilization with nitrate in the Netherlands is a consequence of the need to get rid of waste (manure). In the United States, at least in Florida, it is the consequence of the overabundant supply of nutrients to plants. This is much less readily regarded an act of pollution than dumping manure on the land, which, quite apart from the objective environmental consequences, smells more like pollution in the minds of the general public.

10.3 A dominant multilevel difference between Florida and the Netherlands

If we survey the numerous differences between Florida and the Netherlands in the policy arenas we have investigated, the question arises whether there is a dominant difference between the governance structures of the two states that binds together a number of observed differences. In this section, we examine a cluster of three differences concerning the multilevel aspect. First, we examine the role of central and decentralized government levels in land use decisions, because groundwater protection has to affect farming practices on agricultural land. Second, we examine what kind of intervention

strategy is used to regulate farming practices. Finally, we examine the position of the environment department in both states and its control capacity to intervene in the agricultural sector.

10.3.1 Regulation of land use: local versus centralized decision making

In the United States, protection of groundwater against agricultural pollution is seen primarily as a responsibility of the lower levels of administration. In this respect, great importance is attached to the autonomy of the states and local authorities (Rosenbaum 1995; Cahn 1995). Measures to protect the groundwater often relate directly to the nature of the land use, and because land-use decision making is seen to be the exclusive domain of the lower levels of government, the federal government is reluctant to take any direct action. It is extremely rare for the federal government to directly prohibit the use of a land parcel for a particular purpose; such interference is politically unacceptable to many people (Portney 1992). This reluctance may be explained partly by the philosophy of New Federalism that brought about a decentralization of government tasks under the Reagan administration during the 1980s. In many other countries, it was during the 1980s that national legislation for soil and groundwater protection was introduced (a policy field given a basis in law somewhat later than many other environmental sectors), whereas in the United States, the New Federalism was able to hold of similar developments. This reluctance to legislate for groundwater protection can even be found in Florida's state legislation. However, that reluctance may also be partly explained by a lack of state authority to control land use, a topic we return to later.

There is no such reluctance in the field of drinking water quality and protection of surface water, but regulations in these areas have far fewer direct consequences for the ownership rights of individual citizens. At the federal level, the Safe Drinking Water Act (1974) creates the basis for setting quality standards for drinking water. The Clean Water Act (1977) sets a number of quality standards on discharges to surface waters. Florida has a much longer tradition of legislation to protect water quality.[1] Although the Florida legislature has always amended its own water legislation to keep it in agreement with federal legislation, the state has also acted early on its own responsibilities. In an attempt to classify the U.S. states according to

[1] In 1916, a Pollution of Waters Act was passed in which the state set out its own responsibility for public health, and in consequence for the quality of the drinking water supply and the discharge of sewage and effluents. In 1967, this act was followed by the Florida Air and Water Pollution Control Act. It was supplemented in 1972 by the Florida Water Resources Act and in 1977 by the Florida Safe Drinking Water Act.

their degree of state dependence on federal grants designed to support environmental programs, Davis and Lester (1989) assigned Florida to the group of states that "have developed strong institutional capabilities and are not heavily dependent upon federal aid for implementing state environmental programs. In this instance, states rely on their own fiscal resources, political institutions and state policy formulation in the environmental area. They have established themselves as leaders in the environmental sphere and have often enacted environmental standards that exceed national standards" (Davis & Lester 1989).

If we compare the federal level of government in the United States with that of the EU, one clear difference is that the EU (and its forerunner, the European Economic Commission [EEC]) has issued directives on water policy that the member states are compelled to implement in their own national legislation within a certain period of time. Here, too, these directives are directed primarily at maintaining the quality of drinking and surface water in the Union.[2] However, the EU took a clearly different path from the United States in 1991 when the Nitrate Directive was issued. The purpose of this directive is to reduce water pollution by the application and storage of inorganic fertilizers and manure on farmland. It is aimed at both safeguarding drinking water supplies and preventing wider ecological damage in the form of eutrophication of freshwater and marine waters in general (Haigh 1992). With this directive, the EU not only takes on the regulation of farmland at supranational level, but adds the argument that such regulation, besides safeguarding the quality of drinking water, also serves wider ecological interests.

If we compare the Netherlands as a member of the EU with the position of Florida previously described, we see a clear similarity in that the Netherlands has not waited for European initiatives, but has developed its own legislation on water quality at an early stage. The Netherlands, like Florida, has adopted a proactive stance over the years.[3] But here, too, a substantial difference between the two states arose in 1987, when the Soil Protection Act came into force in the Netherlands. This act regulates the quality of the groundwater, not only to protect water resources used for the

[2] In general, these directives are of two basic types: either they concern water use and are designed to protect the quality of water intended for particular uses, or they concern water pollutants and are designed to control the emissions of particular pollutants to water (Brand, Hanf & Lipman 1998).

[3] Since 1957, drinking water quality in the Netherlands has been regulated by the Water Supply Act; since 1970, the quality of surface waters and discharges to surface waters has been regulated by the Surface Water Pollution Act; and since 1954, the abstraction of groundwater has been regulated by the Groundwater Act (which was amended and extended in 1984 and is comparable to the "consumptive use permitting" under the Florida Water Resources Act of 1972).

supply of drinking water, but also to secure wider ecological protection. Moreover, this act allows restrictions to be placed on the use of farmland in the form of a set of fertilization standards. The intention is to implement the EU Nitrate Directive at the national level through these fertilization standards. And this is the fundamental difference with the situation in Florida, where both the federal and state authorities have no opportunity to regulate the use of farmland in order to protect groundwater quality.

In the United States, government decisions that affect farming practices, such as land-use decisions, are by definition sensitive. The Florida legislation contains principles that grant freedom to adopt agricultural practices as long as they do not lead to contamination of the 'common waters' beyond the permitted standards. The state can intervene only when agricultural pollution of the "common waters" occurs. Even then, individual farmers can be held liable only if this pollution can be traced back to them. Although there is no right to pollute, farmers may not be hindered in running their farms. As long as farmers adhere to "best management practices" and follow the instructions on the pesticide packaging, they are indemnified against liability for any damage. The Florida Right-To-Farm Act (823.14, Florida Statutes) even restricts nuisance suits against farmers by providing that no farm will constitute a public or private nuisance after one year of operation, if it was not a nuisance when established.[4]

Our conclusion is that there is a substantial difference between Florida and the Netherlands regarding the possibilities created for centralized regulation of farmland and farming practices intended to protect groundwater quality. We now examine to what extent evidence supports this conclusion. In doing this, we delve deeper into some of the issues touched upon in the second section of the chapter.

10.3.2 Regulation of target groups: specific versus generic legislation

The main feature of the groundwater protection policy in the Netherlands is that in 1987, generic national legislation was introduced that prescribes the amount of nitrate that may be applied to agricultural land. In 1989, generic national standards on nitrate applications were supplemented by regional generic standards (created by the provinces) that apply to groundwater protection areas. These standards define the maximum amount of manure that may be spread onto agricultural land, depending on the type of farmland in question. The standards are expressed in kilograms of phosphate per hectare per year, and different standards apply to three types of land: arable

[4] Change of ownership does not affect the provisions of the act. However, the act does not extend protection to unsanitary conditions and health hazards or changes of use, either in type or intensity (Olexa & Carricker 1992).

land for maize cultivation, grassland, and other arable land. Initially, the standards covered only phosphate, but in the 1990s, nitrogen standards were also introduced. A feature of the Dutch policy, therefore, is the choice of a generic regulation with limited differentiation according to geographic and hydrological conditions; this is seen to be a way of treating farmers equally in law. This policy takes into account three environmental problems that stem from the same source: (1) the emission of ammonia from manure spread on the land, which contributes to acidification of the environment; (2) leaching of phosphates from manure spread on the land into ditches, which results in the eutrophication of surface waters; and (3) leaching of nitrogen from manure into groundwater, which leads eventually to nitrate levels in excess of the quality standard. Nitrate standards for drinking water form part of the argument for setting these manure standards. In the Netherlands, therefore, the standard for nitrate in drinking water not only applies to the suppliers of drinking water, but also forms the basis for a set of generic standards that place restrictions on agricultural practices (Kuks 1998a, 1998b).

It is characteristic for groundwater protection policy in Florida that no similar generic standards exist. The state of Florida, on its own initiative and without pressure from the federal government, has translated the nitrate standard for drinking water into an equally stringent nitrate standard for groundwater covering the whole state. This is comparable to the EU directive covering nitrate in groundwater, which is applicable to the whole of the Netherlands (and the shallow groundwater zones). But the scope of this standard goes no further than a generic environmental quality standard, with no direct consequences for individual farms. It may appear that Florida has chosen a much more generic policy than the Netherlands, but the Florida standard can be made operational only by legally demonstrating that emissions from an individual farm are responsible for excessive levels of nitrate in the groundwater. Proving a direct link is very difficult, because it is almost impossible to demonstrate that certain concentrations of nitrate in groundwater are due to leaching from specific sources. But a more fundamental feature of the policy is that the standard implicitly differentiates between specific conditions on each individual farm. Nitrate from any one farm becomes a problem only after the local soil and hydrological conditions have done their work. This is not the only example of a regulation in which specific conditions are expressly taken into account; it illustrates a much wider tendency within Florida governance in the field of groundwater protection. This has several significant implications.

The first implication concerns the way monitoring data on groundwater quality are used. In an evaluation of the Ground Water Quality Monitoring Program, which has been running since 1983, DeHan found: “Since the

publication in 1992 of the report on data collected between 1984 and 1988, there has not been a written analysis of data collected since that time. The program currently does not have solid strategies for developing a summary report on each monitoring cycle that would aid, especially the non-technical users in making decisions" (DeHan 1995). It has not been possible, therefore, to draw any policy-relevant conclusions from the data collected. "The 1984-1988 sampling cycle identified 18,861 instances where contaminant levels exceeded water quality standards. Although this figure represents only 2.5 per cent of incidents documented (thus indicating a 'good' background water quality), the program does not have the strategies to trace these contaminants to their sources or to track their movement and fate." This means that only the bare facts have been registered, without any conclusions about the source or the effects of the detected contamination. When considering the level of funding, the authority that commissioned the program was not aware of the limited results that could be achieved with the money available.[5] Also, licensing authorities do not make use of the data generated by the monitoring program because the data do not make a sufficient link to the source of the pollution and because the monitoring program focuses primarily on the deep groundwater.[6] The author of the report concludes that "data will have to be extremely site-specific and source specific to be of any use to regulatory (permitting) or policy decisions by local, regional ore state agencies" because it would be too easy to mount a legal challenge to a land-use decision.[7]

[5] "The 1995 audit [of the program] reported that the Department's evaluation of program achievement does not provide any assessment of the effectiveness of the groundwater quality monitoring program activities. Consequently, neither the Department nor the Legislature is able to evaluate program accomplishments in relation to the budget request as intended."

[6] In interviewing district water facility administrators and their staff about the utility of this program to their daily activities, none of them could recall a case where program data were used to augment their permit evaluation needs. [...] Those who were familiar with the ground water monitor networks cited the fact that the majority of network wells were deep Floridian wells that did not reflect impacts of permitted facilities on shallow or surficial aquifers water quality. Another reason mentioned for the limited utility of monitoring network data is one of scale. The fact that the network is designed to obtain an idea of the regional impact of land use was described as being of "little use" to the permit writers.

[7] According to the report, there appear to be two cases in which groundwater monitoring data have had consequences for the policy pursued. "The GWIS [the database containing all the monitoring data] has contributed to the identification of regional groundwater contamination in two areas of the state (Polk county and Suwannee River Basin) for contamination with bromacil and nitrates, respectively. These findings have been useful in generating regulation by DACS (agriculture department) prohibiting bromacil use in certain highly permeable soil types. The nitrate findings have resulted in closer coordination between DEP (environment department), DACS and the Suwannee River Water Management District in developing agricultural and dairy Best Management

A second implication, concerning pesticide policy, illustrates the tendency in Florida to take more account of specific circumstances in its regulation of policy target groups than the Netherlands. We should first note that the way in which pesticides are approved for use (on the market) in Florida and the Netherlands is roughly the same. However, in the Netherlands, an additional policy was introduced by the Multi-Year Crop Protection Plan in the form of a voluntary agreement, or covenant, with the agricultural sector. The settlement aims at a decrease in the structural dependence on pesticides for crop protection and a general reduction in the use of pesticides. Besides these generic goals, the plan contains more specific objectives for the year 2015. First, the overall use of pesticides has to be reduced by 50 percent by 2000 (compared with the amount used in 1987). Second, harmful pesticides must be removed from use.[8] In fact, pesticides with the potential to leach into the groundwater must be reviewed for registration. It has been left to the sector itself to determine how to reach these goals (Kuks 1998a). In Florida, such a generic approach geared to banning pesticides or achieving a general reduction in the use of pesticides does not seem feasible. In an interview by the author, the senior civil servant responsible for the pesticide policy from the agriculture department (DACS) in Florida observed: "We shy away from a percentage in reduction. The numbers don't say something about a reduction in risk. With the variety in commodities you have big variety in crops. It is more important to work on several risk reductions. There are a lot of variables that we can't control, and that is influencing the effects. There is never one overall best management practice." In short, the pesticide regulations make distinctions according to crop and type of application. Instead of generic goals for pesticide reduction, a holistic approach has been chosen in the form of integrated pest management geared to safer use, but not a ban on pesticides.

A third implication emphasizes Florida's tendency to take more account of specific circumstances than occurs in the Netherlands. This concerns the decision to regulate nitrates in covenants with the agricultural sector that define best management practices (BMPs). These covenants are made with the target groups and signed by the departments involved (DACS for agriculture, DEP for environment, DHRS for public health), the relevant commodity groups (organizations that represent specific agricultural

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Practices (BMPs)." The monitoring report, however, puts the value of monitoring data in these types of case into perspective by quoting one frustrated interviewee who complained that "all that resulted from these cases was recommendations for BMPs which must once again be site-specific. Did we need to spend millions of dollars to tell us that agriculture generates nitrates and pesticides that demand better management practices that must be site-specific to be effective?"

[8] Indicators for the predicate "harmful" are "underground mobility," "persistence" (degradability) and "toxicity" (how harmful they are in an aquatic system).

sectors), and the Florida Farm Bureau as general representative of the agricultural sector. The basis for these covenants is the Nitrate Bill, introduced in 1993 (adding Chapter 576 to the Florida Fertilizer Law). When individual farms sign a BMP covenant, they agree to comply with best management practices in exchange for exemption from liability for any groundwater pollution originating from their farm. In effect, the farmers receive a 'waiver of liability' in return for a commitment that does not place any firm restrictions on farming practices, but is intended to bring about the most effective possible use of nitrates and pesticides by the farmers. Detailed specifications for achieving this are drawn up first in the form of separate documents for each farm type (citrus growing, fruit and vegetables, and so on). Within each BMP, there are further opportunities to elaborate to suit individual farms and specific soil conditions. An attempt was also made in the Netherlands to prevent any further tightening of the nutrient standards, which were actually needed in order to meet the requirements of the EU Nitrate Directive. A system of nutrient accounting was introduced in which farms attempt to reduce the application of nutrients through more efficient farming practices, but the EU considered that this system relied too much on intent rather than on results, and consequently found it to be inadequate (Kuks 1998a).

10.3.3 The position of the Environment Department: weak versus strong political commitment

We originally proposed that there is a dominant difference between use of land in the Netherlands regarding centrally regulated agricultural use of land and farming practices to protect groundwater quality. We have made the case that in Florida, there is a greater tendency to draw up regulations for specific conditions than to establish generic measures. The assumption is that centralized regulation goes hand in hand with generic measures. In this section, we expand in a different direction on our original proposition: we argue that environment departments in Florida and the Netherlands have different political positions and, consequently, differ in their ability to control events.

In the Netherlands, the environment and agriculture ministries have long operated independently of each other. The environment ministry tried to get the manure problem into the political agenda in the 1970s, but didn't succeed until 1984. Until then, the agricultural sector, working closely with the agriculture ministry and farmers' representatives in key political positions in an "iron triangle," could ignore the problem. However, the Dutch agriculture ministry had recognized the problem much earlier and had attempted to prepare draft legislation with cooperation from its own natural constituency,

while expressly keeping the environment ministry out of the discussion. Meanwhile, the environment ministry was preparing its own manure legislation as part of a new integral soil protection act. When both ministries proposed their own draft legislation, political pressure was put on them to work together. In 1982, a strong political figure was appointed as the new environmental minister. He gave his ministry considerable political clout, and from that time, the environmental issue was tackled more as a management issue, and the environment ministry developed a more cooperative attitude toward the target groups in society. Partly because of this, the two ministries were able to reach a compromise in 1984 in which they agreed to continue both legislative processes but to link them together.

From that moment, the environment ministry developed the Soil Protection Act, which formed the basis for the standards concerning the application of manure on agricultural land to protect the soil and, indirectly, the air, surface waters, the groundwater, and, ultimately, drinking water. The agriculture ministry developed the Manure Act, which was primarily geared to dealing with the surplus manure that would result from these application standards. The act also contained preventive measures based on innovative agricultural practices designed to reduce the amount of manure produced. Both laws were passed in 1986, and from that moment, the level of cooperation between the two ministries has grown. Both ministries have created departments to further shape cooperation between environment and agriculture through a series of detailed discussion. From 1984, the environment ministry (VROM) has gained and held position from which it can exert increasing influence over environmental legislation aimed at the agricultural sector. Moreover, agriculture has come under increasing pressure from the environmental legislation. In 1995, this resulted in both the agriculture and environment ministries forcing the livestock farming sector to reduce the volume of manure it produces (Kuks 1998a).

Florida in the same period experienced growing cooperation between the environmental department (Department of Environmental Regulation, DER, after 1993 called Department of Environmental Protection, DEP) and the agricultural department (Department of Agriculture and Consumer Services, DACS). Like the Netherlands, this cooperation in Florida originates from an authority conflict, in the first instance regarding not the regulation of nitrates but rather the regulation of pesticides. In 1982, officials discovered that drinking water wells had been contaminated by the commonly used pesticide Temik. These discoveries led the state's Commissioner of Agriculture to ban use of the pesticide temporarily. In the summer of 1983, more drinking water wells were discovered to be contaminated by a pesticide called EDB (ethylene dibromide), a substance in common and extensive use for at least 20 years, even by the Florida Department of Agriculture and Consumer

Services itself, as a nematocide in commercial citrus groves. Again, the Commissioner of Agriculture was stirred to action and banned use of the chemical.

The Florida legislature addressed many of these pesticide problems in the Water Quality Assurance Act of 1983, which was conceived to assure to the greatest extent possible the future protection of the quality of Florida's water resources. The Water Quality Assurance Act (WQAA) gave the environmental department almost $120 million, principally for the creation of new programs to help preserve the quality of the state's waters. It created within the department more than 100 new positions and the need to promulgate scores of new rules to interpret new statutory language (Fernald & Patton 1985). The WQAA gave DACS primary authority for review and regulation of pesticides, with DEP relegated to a review-and-comment role. DACS became the state leading agency for pesticide regulation,[9] and a Bureau for Pesticides was established at DACS. Also, a nine-member Pesticide Review Council was created within DACS and charged with reviewing data on restricted-use pesticides that are presently registered in the state, and reviewing all applications for registration of restricted-use pesticides. Procedures were established for requiring field testing of restricted-use pesticides in Florida under criteria developed by the state. The final determination of whether a restricted-use pesticide should be registered in Florida lies with DACS (Olexa & Carricker 1992). In the meantime, DEP reacted to the highly visible issue of pesticide discoveries in groundwater by creating a pesticides section. At that time, questions were asked, by both DACS and the industry, about DEP's jurisdiction on pesticides and agrochemicals in general. DEP countered that it (not DACS) was responsible for water quality deterioration by contaminants, to which DACS responded that pesticides and fertilizers were beneficial products, not contaminants, and that contamination results only from the misuse for which they were solely responsible. DACS felt that DEP's need for involvement in agricultural issues could be satisfied by DEP membership on the Pesticides Review Council (PRC) (DeHan 1995). In 1985, this provoked both departments to sign a Memorandum of Mutual Understanding on how to deal commonly with pesticide issues, making it possible for DACS to use DEP's authority (DEP is collecting data, and the regulatory part is turned over to DACS).[10]

The same sort of process happened after discoveries around 1989 of unacceptable levels of nitrates in groundwater. DEP wanted to create a

[9] Similarly, DEP had been entitled to be the state leading agency for drinking water regulation since 1977, with the Florida health department (DHRS) relegated to a review-and-comment role.

[10] In 1986, discovery of EDB and Aldicarb in groundwater also got the health department (DHRS) involved in the pesticide registration process and the Pesticide Review Council.

database on nitrate contamination in an effort to prepare regulations to minimize the impact of nitrates on drinking water quality. DEP could use its authority to delineate areas with groundwater contamination where consumptive water use would be subjected to permitting by the five regional water management districts (WMDs). DACS, on the other hand, fearing too much control over the nitrates issue by DEP, wanted to assert its own authority on basis of the existing Fertilizer's Act. However, this act didn't provide a basis for regulation of nitrates. In 1992, an Agriculture Water Policy Group was created within DACS to handle nitrates issues and to establish a focal point for cooperation with DEP and the WMDs. Although DEP remained statutorily responsible for exercising oversight over the WMDs, DACS got unofficially involved in the control over the WMDs from this moment on. A high official of DEP, responsible for dealing with the WMDs, even moved to the office of the Commissioner of Agriculture to continue the same kind of work in another department.

In 1993, the Nitrate Bill, added as a new chapter to the Fertilizer's Act, placed the statutory responsibility for fertilizer regulation, like the responsibility for pesticide regulation, in the hands of DACS. So, DACS also became the leading state agency for that. The Nitrate Bill made it possible for farmers to agree on so-called best management practices for their farms in order to get a waiver of liability for unacceptable levels of nitrate emissions (coming from their farming practices) to groundwater. The Nitrate Bill also established more involvement for the WMDs, by creating a participatory role for them in the Pesticide Review Council. In 1994, the Office of Water Policy was established at DACS close to the Commissioner, to have a more formal basis for reviewing the role WMDs are playing in agricultural issues. Also in 1994, the rivalry between DEP and DACS on nitrates issues resulted in another Memorandum of Mutual Understanding on how to deal with nitrate BMPs. Both departments agreed on implementation of the Nitrate Bill through voluntary agreements with farmers (prepared through negotiations with farmer commodity groups and developed on the basis of research), allowing farmers to choose between a liability for groundwater emissions (leaving the burden of proof to DEP) and a waiver of liability together with BMPs; DEP offers the waiver of liability, and DACS implements the BMP-program.

Comparing the Florida and Dutch cases, there seems to be a remarkable difference of political interest in an effective groundwater protection policy at the state or national level. Especially if we look at the position and control capacity of both environmental departments, it is clear that the Dutch department (VROM) obtained a much stronger position in regulating farming practices for groundwater protection reasons, whereas in Florida,

DEP's role is much more restricted. There are at least four explanations for this weaker position.

First, the potential attention given to pesticides in the early 1980s and the passage of the Water Quality Assurance Act (WQAA) in 1983 was driven by bad publicity about Florida's pollution problems, including embarrassing stories in *Time* and *Sports Illustrated*.[11] Several politicians saw opportunities in such public attention and quickly associated themselves with the movement for environmental action. In contrast to the legislature's overwhelming support for the WQAA itself, there was deep disagreement over how to fund the law. Although 1983 was "the year of water quality," funding from general revenues could easily be cut back in following years, when legislature's attention focused on other hot issues. After 1983, there where few dramatic, visible disasters to keep the issue in the spotlight, and other pressing public issues - drugs and crime, for example - drew media attention in subsequent years (Williams & Matheney 1995). Although the WQAA has strengthened DEP's position as the state's leading agency for drinking water issues, the act appeared to be a symbolic gesture by the Florida legislature. Only temporary budgets for monitoring activities were provided, and the WQAA was headed mostly for cleanup activities, not so much for preventive policies and not at all for a prevention-oriented regulatory approach. In the United States, political attention for environmental control is often driven by media attention. Many states lack the technical resources to develop numerical standards for groundwater contaminants and, instead, depend on evidence of environmental damage or public health risks before acting to control these substances (Rosenbaum 1995). Also, Cahn (1995) thinks that as a result of high public anxiety over water pollution, policy elites have marketed water policy as bold regulation, satisfying public demand, though the policies themselves are problematic: enforcement is feeble and discretionary, standards are weak, and only a fraction of waterborne pollutants are monitored.[12] In Florida, the creation of a pesticide section in DEP in response to publicity surges caused by aldicarb,

[11] Williams and Matheney (1995: 127) describe how the *Time* cover story was particularly damaging. Entitled "Paradise Lost," it chronicled not only environmental problems, but ethnic strife and drug and crime problems as well. *Sports Illustrated*, in analyzing Florida's daunting water problems, suggested that drinking from the tap in the Sunshine State was like hooking up the kitchen faucet to the toilet.

[12] Cahn (1995: 75-80) is comparing the symbolic aspects of water policy to those of air policy. "Both followed mass public demand for improved environmental conditions. And both air and water policies were enacted with strong standards and strict deadlines – even though few legislators expected compliance. Clean water policies focus on establishing standards requiring expensive control technologies and then inviting voluntary compliance, resulting in what can only be called regulatory stalemate."

and later on by EDB, is regarded as an example of management by crisis abatement instead of planning (DeHan 1995).

Second, nitrates didn't get the media attention given to pesticides. Pesticides seem to be more threatening to people, and most of the concern has been about dangerous and badly managed pesticides, whereas nitrates seem relatively innocuous. The nitrates issue also came up in a different context (separate statutes, separate programs). For example, there is no federal vehicle for nitrate regulation, like one for pesticides, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), or the nitrate directive for groundwater in the EU. In the late 1980s and early 1990s, DEP was also struggling with its regulatory image: many people (especially farmers) in Florida were sick of public regulations, the get-off-my-back syndrome. DEP was desperately seeking nonregulatory actions and preferred voluntary programs. Therefore, DEP felt itself dependent on DACS for getting a fertilizer policy accepted by the farming community.[13]

Third, even though DEP is statutorily responsible for exercising oversight of the WMDs, the department is faced with the political and financial reality of WMD independence. The WMDs started as early as 1984 on the issue of nutrients as a result of the SWIM Act (Surface Water Improvement and Management Act). Since that time, they have been a principal agency in management of surface water and land use; every agricultural operation that expands has to have a permit from a water management district. Thus, a very clear distribution of authority has grown through the years, in which DEP and the WMDs are both natural-resource oriented, but with DEP's authority restricted to regulating water quality, whereas the WMDs regulate on-site operations, such as water well construction, water use, and land use. Only DACS (because it is industry oriented) is entitled to regulate farming operations. With this distribution of authorities, it is very hard for DEP to prove cases of groundwater contamination caused by farming practices. Even for the delineation of contaminated areas, with the purpose of preventing consumption by residents of contaminated water, DEP is dependent on the WMDs. Centralization of the authorities attributed to the lower administrative levels is still controversial, both in respect to whether the WMDs are taking over authority that has been originally in the hands of

[13] In an evaluation of the Ag Source and Water Well Management Section within DEP, it was stated that DEP is playing second fiddle to DACS, which is the department statutorily responsible for pesticide and fertilizer regulation in Florida. The effectiveness of DEP is considered to be limited because of the placement, by the Legislature, of the nitrate BMP research responsibility in the hands of DACS; and because the responsibility for drafting, development, and implementation of the Pesticides and Groundwater Management Plan required by EPA is in the hands of DACS; and because the Pesticides Review Council is only an advisory body to the Commissioner of Agriculture and DEP is only a participating member (DeHan 1995)

the counties and whether the state is taking over authority originally in the hands of the WMDs.[14]

A fourth indication of Florida DEP's weaker political position concerns institutional imagery. Although the department is rather proactive in developing environmental policy programs compared to the other U.S. states, and has a good record in developing environmental policy programs compared to the other U.S. states, DEP's image seems to be that it doesn't believe in cost share or incentive programs; that it strongly prefers regulatory policies, although it lacks the requisite funding sources and staff; that it is occupied with paperwork; and that it is more concerned with domestic and industrial waste. DEP has a bad image, especially among farmers, because it allegedly prefers traditional regulatory and enforcement policies. The lack of financial means for implementation (as we described before) also creates relatively lower salaries and lower status for DEP employees, compared to similar positions in neighboring states (Alabama and Georgia) as well as to similar positions of county or city environmental officials. We also noticed already that the department lacks a commissioner or cabinet officer to make it more politically influential.

10.4 Conclusion: Three mechanisms by which the dominant method takes effect

In addition to a number of clear similarities regarding the distribution of governance between the various administrative levels, we have seen dominant differences between Florida and the Netherlands regarding the possibilities for central regulation of agricultural land use and farming practices to protect the quality of groundwater. In the United States and Florida, land-use decisions are primarily seen as belonging within the competence of the lowest, or most local, tier of government (counties and municipalities). The federal government and the state of Florida have hardly any influence over land-use decisions, but at the regional level, the growing restrictions being placed on land use by water management districts are controversial. In contrast, we have seen that there is active intervention from the center in groundwater protection issues in the EU and the Netherlands, involving restrictions on the use of agricultural land and on farming

[14] On the other hand, both tendencies could be noticed. We have mentioned already that DACS is trying to get more control over the WMDs. DEP is having more problems with that. For example, in 1988, the federal government (EPA) sued the WMD South to better protect the Everglades by regulating agricultural practices in the Everglades Ag Area, south of Lake Okeechobee, which actually should have been done by DEP. This case is referred to as the Everglades Ag Case.

practices. In Florida, intervention from the center is permitted only to the agriculture department and then only with incentives, not restrictions (through the use of voluntary agreements on best management practices). The environment department can achieve something in the agricultural sector only if it adheres closely to the structures of the agriculture department. In contrast, over the years, the agriculture ministry in the Netherlands has had to defer to the environment ministry and has gradually accepted restrictive measures imposed on farmers, despite the presence of an influential agriculture lobby in the Netherlands, as in Florida. The Dutch environment ministry receives much more political support and guidance than the environment department in Florida.

In Florida, the environment department's powers are limited primarily to setting quality standards for drinking water and, in cooperation with the water management districts, to delineating vulnerable water abstraction areas. The environment department has been able to strengthen its position in this policy arena in relation to the agriculture department mainly because of a number of major incidents of groundwater contamination during the 1980s. These attracted much media attention and threatened the image of Florida's main tourist attraction, its undamaged and exceptionally varied wetland ecosystem. The public demand for action following these incidents, however, resulted in partly symbolic policy: a temporary financial injection for monitoring activities and curative policy response (cleanup program). Little in the way of preventive policy came out of it. We also saw how the centralized approach in Florida is hampered by a fragmented water supply system, with many individual and small-scale drinking water suppliers. This situation has led to a policy in the first instance geared to implementing curative measures to protect public health and much less concerned with preventive measures. Moreover, centralization of water management in Florida, in which the autonomy of the counties is restricted by the water management districts and that of the water management districts by the state, is controversial. Because all the water-supply systems in the Netherlands are large in scale, more attention is paid to safeguarding water resources for the future, and so the policy has a preventive character. We also noticed that in Florida, there is a tendency for regulations to be highly specific to certain conditions and, in contrast with the Netherlands, generic measures are avoided.

A tendency toward a centralized approach seems to be a crucial difference between Florida and the Netherlands. This difference manifests consistently not only through the governance subsystem at each of the four intervention points, but also within a governance system from one element to another. This suggests a feature that typically leads to adjustment between elements of a governance system, thus giving that system a genetic imprint.

It is also interesting to examine which mechanisms are at work during this process.

We stated that our main assumption rested on three secondary assumptions. The first assumption is that adjustment arises from the tendency of actors to act from a set of constant values. In Florida, this mechanism relates primarily to the value placed on freedom; the equivalent in the Netherlands is the value placed on community spirit. Of course, this is a relative difference. For example, in Florida, this value is expressed in the many small-scale water-supply systems and by an aversion to public utilities. It is also expressed as an antigovernment sentiment and a dislike of generic regulations. This weakens the position of the environment department and forces them to take a voluntary incentive-based approach, and it leads at all levels of government to measures geared to specific conditions. It is also expressed in the different meanings attached to the administrative concepts of New Federalism in the United States and subsidiarity in the EU. New Federalism recognizes the autonomy of local politics and believes that centralized levels of government add little value. Subsidiarity, in principle, recognized collective values and states that collective decisions should be taken at the level at which the common interest is served, and accepts the limitations this view places on individual autonomy.

The second assumption is that adjustment arises from the tendency of actors to use a common frame of reference to interpret cognition. In the case study, this mechanism mainly relates to the way the policy problem of "groundwater contamination by pesticides and nitrates" is interpreted. In Florida, this problem is interpreted mainly in terms of public health, which leads to a curative approach involving cleanup measures and defining water-abstraction areas where drinking water consumers can be regulated. In the Netherlands, the problem is interpreted mainly in terms of long-term sustainability, in which the concern is the need for a lasting, and thus preventive, solution. Water-abstraction areas, for example, are identified for purpose of ensuring extra regulation of activities that may be a source of pollutants. Preventive measures to control sources of groundwater pollutants are also implemented outside these areas.

The third assumption is that adjustment arises from the dependence of actors on each other's resources. Such dependence is clearly expressed in the demarcation of powers between administrative levels and between administrative actors. A striking feature in Florida is that the lower levels of government (both the counties and the water management districts) operate largely autonomously, whereas in the Netherlands, these layers of administration (municipalities, water boards, provinces, and national government) execute many of their tasks jointly. Moreover, in Florida, the ability of the environmental department to act remains limited to setting

environmental quality standards and their enforcement; there is little support for measures aimed specifically at target groups that go beyond a voluntary, incentive-based approach. The department is totally subordinate to the agriculture department or to the water management districts, certainly as far as agriculture is concerned or where control over land use is involved. In the Netherlands, the environment ministry has been able to break the power monopoly held by the "iron triangle" in the agriculture sector and has been accepted as an influential partner in the administration of agricultural affairs.

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Appendix 10.1
List of interviews for the Florida case study

Florida House of Representatives

Committee on Water Policy
John T. Mitchell (staff director)

Department of Environmental Protection

Office of Water Policy
Terry Pride
Tom Swihart

Drinking Water Section
Kenyon E. Carter
John R. Sowerby
Michael D. Leroy
Kenna Study

Ground Water Monitoring Section
Rick Copeland (administrator groundwater monitoring section)

Agricultural Source and Water Well Management Section
David S. Vogel (environmental administrator)
Mark B. Dietrich
Peter Wilkens
Crystal Steele
Charles A. Coultas
Subbu Kuchibhotla
Andres E. Kraul

Environmental Protection Agency (EPA / federal)

Region 4 (Atlanta)
Donald Z. Goode, Jr. (pesticides section)

Department of Agriculture and Consumer Services (DACS)

Office of Agricultural Water Policy
Charles `Chuck' C. Aller (director)

Division of Agricultural Environmental Services
Kenneth A. Kuhl (environmental administrator)
Richard Budell (assistant director)
Marion H. Fuller (chief bureau of pesticides)

Department of Health and Rehabilitative Services (HRS)

Environmental Health Program
Roger C. Inman (director environmental toxicology)
Juan `Pepe' J. Menendez (environmental health programs administrator)

Environmental Groups

Independent
Kerry Dressler (member Pesticides Review Council)

Legal Environmental Assistance Foundation (LEAF)
B. Suzi Ruhl (president)
Andrew Jubal Smith (staff attorney)
Lance H. Jepson (technical advisor)

Sierra Club Legal Defense Fund
David G. Guest (managing attorney)

Water Groups

Florida Rural Water Association
John Martineau (ground water technician)
Garry Williams (executive director)

Farmers Groups

Florida Farm Bureau Federation
Philip L. Leary (director local governmental affairs)
W.P. 'Pat' Cockrell (director agricultural policy)

Berry Company (citrus company in Winter Haven)
Ernie Caldwell (vice president government and environmental affairs)

Florida Nurserymen and Growers Association
Earl Wells (executive vice president)

Florida Fruit & Vegetable Association
Daniel A. Botts (director environmental & pest management division)
H.F. 'Butch' Calhoun III (assistant director environmental affairs)

Florida Citrus Mutual
Joseph J. Gleason (vice president, staff legal counsel)

Florida Peanut Producers Association
Amanda McKoy (executive director)

Highlands County Citrus Growers Association
Dan Foley (executive director)

Institute of Food and Agricultural Services (IFAS / University of Florida)

Food and Resource Economics Department
Roy R. Carriker (professor)

Soil and Water Science Department
Arthur G. Hornsby (professor & extension specialist)
Susan W. Williams (coordinator florida farm-a-syst program)

Home Economics Department
Mickey E. Swisher (associate professor)

Water Management Districts

South West Florida Water Management District
Paul W. O'Neil, Jr. (director technical services)
Charles H. Miller (chief regulation engineer)
Anthony E. Gilboy (manager well construction regulation)
Steven W. Desmith (water use permitting)
Eric P. Eshom (well construction regulation)
Steve Camp (well construction regulation)
Gardner Strasser (well construction regulation)
Kenneth A. Weber (chief regulation geologist)

South Florida Water Management District
Terrie A. Bates (director regulation department)
William C. Donovan (civil engineer regulation department)
Jeff Rosenfeld (supervising professional regulation department)
David Gilpin-Hudson (senior planner planning department)
Emily E. Hopkins (senior hydreologist planning department)

St. Johns Water Management District
Kathryn Mennella (secretary assistant general counsel)
Jeffrey C. Elledge (director department of resource management)
Carol Fall (technical program manager)
James M. Frazee, Jr. (hydrologist IV)

Suwannee River Water Management District
Marvin E. Raulston (water resources planner)
David Still (director resource management)
Donald C. Jensen (water management liaison / department of environmental protection / office of water policy)

Northwest Florida Water Management District
Douglas E. Barr (executive director)
Robert D. Wright (associate regulatory administrator)

Counties

Alachua County
J. Chris Bird (director environmental protection department)
Robin R. Hallbourg (natural resources program)
Richard J. Burges (supervisor natural resources)

Jackson County
Bill Dean (public health unit)
Sharon Pumphrey (public health unit)
T.G. Harkrider (public health unit)
H.E. 'Ed' Jowers (cooperative extension service)
Kenneth M. Griffith (cooperative extension service)
Bob Nix (community development director)

Highlands County
Roger L. Christopher (director environmental health division)
Jim Polatty (development services director)
June Fisher (planner planning-zoning-building departments)

University experts in the field of US and Florida environmental policy

University of Florida / Center for Governmental Responsibility
Richard Hamann (attorney)
Jeffry S. Wade (director environmental division)

University of Florida / Department of Political Science
Albert R. Matheny (associate professor environmental policy)
Walter A. Rosenbaum (professor environmental policy)

University of Florida / Center for Wetlands & Water Resources
Mark T. Brown (associate research scientist)

University of Georgia / Department of Political Science
Laurence J. O'Toole, Jr. (professor political science)

Part four

Market forces in water governance

Chapter 11

The public private divide in the governance of water services

11.1 Introduction

Privatization of Dutch water services has been and still is a huge debate in the Netherlands. This debate really started in 1997 with a report by the Dutch Ministry for Economic Affairs on privatizing water services. This report concluded that privatization could reduce the price of water services by at least 10 percent (Dijkgraaf 1997). The industrial sector and the privatized energy utilities (especially those who want to become a multi-utility) were very much in favor of this idea. Important opposition came from the water sector itself (drinking water supply companies and the water boards who are responsible for wastewater treatment) as well as from the Dutch environmental ministry. Their argument is that small water consumers (households) should be protected by the lowest prices possible and that public ownership is a better guarantee for that. Another argument is that public companies and utilities are taking the environmental side-effects of water supply and waste water treatment more seriously. Together with water services, environmental services are also being produced, included in the water supply and water treatment prices. Only for big water spenders and waste water producers (mainly large and medium sized industries) a liberalization of the water market is accepted. In 1999 the Dutch cabinet decided to protect the public water sector in the short run by forbidding privatization of water services concerning households and small industries. Another actual turning point in the privatization debate is that an authoritative council of the Dutch government (the Netherlands Scientific Council for Government Policy) has advocated that we should not proceed so quickly in privatizing utility sectors and we should reconsider the public interest (WRR 2000).

Before looking more closely at the Dutch privatization debate, we first want to clarify in section 11.2 how the Dutch water sector is organized with

respect to the provision of water services. We distinguish between a water systems perspective and a water cycle perspective. In section 11.3 we show that in addition to their operational services, the various elements in the water cycle also deliver public services. If the activities of the water cycle are divested, commercialized or privatized, the public sector should think very carefully about whether and how these public services are going to be maintained. Moreover, one of the features of a cycle perspective of the water sector is to ask what form of synergy can be generated by cooperation between water supply companies, municipalities and water boards. This issue cannot be considered independently of other developments in the water sector. To address this, section 11.4 examines the increasing scale of operations in the water sector, the significance of technological progress, the formation of multi-utilities, the political preference for greater market freedom in the 1990s, the exemplary function of the French and British models in Europe, and the introduction of benchmarking and customer differentiation. Section 11.5 discusses how these contextual developments have stimulated parties in the water cycle to cooperate. In addition to the public performance and the efficiency performance of water services, a commercial performance is distinguished. In section 11.6 we evaluate market forces in terms of those three performance types. In section 11.7 we discuss how privatization of public services and market forces in the public sector are assessed by other authors in the field of political science. We end with a conclusion on the Dutch privatization debate in section 11.8.

11.2 The Dutch governance of water services

For many years the water sector in the Netherlands has been familiar with thinking in terms of production and supply cycles, as well as in terms of systems. The term ‘water sector’ refers to that part of the public sector that has the administrative responsibility for water management. This covers a multitude of administrative organizations at the national, provincial, regional and local levels. A special feature of the water sector is that it has its own administrative level - the water boards[1] - separate from the three standard

[1] Like the provincial and municipal authorities, the water boards are also independent governing bodies. They have their own areas of authority. They can draw up regulations which citizens must observe and they can levy taxes. The difference is in the tasks. While provinces and municipalities are involved in various tasks of general significance, the water boards only have a concern for water management. They operate at a regional geographical scale (often smaller than a provincial area, but overlapping several municipalities). Their boundaries are determined by water sheds between regional river basins. The first water boards appeared in the Netherlands in the Middle Ages. By 1850 there were about 3,500. Mergers reduced this number substantially. In 2000 the

administrative levels (central government, the provinces and municipalities). In fact it is the only policy sector in the Netherlands for which separate functional administrative arrangements have been made in the constitution. This is not really surprising when you consider the role of water as the dominant natural phenomenon in the Netherlands. This significant European delta requires a distinct institutional arrangement for water. (Toonen & Glim 2000).

Water management works best when the administrative structures reflect the natural hydrological units. The law of 'communicating vessels' has taught us that an intervention in one water compartment, or vessel, has an effect on the next water compartment. This is the logic behind the coordination of administrative tasks in water management. It is the nature of water that it flows, and so it is best controlled when the interconnections between hydrological units are recognized. This *water systems perspective* is reflected in the importance given in the Netherlands to integral water management and the water systems approach, at least since the publication of the Third National Policy Document on Water Management (1989). Since then not only have integral water plans been produced at the national and provincial level, but the water boards have been expected to take an integral approach in their work. One of the implications of integrated plans is acknowledging the links between groundwater and surface water and between the quantitative and qualitative aspects of water management (V&W 1989). Since the publication of the Fourth National Policy Document on Water Management (1998) this integral approach also implies a link between urban and rural planning and the spatial requirements of water management. The problems of falling water tables (water shortage) and of flooding can often be traced back to the same basic problems: there is not enough space to store excess water and to retain water as a buffer for periods of water shortage (V&W 1998). This briefly sums up the systems perspective on water. It is because of this systems perspective that, through the water boards, water has its own voice and representation in the broader

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Netherlands was divided into 57 water boards. Water boards are charged with water quantity management tasks (flood protection by dike construction and maintenance, water level control, maintenance of waterways, water system protection) and water quality management tasks (construction and operation of waste water treatment plants, surface water quality protection and regulation). They are not responsible for drinking water. The water supply companies take care of this. Water boards work in a democratic fashion based on the so-called 'profit-payment-participation' principle. Farmers, estate owners, industries and inhabitants are the four distinguished groups having their own elected representatives in a water board. The costs of water quantity management are fully recovered by these groups (partly raised as a property tax). The costs of water quality management are recovered on basis of the 'polluter pays' principle (payment per pollution unit in waste water discharges).

political and administrative landscape. At the European level, the EU Water Framework Directive (2000) is also evidence of an emerging need for distinct functional authorities to coordinate water management within the larger river basins. The Dutch water board model is viewed as an example of how this could operate - in spite of the fact that the administration of water management tasks in the Netherlands is still considerably fragmented. In particular, the administrative responsibility for operational water management is split between the provinces, water boards and municipalities.

Viewed from a *water cycle perspective*, water management in the Netherlands is thought of mainly in terms of the logistical cycle needed to meet the demand for drinking water as a physical product. To meet this demand a whole series of links is needed in the production and supply cycle. These include water abstraction, the production of drinking water and its distribution via the water mains to customers (mainly households and industry). After the water is used, the cycle continues with the collection of sewage (via the sewers), its treatment and discharge back into the natural environment (often into surface water, sometimes by infiltration into the groundwater). Even though the cycle approach is based on the idea of integration, the responsibilities for the various links in the water cycle have traditionally been delegated to different actors. Water abstraction, drinking water production and distribution are mainly in the hands of the water supply companies.[2] The collection of sewage and maintenance of the sewers are municipal tasks. The responsibility for sewage treatment was given to the provincial councils by the Pollution of Surface Waters Act 1970, but most of the provinces have delegated this task to the water boards, and in a number of cases to water purification boards (special types of water boards that only have water quality management duties). A characteristic feature of the cycle perspective on the water sector is that the links in the cycle tend to be viewed as business activities which are suitable for divestment, commercialization or privatization (insofar as they are in public ownership).

11.3 Public performance and efficiency performance in the water cycle

The links in the water cycle are typical utility activities: water supply, sewerage and sewage treatment services have been established for the public

[2] These companies are a cross between a public-owned utility and a private company: the Public Water PLC (government-owned public limited company). Public Water PLCs are incorporated as private companies and are also subject to the rules and regulations governing commercial business. The majority of the shares, however, are owned by local or provincial government (Blokland et al. 1999).

good. The aim is to connect all dwellings, and the percentage of dwellings connected to the mains services in the Netherlands is now very high (more than 99%). These public utility services were originally established by public authorities, which most clearly appreciated the public benefits and took on the responsibility for providing them.

The first *water supply companies* were established by the urban municipalities.[3] Water supply companies for the smaller settlements and rural areas were established later, mostly by the provincial authorities. Through a series of mergers, usually at the instigation of the provincial government, many of these water supply companies have grown to a size where they supply a whole province or substantial part of a province. The justification for the directive role played by the provinces in stimulating and guiding this development was twofold. On the one hand was their desire to guarantee a supply of good quality drinking water at a reasonable price - for which 100,000 connections was considered a minimum size requirement for the supply companies; and on the other hand were strategic groundwater management duties, under which the provinces are the competent authorities for issuing permits to abstract groundwater for the production of drinking water. When assessing permit applications the provinces must take the limited environmental capacity of water resources into account. By exerting control over the abstraction of groundwater the provinces try to prevent the exhaustion of water resources, which leads to falling water tables. They also aim to increase the proportion of surface water used in the preparation of drinking water (Kuks 1998). The costs of abstracting, producing and distributing drinking water are expressed in the price the customer pays per cubic meter.[4] Distribution costs (the mains water network) make up the largest share of these costs. Water supply companies also face rising costs in meeting the quality standards for drinking water, either by having to invest in purification technologies or in preventing the contamination of water

[3] Sanitation has been a focus of water management since the early 20th century, when sewage and supply systems started to be constructed as public services, mainly at municipal scale. After World War II the infrastructure for sewage and water supply has gradually been extended to rural areas. In the 1950s the Dutch water supply became institutionalised by national legislation to guarantee a supply of good quality, in sufficient amounts and with affordable prices for all Dutch citizens. To achieve sanitation in terms of drinking water quality, the Water Supply Act of 1957 was adopted, introducing quality standards for drinking water. This act charged the provinces to organize the drinking water supply.

[4] Each water supply company is setting its own price. In the Netherlands the average price per cubic meter of drinking water is about € 1.15 as of 2000. Included in this price is a provincial levy, earmarked for groundwater conservation policies (about € 0.01 per cubic meter), and a national levy (about € 0.15 per cubic meter), earmarked as a green tax on groundwater as a natural resource and used as a general revenue for the national treasury (like the Dutch green tax of € 0.11 on fuel per litre).

resources in the first place.[5] A major achievement of the Dutch drinking water supply companies, compared with other countries, is that the water does not contain any additives.

Maintenance of the sewer system has always been a duty of the *municipalities*, and remains so. The municipalities took on the responsibility for public health, at first within the urban areas where adequate drainage and discharge of rainwater and sewage via a closed sewer system is crucial. Because sewers are laid under streets and roads maintained by the municipality it seems logical to give the municipalities a directive role in sewerage, and this is why municipal councils play a significant role in sewage collection and transport. They make use of their powers to issue discharge permits to determine the quality of sewage that is considered acceptable from the viewpoint of sewer maintenance (to prevent sewer pipes being damaged by certain substances or the degree of acidity of the sewage). They also exert an influence on the rest of the water cycle by deciding on whether rainwater runoff is discharged into the sewer or not. Rainwater is generally quite clean and dilutes the sewage if it is drained into the sewer system, which reduces the effectiveness of (biological) sewage treatment plants, and pumping it through the sewers involves substantial costs.[6] If rainwater is fed via a separate sewer network directly to the water system it can play an important role in maintaining groundwater reserves in the area. And so it appears that there is considerable interdependence between the directive role of the municipalities in sewer maintenance and the role of the water boards in water purification and managing the water systems (UvW, 1998). The municipalities can recover the full costs of maintaining the sewers through the sewerage charges that everyone connected to the sewers has to pay. Not all municipalities make use of this right and instead include these costs in the property tax, which is the general source of income for municipalities in the Netherlands (Brussaard et al. 1993).

Since the adoption of the Surface Water Pollution Act in 1969 and the Waterboard Act in 1992 sewage treatment has been a task of the *water boards*. Given the responsibilities the water boards already had for the quantitative aspects of surface water management it was logical that they

[5] Many water supply companies are voluntarily paying money to farmers in groundwater protection areas as an incentive for over-compliance with the national standards for manure and pesticides applications. This should be understood as making costs for source protection to prevent future production costs. Internalisation of these costs can be justified if they have a profit for the price payer (see Kuks, 1998).

[6] In general it is accepted that in the Netherlands 30% of the costs of water purification can be attributed to rainwater, the most important cost factor being the hydraulic capacity required to pump it through the sewer system (KIWA/RIONED 1998; Togtema 1999).

should take on the qualitative aspects as well.[7] A distinction is made between active and passive water quality management. Active management concerns actual sewage treatment, such as the building and operation of sewage treatment plants, pipes and pumping stations. Passive management includes setting water quality standards, issuing discharge permits, raising levies based on the number of 'equivalent pollution units' in sewage, and inspection and monitoring of discharges. Passive management also includes permitting sewerage discharges delivered by municipalities as well as storm water overflows, which can be prevented if municipalities create sufficient storage capacity in their sewerage system. The costs of water quality management by the water boards are proportionally distributed over the number of 'pollution units' via the pollution levy, which in effect creates a sort of price determination mechanism.[8] The costs of water quality management are not only determined by the number of pollution units to be treated but also by the required water quality standards. In the Netherlands the water boards have been increasingly successful in removing nitrogen and phosphate from sewage and some can now remove as much as 75% of the phosphate and more than 70% of the nitrogen.[9] Water quality managers also

[7] Sewage treatment was initially taken up in the 1950s and early 1960s, when many water boards and municipalities became active in the preliminary construction of waste water treatment plants, to prevent direct discharges of untreated sewage into surface waters. However, water boards and municipalities were insufficiently equipped to handle this systematically. Initiatives were mostly restricted to areas with a high concentration of inhabitants and industrial activities. This changed around 1970, when many European countries, on the basis of international agreements, adopted legislation to protect surface water quality. So did the Netherlands in 1969. Initially, the question which governance level should be responsible for the operational water quality management was resolved by allowing the provinces to delegate this responsibility to the regional water boards, which is what most provinces did. Only three provinces (Utrecht, Friesland and Groningen) carried out these tasks themselves, while two cities (Amsterdam and Tilburg) refused to relinquish their active role in sewage treatment. In 1992, however, a constitutional act on water boards finally determined that water boards should have the primacy over regional water management, which means that provinces and municipalities had to transfer their operational water management tasks to the water boards.

[8] Each water board is setting its own price per pollution unit. In the Netherlands the average water treatment price per household (3 pollution units) is about € 136 a year as of 2000.

[9] This was revealed by a comparison of the budgets of a large number of water boards held in 1998 (Deloitte & Touche 1999). These levels of efficiency in removing nitrogen and phosphate are the highest in Europe. Incidentally, the Netherlands has committed itself in the North Sea Action Programme and the Rhine Action Programme to achieve an extraction efficiency of 75% for nitrogen and phosphate. Moreover, a Danish study into the use of economic instruments for reducing contamination of surface waters, in which Denmark, France, Germany and the Netherlands were compared, has revealed that the Dutch pollution levy is the most successful in achieving water quality objectives and also the most cost effective considering the social costs and technological innovations involved (Andersen 1999). The powerful regulatory effect of this levy had been demonstrated earlier in the Netherlands (Bressers 1983).

face costs for ensuring the safe removal and processing of sewage sludge, for cleaning up contaminated bottom sediments and for untreated discharges into surface waters.[10] The last of these, for example, involves the costs of connecting buildings in rural areas to the mains sewers and building individual sewage treatment facilities (improved septic systems), or dealing with diffuse sources of pollution, such as leaching from open field cultivation.

The above illustrates, first of all, that a price has to be paid for treating the sequence of activities in the water cycle as separate delineated tasks. The drinking water supply and the wastewater treatment in the Netherlands fully meet the EU Water Framework Directive requirements of full cost recovery. This raises the question of whether this price could be competitive in a market in which other players offer only a selection of these services and de-emphasize some others. This is discussed later in this chapter when the debate on the effects of market forces in the water sector is examined.

Second, the above discussion shows that this price includes costs that a private operator - in the interests of remaining competitive - would probably not want to take on board, while the benefits accruing from those costs are considered important for society as a whole. In connection with this, a distinction is made between the functional value, water system value and future value of water (Waterkring 1998). The concept of *functional value* is a way of looking not just at the price of water, but at the total service delivered: a guaranteed supply of clean water of reliable, constant quality. The concept of *water system value* reflects the extra service delivered by water boards and water supply companies, such as natural habitat development in water abstraction areas, recharging stream systems with purified sewage water, and encouraging less polluting agricultural practices in water abstraction areas. The concept of *future value* focuses attention on the responsibility providers of water services have for ensuring a sustainable supply of water; in other words, the sustainable use of water resources, closing water cycles (supply management) and minimizing any burdens placed on the environment that may arise from their operations (energy, wastes). In addition to the operational services delivered by companies in the water cycle, in the form of the functional value of water, their interrelations with the public sector means that they also perform a public service largely expressed in the form of the water system value and future value of water.

Third, the previous discussion on the utility companies in the water cycle shows that these companies are managed as business operations in the public interest. The provinces have a directive role in the supply of drinking water

[10] In the near future Dutch water boards will get a national levy imposed on the pollution parts left in the effluent they discharge to the water system.

(from the viewpoint of groundwater management and achieving an adequate level of service provision). Where the maintenance of the sewer system is concerned, it is not only the municipalities that have a directive role (weighing different interests in relation to the level of municipal services) but the water boards and provinces as well (because of the importance of decoupling and retaining rainwater in the area). As managers of surface water systems, the water boards have a leading role in water purification (based on their responsibility for the quality of all surface waters and not only the quality of the effluent from sewage treatment plants.). In the Netherlands the general opinion is that it is a public sector task to keep a watchful eye on the impacts of water abstraction, sewerage and effluent discharge on the whole water system and to act accordingly when supervising and monitoring these activities in the water cycle (UvW 1998; Van Erkelens 1999). The water sector is different from other utility sectors, such as energy, waste and telecommunications. A feature of water is that it has a limited environmental capacity and water supply is to a great extent a regional resource: use of the resource directly affects the regional system from which it is abstracted. The vision of managing the water cycle from the perspective of the water system was stated by the Dutch water boards in the report 'Water Centraal' (UvW 1996) and subsequently adopted in the Fourth National Policy Document on Water Management (V&W, 1998). According to this vision the water in the cycle is viewed primarily as a commodity. Although management of the water cycle is not regarded as being a typical government duty, it is recognized that government does have a duty of care for the water supply, maintenance of the sewer system and for sewage treatment.[11] The water system vision focuses attention on water as an element in the living environment. Water system management is seen as a typical government duty geared towards the maintenance of sustainable systems (water as a planning principle), the appropriate distribution of the scarce water resource between functions and users (allocation issue) and adequate protection against flooding (safety).

[11] In terms of an often quoted privatization typology by Kraemer (1998), it is preferred in the Netherlands to have the responsibility for service provision as well as the responsibility for the operation of systems in the public sector, while the legal status of operators varies. In the case of water supply the operators have a legal status as public enterprises (publicly-owned firms under private law). In the case of sewer collection and waste water treatment the operators have a legal status as public agencies.

11.4 Contextual developments in the water sector

Before addressing initiatives for cooperation through the water cycle and the underlying motives, for these it is first useful to briefly describe a number of developments in the water sector. These concern developments that, taken together, have created conditions that make cooperation through the water cycle a more obvious option.

11.4.1 Increase in scale

The activities of the Dutch drinking water industry and the water boards have been increasing in scale for some time. In the drinking water sector this process has moved into the stage of integration and formation of alliances. In 1960 the Netherlands had about 200 water supply companies; in 1980 they had about 100 companies; in 1990 this was reduced to 60; and in 2000 there are just 20 left for about 16 million inhabitants (which is on average 800,000 inhabitants or 250,000 households per water supply company connected).[12] The water supply companies have completed the task formulated more than 100 years ago (to ensure that everyone in the Netherlands has access to a safe, affordable and continually available supply of drinking water). Now that this has been achieved, the owners of these companies are losing interest and are more readily amenable to the absorption of their companies into larger units. After all, their work now consists of management and maintenance, which is viewed as less of a challenge than building up a network (Cals 1999). The water boards are also undergoing a continuous increase in the scale of operations, primarily motivated by the pursuit of efficiency. The number of water boards in the country has been cut back from 2700 in 1900 to 57 on 1 January 2000, and it is expected that the number will soon be further reduced to about 25 in 2005.[13] The professionalism of water management and the quality of service expected require a certain minimum scale of operation, with efficiency of operations, the position of the company in relation to other businesses and customer service being important considerations (Anderson Consulting, 1999). But the flip side of scaling up is that as the areas to be managed become larger the relation between the utility company and its customers might become weaker. This may affect the democratic legitimization of the policy (Toonen & Glim 2000)

[12] In 2004 the number of water supply companies was reduced through mergers to 11.

[13] The number of municipalities has also been drastically reduced; more than halved since 1900.

11.4.2 Progress in expertise and possibilities

New water technologies that make small-scale stand-alone solutions possible are becoming available at a rapid pace. These include membrane filtration for the supply of process water or the reuse of wastewater (membrane technology enables decentralized water purification or sewage treatment). While the prices for drinking water and sewage treatment continue to rise and permits for private abstraction of groundwater are issued on a limited scale only, alternative techniques for the preparation and purification of drinking water and process water are becoming cheaper. The utilities' larger customers in particular will want to start negotiations on the prices they pay. But tailor-made solutions are not only possible for large customers, such an approach can also pay off for smaller customers as well. For example, individual sewage treatment systems are in great demand. In cases where a connection to the sewer is not possible (predominantly in some rural areas) these facilities enable sewage to be treated independently in such a way that the effluent can be discharged directly into surface water, even in areas that are highly sensitive from a nature conservation or environmental perspective. Moreover, decentralized facilities can be used to treat grey water (bath, shower and kitchen water) so that it can be reused for flushing toilets or washing the car and watering the garden (outside tap). This can be a good way of saving water. Water-saving devices such as low-flow showerheads and low-flush toilets are also increasingly efficient in reducing water demand (Tauw 1997; Meijer et al. 1997). One implication of technological advance is not only that more and more tailor-made solutions in the form of small-scale stand-alone solutions are possible, but that increasingly innovative ways of saving and reusing water are becoming available. This will reduce customer dependence on water utilities.

11.4.3 The formation of multi-utilities

Multi-utilities are companies that offer more than one utility service, often with a commercial motive. Multi-utilities attempt to offer their customers as complete a package of services as possible in the area of energy (electricity and gas), waste collection and treatment, drinking water supply and sewage treatment, telecommunications, etc. Customer service and efficiency are prime objectives: the customer only has to be acquired once, the complete range of services can be provided via a 'one-stop shop' and only one bill has to be sent. By interlinking different functions an attempt is made to achieve 'scope advantages' (Van der Laan et al. 1995; Booz et al. 1998). In the Netherlands a large multi-utility by Dutch standards is Nuon, which started as a power company, but after taking over water supply companies in the

provinces of Gelderland and Friesland became a water utility as well. A smaller but more typical multi-utility is Delta, which supplies gas, electricity, water, waste collection and cable television services throughout the whole province of Zeeland. One aspect of the formation of multi-utilities is that utility companies from other sectors are taking an increasing interest in entering into exclusive collaboration agreements, mergers or alliances with utility companies in the water sector. And these not only include other Dutch competitors; the liberalization of the various utility sectors in Europe has encouraged interest from foreign (multi-)utilities as well. Large foreign concerns such as Vivendi, Lyonnaise des Eaux, Thames Water and Scottish Power are not only active in gas and electricity supply but are also involved in international billion-dollar takeovers in the water sector and in the export of water utility projects to developing countries, often with financial support from the World Bank.

11.4.4 Political preferences for greater market freedom

The water sector in the Netherlands is still a government-dominated utility sector. Nevertheless, in the 1990s there was a great deal of political interest in the operation of market forces and in increasing the cost transparency of the operational activities in this sector. Discussion of these issues are not only taking place among the water boards, where sewage treatment operations can easily be divested, but also in the drinking water industry, in which most water supply companies have until now been in public sector ownership. European developments (liberalization of the utility sectors and European competition regulations) as well as technological developments mean that water supply companies are no longer the only or the cheapest market players, and a more open and competitive situation can no longer be ruled out. This discussion was prompted in part by examples in other European countries where the water sector has already been partly or entirely privatized. This process is quite advanced in England and Wales and in France, and a start has been made in Spain, Germany and Belgium. But in Sweden any liberalization of the water sector has been deliberately rejected. In the Netherlands the issue has been driven from the Ministry of Economic Affairs, which published a study in 1997 into possibilities for utilizing market forces and stating that efficiency savings could reduce the price of water by at least 10% (Dijkgraaf et al. 1997).

In 1998 the transport and public works minister took the position that it should in principle be possible for water boards to operate in a competitive free market for the treatment of trade effluent, while the exclusive responsibility of water boards for treating domestic sewage and sewage from small businesses should be given a basis in law. In the Fourth National

Policy Document on Water Management (1998) this position was stated as follows: "The responsibility for the treatment of sewage from households and small businesses is a government task. This responsibility, which requires a legal basis, lies with the water boards. Appropriate management is essential. Large companies can, as is now the case, treat their own effluent or have this done by third parties. It will have to be established whether the efficiency of sewage treatment can be increased by the water boards issuing concessions to third parties for sewage treatment or by a supervisory body regularly inspecting the efficiency of sewage treatment." (V&W 1998)

In 1998 the environment minister had similar intentions, stating that the supply of drinking water to private consumers and small business users should remain the exclusive task of the water supply companies, but that competition should be allowed for all other water used as a means of production by large-scale users and for water supplies to households through a second mains network (VROM 1998). In 1999 a subsequent environment minister adopted the position that government should retain control over the drinking water sector and that market forces were undesirable in the sector.[14] Eventually, in 1999, the cabinet decided to exclude drinking water supply from the free market and to retain the monopoly held by the water supply companies. The role of government was set down in the new Water Supply Act (Waterleidingwet). It was feared that introducing market forces would lead to a loss of quality management, a reduced security and continuity of supply and reduced prospects for the wise management of water resources. In an interview with a national newspaper the environment minister said that the current drinking water supply system worked "excellently". The Dutch model of public limited companies in public ownership "has proved to work well in practice". If these companies were allowed to be sold off, the cabinet feared that "private monopolies" might form, requiring setting stricter regulations and involving greater risks for the supply of drinking water. Backing this up, the minister pointed to foreign examples, such as France where the market is dominated by private companies and prices are no lower than in the Netherlands, but where the quality of the drinking water and security of supply is worse: "There the cheaper option of chlorinating drinking water is still preferred. In the Netherlands this practice was stopped many years ago for public health and environmental reasons." (NRC Handelsblad 1999). The cabinet did create an opening to the market for the supply of industrial process water. The intention is to make provisions in the new Water Supply Act for companies consuming at least 100,000 cubic meters of drinking water yearly to be allowed to choose from which company they buy their water. In particular, opportunities are presented by

[14] He followed the line taken by the 'Feenstra motion', which contained similar proposals and was adopted by the Second Chamber of Parliament in 1998.

new water purification techniques and total water management in industry. Membrane technology also makes it possible to supply alternative types of water, which, incidentally, puts the 100,000 cubic meter limit into perspective because it means companies will no longer have to depend on the mains water supply.

11.4.5 The French and British models

By taking this position on the operation of the free market and sewage treatment, the Dutch cabinet's main intention was to protect small-scale consumers (households and small businesses) and to 'tie' the water boards and water supply companies to them. The cabinet believes that the opportunities for the operation of pure market forces resulting in competition for these customers (*competition in the market*) are limited. The mains water and sewer networks are monopolistic concerns by nature. The infrastructure's high cost of construction and low cost of use mean that one mains network in an area can be exploited at considerably lower cost than two or more in competition. A more conceivable option is a market mechanism in which a temporary monopoly position (concession) is awarded in a competitive bidding process to the party that makes the most favorable offer (*competition for the market*). Conditions affecting the price, the quality and security of supply or collection can be included in the contract (Haffner & Van Hulst 1998; Hancher et al. 1998; Arthur D. Little 1999; Oosterhaven 1999). This market mechanism model is used in France for drinking water supply. The water mains network is owned by the local authorities but its operation is outsourced via concessions, mostly in the sense of lease and management contracts while the local authorities do the investments, not the private companies. In practice, though, there is little in the way of real competition in the French model. The French liberalized market for drinking water is dominated by three big companies: Vivendi (formerly Compagnie Générale des Eaux), Suez Lyonnaise des Eaux and Bouygues (formerly Saur-Cise). Between them, these three companies have an 85% share of the market with the other 15% in government hands. The actual situation is an oligarchy, a situation that in theory and practice leads to stable high prices and in which competition between members is conducted in a variety of ways excluding the price mechanism. A third (and the least far-reaching) market mechanism is *benchmark competition*. In this form of competition the performance of the various water supply companies is compared and the company with the best performance becomes the benchmark for the others. Through the exchange of comparable (price) information the companies are forced to take account of the performance of the others, while their monopoly position remains intact (Haffner & Van

Hulst 1998; Hancher et al. 1998; Arthur D. Little 1999; Oosterhaven 1999). This market mechanism is found in the United Kingdom, where in 1989 (under the Thatcher government) the water companies - which in the UK are responsible for both drinking water and sewage treatment (the regional water authorities) - were privatized as regional monopolies. A regulator, the Office of Water Services (OFWAT), tries to force efficiency improvements through by means of cost comparisons. The motivation for the privatization was to attract capital from the capital markets so that the government would not have to finance the necessary investments. The British privatization led to a considerable rise in prices and very high profits, while the level of service remains mediocre. There seems to be little evidence that the benefits of any efficiency improvements that may have been made have been passed on to the consumer (Maloney and Richardson 1995; Bressers et al. 1995; Blokland et al. 1999).

The French and British models show that opening up the water sector to market mechanisms and privatization does not necessarily guarantee better prices. Abandoning a public sector monopoly can lead to the creation of a private monopoly in its place, with the result that any price advantage induced by competition is not achieved. A market mechanism based on concessions is also only workable if the concessions are awarded for a long enough period (for example ten years). Nevertheless, it is in principle possible to introduce a distinction within the water cycle between the public duty of policy setting and the operational activity of implementation, in which operational activities such as sewage treatment and the construction and maintenance of sewers or drinking water facilities are outsourced. In this case, the policy-setting or directive public authorities will have to be prepared for higher administrative costs (transaction costs) without there being any clear advantages for the customer. These administrative costs include the costs of regulation and supervision, which are currently hidden in the sector itself and included in the prices of drinking water and sewage treatment. The introduction of market mechanisms or privatization will make these costs transparent. The question is whether the price of water will not actually rise because the administrative costs will eventually have to be paid for by the consumers. For this reason the argument is made for keeping more market-driven utility companies under the influence of a dominant public sector, with shares held by the relevant government authorities (Van Erkelens 1999).

11.4.6 Benchmarking and customer differentiation

The discussion about market mechanisms seems to be finding expression in two practical ways. First, it appears that the discussion has generated more

interest in making costs visible and for improving the efficiency of activities in the water cycle. Drawing on methods of comparison, such as benchmarking, comparative budget analysis and cost comparison, attempts are being made to generate information (for example in the form of key statistics) designed to increase cost transparency. Initiatives have been started both among the water boards and in the drinking water sector in this area. About 20 water boards are voluntary participating in a benchmark, which is not really used as benchmark competition, but which is more of a 'ranking system' for various price and effect performances. This benchmark is especially focusing on the proportional removal of phosphates and nitrogen from waste water related to the tax rate per pollution unit, on the proportional costs of sludge transport and treatment, and on the proportional costs of water soil sanitation to remove historical effluent parts (UvW 2001; 2003). A voluntary system of benchmarking also existed among water supply companies, looking at four aspects: drinking water supply, cost efficiency, environmental performance and service performance. This system has even become mandatory (by a revision of the Water Supply Act) in 2001 (Vewin 1999; 2001). In general, increasing cost transparency means that all costs are made explicit; not only the costs relating to the efficiency performance but also those relating to public services provided by the water cycle (the public performance). This information can be used to make management of the organization more efficient and therefore has significance for the internal management function. Cost information can also be used outside the organization to make a judgment about the market position and price performance of the water supply company compared with other market players. The risk attached to this is that insufficient account will be taken of the public performance and that such judgments will only reflect a comparison of the efficiency performance of competing companies. To the extent that market mechanisms depend on the price sensitivity of customers, it can be expected that competing parties will remove the cost component of the water system value and future value of water from the price of water services. The greater the 'distance' between the public policy makers and the divested operator, the greater the chance will be that the public service aspect will be ignored and will have to be taken up by the public sector policy-making body itself; the costs of which will then have to be passed on to the consumer through a public service tax. In 1999 an advisory report on the reform of the water taxation system was presented to the water boards which argued for the removal of as much of the cost components relating to the water system as possible from the prices charged for sewage treatment so that the price per equivalent pollution unit would reflect the actual costs more accurately. This price would then enable a better

comparison between the market players (Togtema 1999).[15] The business community has also argued strongly for water prices that contain no 'spurious elements' (VEMW 1999).[16]

The second practical impact of the discussion about market mechanisms is to make it possible to introduce market mechanisms for 'footloose' customers (i.e. that are not legally tied to one supplier). Footloose customers are mainly large companies that usually consume more than 100,000 cubic meters of water per year in their production processes or produce more than 5000 equivalent pollution units in their wastewater.[17] As 'large consumers' these companies are much more price sensitive than tied customers. The difference between 'tied' and 'footloose' customers is that the government would have a legal duty to guarantee drinking water supplies and sewage disposal services to small-scale consumers. In return for this guarantee, small-scale users are then tied to their water supply company and their sewage treatment company. This allows the water utility companies to calculate to a high degree of accuracy the capacity they require to serve their customers without the risk of being left with an overcapacity if customers switch to a competitor. In the interests of providing efficient water facilities a public monopoly for small-scale consumers is considered acceptable. It is also considered acceptable for 'large consumers' to be free to switch between utility companies at will, on the condition that the public sector water companies have no legal duty to supply water or sewerage services to these customers. Because this freedom to switch between utility companies can have significant consequences for the capacity of the water infrastructure operated by a water company, the duty of care towards these customers is exchanged for a market mechanism in which the utility company, in competition with other market players, can decide whether it wishes to supply its services to any particular potential customer or not. A condition on utility companies when making such a decision is that contracts with footloose customers must not be made at the expense (i.e. price rise) of the

[15] This commission, which has been reviewing the taxation system of water boards, concluded that in general 40 percent of the water treatment tax could be distinguished as environmental costs or water system costs which should be covered by the other water board tax on water quantity management. The transfer of this 40 percent cost component to the budget for water quantity management would make the water treatment price more competitive and would increase the cost transparency.

[16] The VEMW was created on 1 January 1998 from the merger of the Vereniging Krachtwerktuigen and the Samenwerkingsverband Grootafnemers van Energie. It represents the interests of companies and organizations in the areas of energy, environment and water.

[17] The 100,000 cubic metres threshold is being reconsidered in the revision of the Water Supply Act. The limit of 5000 pollution units is not listed anywhere but gives an impression of what might be understood by a large producer of sewage.

utility company's tied customers. In other words, if a large customer pulls out, this will incur costs on the remaining customers, while pulling in may also incur costs on the tied customers if a market price below the cost price will be offered. This means that where rate differentiation is permitted, tied customers must be given protection against price rises.

11.5 Water cycle cooperation and commercial performance

The developments outlined above have stimulated parties in the water cycle to cooperate. It is now official policy to pursue cooperation between water managers, municipalities and drinking water companies with a view to making use of environmental opportunities and increasing efficiency (V&W 1998). There are many advantages to be gained from such synergy. I discuss these in three categories.

First, there are advantages to be gained for the *water system* itself, based on the interaction between the water cycle and the water system. These are advantages that lead to an improvement of the *public performance*. Water abstraction activities and effluent discharge can, if desired, be located in places where they are least problematic in terms of water quantity and quality management. For example, it is possible that a choice be made to discharge effluent in an area susceptible to falling groundwater levels, involving extra treatments costs, instead of a cheaper option of discharging it into a larger receiving water body. Another option for tackling the problem of falling water tables is to alter the proportions of water abstracted from groundwater and from surface water resources. Besides water abstraction and the discharge of effluent, there are other points of interaction between the water system and the water cycle. One of these is the clear but complex relationship between the functioning of sewage treatment works, the problems caused in them by 'thin water' (including rainwater), the storage capacity of a sewer system, the presence of storm overflows and storage basins, the disconnection of hard surfaces, the construction of separate sewerage systems and the construction of infiltration facilities and retention ponds in (new) urban areas. Other issues include the problem of pollution from leaky sewers and drainage from broken and damaged sewers. Another cause for concern are discharges from sites not connected to the sewers and, in connection with this, the use of individual sewage treatment systems or technologies for infiltration in the soil. Synergetic benefits for the water system can also be gained if grey water or rainwater is reused to reduce the demand for tap water. Wastewater from one use can be usable for an industrial process, for example by upgrading its quality using membrane

technology. In general, we can say that cooperation through the water cycle can generate more innovative solutions for water management and closing water cycles. For all such solutions, more cooperation between water boards, municipalities and drinking water companies within the water cycle is crucial; the provinces can play an important directive role in this (UvW 1998).

A second category of advantages of water cycle cooperation concerns synergy in *business management*, also called operational advantages of cooperation through the cycle. These advantages are revealed especially in efficiency gains and cost savings, and thus they lead to an improvement of the *efficiency performance*. They allow many activities to be carried out jointly by the parties in the water cycle, particularly those activities involved in the maintenance of infrastructure. For example, joint construction of a mains network for tap water and district sewers, cooperation on sewage treatment technology, sludge processing, monitoring water quality, capacity planning, maintenance of pipeline infrastructure, water for fire-fighting services, automation and repair services, cleaning and inspection, joint procurement, customer service, laboratories, etc. In many of these examples efficiency can be improved through economies of scale.

Third, synergy advantages can be obtained in the area of *customer service*. The parties in the water cycle have overlapping groups of customers. Particularly where the market is allowed to operate in relation to footloose customers, it is crucial for commercially-minded companies to build up a strong market position and customer relations; after all, customers have to be acquired and retained in competition with other companies. One way of maintaining permanent relationships with customers is to develop a varied package of products. By cooperating through the water cycle it is clearly possible to sell a number of water-related utility services as a package. And this becomes even more attractive if other utility services (energy, telecommunications, etc.) can be included in the package as well. Moreover, a fully free market rules out the idea of service districts. Water supply companies, therefore, can develop commercial activities outside their traditional areas. It is even possible to develop products and projects on the global market, for example for export to developing countries as 'build, own and operate projects'. Commercial activities outside the core business of the water or utility company are also possible. In short, there are business opportunities in cooperating within the water cycle, particularly in relation to footloose customers. Synergy advantages can also be gained from an improved focus on the needs of tied customers, not only in terms of improved efficiency and customer service ('one-stop shop') - which I am more inclined to interpret as synergy in operational management - but also in commercial terms. The way in which multi-utilities make use of synergy

between various utility services in the area of customer focus is a clear example of this.

In water cycle cooperation with a commercial goal the focus is primarily on footloose customers (and in certain cases also tied customers via the formation of multi-utilities). Market mechanisms are appropriate for this. While the prices of drinking water and sewage treatment rise, companies that are footloose innovate to achieve a structural reduction in their costs. These companies want to concentrate on their core activities and water management is usually not one of them. They are keen to make use of expertise other parties have in water management that makes it possible for them to save water. Some industrial companies, for example, are keen to outsource all their water management activities to a water supply company, which would therefore have a stake in the company. Other companies prefer stand-alone systems for supplying specific grades of process water. Membrane technology makes it possible to produce various qualities of water for industrial use from surface water resources at a competitive price. This may lead to pressure on the price of water supplies to industry or encourage companies to disconnect from the mains water supply system if other market players offering the required services are willing to sign a contract. But there are other considerations as well. Security of supply (guarantees) and continuity (multi-year price agreements) are also important for industrial consumers of water. Companies may also place a value on their water supplier or sewage treatment company being in the same region. Or they may have built up a relationship of trust with a traditional water supply company, which will tend to discourage them from doing business with another water company.

Traditional water supply companies are being stimulated into action by the potential threat of losing customers to competitors. To maintain their market positions they have to maintain their ability to innovate (to offer their footloose customers the customized solutions they demand for in-company water management) and they benefit by bringing together expertise from all links in the water cycle. Establishing a commercial water cycle company with partners from the cycle is one way of doing this. In commercial water cycle companies, more so than in traditional water supply companies, attention is paid to market orientation, diversification of the range of products and services they offer and efficient business operations. Besides, the Dutch government has taken up the recommendations of the report by the Cohen Commission (1997) and is pursuing a policy of bringing all the activities of public sector organizations that may find themselves competing with market players or market activities into a legally, financially and organizationally independent unit (Havekes 1997; UvW 1998). This means

that there is little other choice for traditional water supply companies than to transfer their commercial activities to a separate company. By dividing their assets in this way they can prevent the business risks associated with their commercial activities being passed on to their tied customers, which would be improper competitive practices in a free market. A water cycle company with commercial goals cannot, in actual fact, be considered to be a utility company any more and does not need to have any public sector shareholders.

11.6 Evaluating market forces in terms of the three performance types

We have drawn a distinction between public performance, efficiency performance and commercial performance in the water sector. Cooperation through the water cycle can benefit all these outputs because synergy benefits can be achieved for the water system (public performance), in terms of operational synergy (efficiency performance), and in terms of customer focus (commercial performance). But not all these outputs benefit from the operation of market mechanisms.

At the core of the *public performance* element lies the policy responsibility for a sustainable water system and the government's duty of care for tied customers. Only government can determine how society should treat water as a natural resource with a view to the future and in relation to environmental management, nature management, spatial planning and economic development. Only government sets standards and puts policy into practice through licensing, enforcement and financing water management. Only government protects the rights of every citizen, without exception, to access to drinking water and sewerage. The public performance aspect encapsulates the public utility of water management and water supply facilities. Cooperation through the water cycle will deliver better performance because undesirable environmental impacts can be tackled in a more preventive and sustainable way.

The *efficiency performance* concerns business management issues and the level of efficiency achieved (realizing collective utility facilities at the lowest possible cost to society). In the interests of efficiency it is not necessary for these operational activities to remain in public ownership. Government can outsource tasks but has to maintain control over them because of its accountability to the public. The day-to-day tasks that can be outsourced may include operational management activities such as the production and distribution of drinking water, the construction and maintenance of sewers and the secondary processes required to carry out the primary tasks, such as procurement, customer service, field service and

repair and laboratory services. Cooperation through the cycle, for example for the joint management of mains pipelines, will deliver better efficiency performance. Market mechanisms can, in principle, benefit the efficiency performance, but must not harm decision making in the public interest or public accountability.

The *commercial performance* is also about efficiency, but in this case efficiency from the perspective of the client, who wants water services at the most attractive price. Cooperation through the water cycle promotes better customer relations in a market for footloose customers because a more extensive range of customer services can be provided. However, because government has a public responsibility for water, even footloose customers will still have a relation with government; if not directly with government as a supplier of utility services then indirectly because the side effects of water use in the water system are subject to regulation and have their price. In this sense the main effect of market mechanisms will be to express the public service and operational service in separate prices. The market price for water will not only include the cost of the operational service but also the costs that are considered necessary to deliver the commercial performance. These may include all the costs of acquiring and retaining customers. And when determining the costs of the public service, the regulatory costs (transaction costs) of outsourced activities should also be taken into account. The more activities that are outsourced the greater will be the administrative burden in the form of contracts, licenses and associated enforcement. Moreover, a consequence of privatization may be that, because of the continuing increase in the scale of operations, the Dutch infrastructure for drinking water, sewerage and sewage treatment will fall into the hands of large international water companies. As the scale of operations continues to increase, it will become even more difficult for regional water system managers to place conditions on the operations that they themselves have outsourced for reasons of efficiency. Efficiency threatens to become more important than effectiveness.

Where market forces and privatization are used to increase cost transparency and effectiveness, it must be realized that in a public-owned structure attention is also paid to efficiency and price restraint. In the drinking water sector the provinces exercise control over prices, and for this reason they have taken steps in the past to expand the scale of operations to achieve economies of scale. The democratic structure of the water boards guarantees participation of interested parties in the decision-making procedures. The same goes for the determination of the costs of sewerage by municipalities. The citizen has an interest in the provision of water services at the lowest possible cost to society. There is an opposing argument that

only market mechanisms operating under conditions of free competition can deliver the lowest prices. But if pure market mechanisms cannot be guaranteed in practice and a choice has to be made between a private or a public monopoly, the greatest benefits in terms of price control are to be gained from the transparency and democratic legitimacy offered by the public sector alternative. Moreover, drinking water companies and water boards have always had to react to the workings of a free market. Depending on the prices they set, their industrial customers will either decide to choose an alternative option (setting up their own facilities for abstracting groundwater or treating their wastewater) or make use of the public utility. In order to avoid risks associated with capacity utilization, it is clearly in the utilities' own interests to set moderate prices.

Since the 1980s market forces and privatization have been strong articles of faith in society. In the Netherlands waste processing, the exploitation of cable networks and telephony have been privatized, and traditional utility companies, such as the electricity companies, are also set to be taken out of public ownership. The belief that society can be shaped to meet human needs - a belief that characterized the 1970s - has rapidly made way for the belief that the market can be shaped to meet human needs. Although this belief is still extant, it too is beginning to show signs of wear and tear. Some people are already arguing for a better delineation of the public domain and a stricter direction by government of the privatization of public assets (WRR, 2000). The public debate on privatization has not left the water sector untouched. We have attempted to clarify the discussion by drawing a distinction between a public performance, an efficiency performance and a commercial performance of the water sector. The intention of using market mechanisms and privatization is to gain greater efficiency. While there is nothing wrong with this, it must not be at the cost of the public performance. A water supply company that has to compete in the market will consider every possible means to reduce costs, and it can be expected that every cost item not concerned with functional value but with water system value or future value (including maintenance of infrastructure) is liable to be scrapped. It may well be that public supervision of outsourced activities is possible but one can doubt whether a government that is at distance from the operational activities is able to sufficiently guarantee the public interest. Moreover, it may also be doubted whether privatized water facilities can be delivered at the lowest possible costs to society given the additional costs of public supervision and commercial interests for which the citizen is billed.

11.7 The ‘leave it to the market’ discourse

What do other authors in the field of political science say about privatization of public services and market forces in the public sector? Various authors discussed privatization in ideological terms as an end in itself, or as a discourse (Ringeling 1993; Dryzek 1997; Dicke 2001). A discourse could be defined as “a shared way of apprehending the world. Embedded in language, it enables those who subscribe to it to interpret bits of information and put them together into coherent stories or accounts. Each discourse rests on assumptions, judgments, and contentions that provide the basic terms for analysis, debates, agreements, and disagreements” (Dryzek 1997: 8). Dryzek distinguishes three discourses as alternative approaches to solving environmental problems, which he labeled as administrative rationalism (leave it to the experts), democratic pragmatism (leave it to the people), and economic rationalism (leave it to the market). He associates privatization preferences with economic rationalism, as it is committed to “the intelligent deployment of market mechanisms to achieve public ends” (Dryzek 1997: 102). Dryzek thinks that economic rationalists have proven to be skilled rhetoricians. They oppose regulation, so getting it stigmatized as ‘command and control’ obviously helps them. Another pervasive rhetorical strategy in economic rationalism is the horror story, usually involving governmental action that produces perverse, inefficient, and costly results. (Dryzek 1997: 114-115)

Ringeling emphasized that privatization is more a matter of political ideology than a matter of hard facts. While it is often assumed that private companies do operate more effectively and efficiently than public organizations, his survey of American literature on the efficiency performance of public versus private organizations learns that a more balanced judgment is needed. For instance, Goodsell concludes that in some cases private companies perform better in the field of efficiency, costs and quality of the delivered goods and services, while in other cases public agencies have a better performance (Ringeling 1993: 214). Downs and Larkey argue that “… it is very difficult to know just how efficient any particular government agency or business firm is and virtually impossible to fairly compare the relative efficiency of these two types of organizations” (Ringeling 1993: 214). Public agencies are often underestimated in terms of output and efficiency performance, while the output and efficiency performance of private companies is often overestimated. Although the Netherlands has some experience with privatization of public tasks, as I indicated in the previous paragraph, Ringeling argues that these experiences are too specific to allow general conclusions on the benefits of privatizing public tasks. Privatization operations are often triggered by political

pressure, and not based on an adequate analysis of costs and benefits, or an adequate estimation of new problems that might arise after a privatization operation. Privatization is often considered in cases where the public sector experiences financing problems (like in the UK), while a sale of share capital only generates a benefit in the short run. Privatization requires increasing regulatory efforts in terms of guidance (contracting) and control (monitoring, evaluation, and feedback), resulting in transaction costs which are often not fully considered. Privatization of public tasks will result in a loss of expertise for the public sector, making guidance and control on a distance more difficult. Privatization can imply that a public monopoly gets transformed into a private monopoly, due to a lack of private providers. The risk even exists that a private provider does not want to take over the less profitable elements of a public task. In this context, Ringeling quotes Waldo who remarked that the device of the more conservative businesses is "to privatize profit and to socialize loss" (Ringeling 1993: 211-213).

In their case study on the privatization of waste water treatment facilities in the United States, Heilman and Johnson found that many authorities considering privatization, including some that proceeded with it, were deeply concerned about loss of public accountability and control over the public facility and service (Heilman & Johnson 1992: 195). They conclude that the complexity of privatization permits multiple and sometimes conflicting interpretations. Inappropriately defined and implemented, it can be an unacceptable regression to unfettered private market competition for the provision and production of essential public services. Appropriately understood and implemented, however, privatization can provide the accountability and stability needed to avoid such an outcome (Heilman & Johnson 1992: 198-199).

Privatization requires public accountability of provisions and a continuing public oversight role in the privatization structure. In their case study on the privatization of water supply and waste water treatment in Britain in the 1980s and 1990s, Maloney and Richardson found that privatization brought with it a new and extremely complex regulatory regime (Maloney & Richardson 1995: 101). Prior to privatization, the regulatory regime was strongly characterized by consensual and private decision-making in the British regulatory tradition (Maloney & Richardson, 1995: 103). The water sector in England and Wales was subject to regulation when in the public sector, but this was a mixture of rather 'light' public regulation and a good deal of self-regulation. The water industry was thought to be 'governed' by the public service ethic (Maloney & Richardson, 1995: 126). In the post-privatized world the political salience of the sector has increased rather than declined. Consequently, water policy-making has been exposed

to the glare of publicity, has provoked public debate and has seen public conflict between some of the key actors. This has not simply manifested itself as a struggle between the new regulatory authorities and the water companies as they naturally search for a consensual modus operandi. There have been bitter 'turf fights' between the regulators themselves (Maloney & Richardson 1995: 103). Privatization resulted in a more open and less predictable style of policy making and implementation (Maloney & Richardson 1995: 168).

Privatization has increased the transparency of the water sector in England and Wales. We may find similar conclusions in a study by Dicke, who found that contemporary British water management scores high on visibility. Water suppliers are forced by regulators to publish a considerable amount of information, and therefore both are continuously in the public eye. As a result and in contrast to the Netherlands, drinking water supply is news in England and Wales (Dicke 2001: 227). In a 'narrative analysis' of water management in England, Wales and the Netherlands, Dicke describes how England, Wales and the Netherlands dealt with the 'liberalization of the water market' as a narrative or a discourse. This narrative is "built around the themes of efficiency and democracy. In the first place, drinking water and purification are not common goods, but private goods. They can be sold on the market. Efficiency can be improved dramatically if private companies take over the provision of drinking water supply. Private drinking water supply and purification are also good for the transparency of the sector." (Dicke 2001: 223) Dicke finds that the Netherlands assumes a common good in the debate in drinking water supply, whereas water management in England and Wales fights over drinking water as a private good. In the first place this is explained by the strong voice which the waterboards had in this debate. The manifesto against privatization, which influenced the debate in parliament, was initiated by influential dike reeves (Waterkring 1998). Secondly, there are historical reasons why the Netherlands emphasize the collective dimension of water. Water management is much more existential for the Dutch than it is for England and Wales (Dicke 2001: 227).

We have to be aware that in Britain, privatization was triggered by growing financial and economic pressures, which forced policy makers to re-examine existing policies and existing rules of game; by a new ideological climate advocating economic rationalism, starting in 1976 but accelerating after the election of Mrs. Thatcher's first Conservative Government in 1979; and by the process of Europeanization and developing one European market (Maloney & Richardson 1995: 159). For the Netherlands the third context factor has been the same, but the first and second ones have not. The political preference for more market at the end of the 1990s has been by far

not as strong as the Thatcherism in Britain. So, the ideological climate for more market has been very weak in the Netherlands. And even more important is that there was no strong financial or economic pressure in the Netherlands to consider privatization. The water sector performs already rather efficient on the basis of affordable prices for water services and in accordance with European principles of 'polluter pays' and 'full cost recovery'.

In this context it is interesting to consider the hypothesis that privatization might become an option when the efficiency of public services declines and when governments are obliged to provide regular (operational) subsidies in increasing amounts in attempts to maintain services or keep prices at a politically and socially acceptable level. This dilemma between the level of subsidies, services ad prices will eventually lead to a budget crisis forcing government to privatize public services and to re-install regulatory oversight. This hypothesis was suggested by Kraemer with reference to Gomez-Ibanez and Meyer, who analyzed the reasons for the instability of certain types of institutional arrangements, using public transport as an example. They found that privatization and nationalization can form recurring patterns of crises in a vicious cycle (Kraemer 1998: 328).

To conclude, 'privatization belief' is not only triggered by political pressures (national or European), but also by an unfavorable financial situation (need for extra investments) and a belief that the public sector operates inefficient. It is based on high expectations of efficiency improvements in a market situation. It also expects better accountability and cost transparency in a market situation. We emphasized however that the question should not be if hypothetically the public or the private sector better performs, but how the actual performance on public goods and services can be improved. Furthermore, water services should be evaluated or assessed not only on efficiency performance, but also on public performance. The cost transparency and accountability of these performances should increase in a privatized situation as well as in a situation where the public sector delivers water services. The success of privatization depends at least on the performance of a complementary public regulatory regime. Without privatization, a public agency could also improve its efficiency and try to become more competitive in relation to other service providers.

11.8 Conclusion

Privatization of water services, legally adopted in surrounding countries like France and Britain, is still highly debated in the Netherlands,. Advocates of privatization believe it is the best way to save on utility costs and to increase

their transparency. Opponents believe that the Dutch water sector already provides high quality services for low prices, while including an additional public performance which has no place in a free market. For the moment, the formal conclusion of the debate has been that the public sector should maintain its influence in the water cycle to guarantee the sustainability of the water cycle and to protect small customers. Meanwhile a liberalization of water services for large customers has to be allowed. Market activities should be positioned outside the public sector. In practice however, it appeared that commercial initiatives to provide water services to large customers have hard times to survive. Large customers do not switch easily and prefer to remain being served by their traditional suppliers. Another outcome of the debate has been that implementing benchmarking should increase the transparency of utility costs and externalities, and that attempts should be made to achieve efficiency advantages (synergy) through cycle cooperation. Prices of water services should become more transparent. Also the non-marketable costs of externalities should be fully recovered.

Around 2000 a turn in privatization thinking in the Netherlands was triggered by a belief that the Dutch water sector was providing high quality services against low prices, based on full cost recovery. The Netherlands almost fully meets the EU requirements of full cost recovery. It was also triggered by fears that public investments of the past might disappear into foreign hands, fears of losing control, a fear that private businesses would no longer take care of externalities that are important from a public performance point of view; fear that private businesses would not invest enough in maintenance of the utilities risking quality of Dutch water services; and by the expectation that transaction costs would increase the costs of water services. In this chapter we argued that the performance of water service providers should not only be assessed in terms of efficiency, but also in terms of the effects on the water system (as part of the public performance). We also argued that a public provider can be competitive in terms of efficiency without privatization.

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Chapter 12

Epilogue

Revisiting the research questions

The central theme of this dissertation has been water governance and institutional change. We regard water governance as collective action with respect to water issues, not restricted to government action by public authorities, but including involvement and participative action of non-public stakeholders. Furthermore, this means that we are not only interested in the 'action aspect' of collective action, but also in the complexity of the institutional context in which collective action is embedded and achieved. The focus on institutional change means that we are interested in the evolution of the public domain, the interaction with the private domain, and the shifting boundaries of the public private divide. In this epilogue we want to revisit the research questions that we formulated in chapter 1:

1. How can we elaborate the elements of a water governance structure, if we want to understand shifts in governance?
2. What are the main institutional shifts in water governance that can be perceived in the Netherlands and in a wider European context?
3. How can these water governance shifts be explained in terms of institutional conditions that determine - as intermediate mechanisms - the effects of external triggers?
4. What are the implications of governance shifts for the demarcation between the public and private domain?
5. What institutional lessons can be learned from governance arrangements in which non-governmental actors play an influential role?

Although these questions have been discussed in the previous chapters, as explained in chapter 1, we want to make some final summarizing and reflective remarks in this epilogue. We spend a separate section on each research question.

12.1 Theoretical framework

In chapters 2 and 3 we dealt with the first question of this dissertation: *How can we elaborate the elements of a water governance structure, if we want to understand shifts in governance?* In chapter 2 we elaborated the governance concept into elements that constitute a governance structure. The elaboration coincides with the scientific work of various scholars in the policy science field. The notion of governance is gaining attention in public administration and public policy sciences. For comparative studies on a particular policy sector in different states, countries or periods, it is insufficient to understand a policy sector only in terms of the policy content (goals and instruments). The features of public authorities and target groups and consequently their actions and interactions are influenced by such aspects as the administrative capacity available or provided for policy implementation, the different problem perceptions at stake, the position and links of actors in policy networks or arenas, and relations between the different administrative levels involved. Although the governance notion is increasingly used, the conceptualization of this notion is demonstrating a huge variety throughout literature. On the basis of this literature we reviewed what outside of policy content could be important elements of governance. In our opinion, the following five elements matter:

- Levels (not necessarily administrative levels): governance assumes the general multi-level character of policy implementation.
- Actors and their networks: governance assumes the multi-actor character of policy implementation.
- Perception of the problem and objectives (not just objectives): governance assumes the multi-faceted character of the problems and objectives of policy implementation.
- Strategies and instruments: governance assumes the multi-instrumental character of policy strategies for policy implementation.
- Resources and organization of implementation: governance assumes the complex multi-resource basis for policy implementation.

There is a certain logical relationship between our five elements of governance. It is easy to see why each element imposes harder or softer limitations on aspects of the following element. However, there is no a priori reason for thinking that the mutual influences between the elements are restricted to this alone. We believe there is a continuous mutual adjustment process, implying that all five elements can influence all others in any direction. The influences that the five elements of governance exert on each other will promote their mutual adjustment in a governance system. Changes

within a governance system occur because external factors (pressures, triggers) alter characteristic features of one or more of the five elements, where after the other elements adjust themselves to this. The elements of a governance system result from social interaction. Therefore we assume three social mechanisms leading to mutual adjustment, based on objectives, information, and power as relevant aspects of social interaction. First, mutual adjustment arises partly from a tendency among actors towards mutual consistency of values. Second, mutual adjustment comes partly from a tendency among actors to fit cognitions into a common framework for interpretation. Third, mutual adjustment arises partly from mutual dependency among actors on each other's resources. The idea of mutual adjustment also offers the possibility of explaining differences between the situations in two or more countries (see for instance chapter 5 and chapter 10). According to this idea, differences in external factors, for example, in geological and hydrological features, or in solidly grounded aspects of governance, such as the constitutional allocation of competencies to government authorities, will indirectly bring about a series of differences in (other) elements of governance.

While chapter 2 focused on water governance from a public policy point of view, we added in chapter 3 a property rights perspective, based on the notion that property rights determine the accessibility of water systems as a natural resource for various users and use functions. Both perspectives are combined as steering dimensions into a concept of resource regimes. Resource regimes are considered as social institutions in which the public and private domains interact with each other. The property rights perspective emphasizes that public policies need to take into account the property rights of individual persons or self-regulating groups in society, which, though they can be a restraint, can also be used as an opportunity. We developed a regime theory on this interaction, introducing regime extent and regime coherence as criteria for the evaluation of regimes on their contribution to resource sustainability. In this context we introduced the term 'institutional sustainability'. An increased extent and an increased coherence are indicators for higher sustainability. Thus, different types of resource regimes (or phases in the evolution of a regime) can be distinguished. In general, water resource regimes will show a development from simple into complex regimes. A regime becomes more complex when more layers and scales, actors, perceptions of the problem and accompanying goals are involved, more instruments are part of the policy mix and more organizations share responsibilities for policy implementation. The central assumption is that coherence occurs when the relevant actors acknowledge that it is necessary to prevent further deterioration of the resource. This means that improving

coherence is not a spontaneous development, but is more deliberate in character. Coherence becomes a relevant concept only after increased complexity involving among others multiple uses of the water resource. Coherence though comes at a price. Every form of coherence creates the need for additional interaction and increases transaction costs.

In chapter 3 we also dealt with the political context in which regimes exist and develop. We focused on conditions that determine - as intermediate mechanisms - the effects of triggers on regime change, and formulated hypotheses on the institutional dynamics of water resource regimes. The first hypothesis, based on the path dependency, argues that the institutional sustainability of water resource regimes - as desired by the EU - will be better and adopted faster by member states the more easily the required regime changes fit into the existing institutional structure of the national water regime. The other hypotheses are built on the three mechanisms that are identified in chapter 2. The second hypothesis, based on the tendency of actors to act from a set of constant and coherent values, argues that the more the dominant set of values in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction. The third hypothesis, based on the tendency of actors to use a common reference frame to interpret cognitions, argues that the more the dominant cognitive reference frame in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction. The fourth hypothesis, based on the dependence of actors on each other's resources, argues that the more the power configuration of the water sector in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime in that direction. The formulated hypotheses are statements about the dynamics of resource regimes as well as their stability (restraints to change). They guided the comparative analysis in chapter 5 (see also section 12.3 in this chapter).

12.2 Main institutional shifts

In chapters 4, 5, 6, and 7 we dealt with the second question of this dissertation: *What are the main institutional shifts in water governance that can be perceived in the Netherlands and in a wider European context?* Chapter 4 deals with the evolution of the water regime in the Netherlands on a national scale during a two-hundred-year period, mainly focusing on the most recent 50 years. Chapter 5 compares the evolution of the Dutch national regime with the five other European countries: Belgium, France,

Spain, Italy and Switzerland. Chapter 6 includes an in depth analysis of the most recent regime transition in the Netherlands on the scale of two water basins: the IJsselmeer basin and the Regge river basin. Chapter 7 is based on a comparison of twelve case studies at basin scale across the six countries that were involved in the Euwareness project, including the two Dutch case studies described and analyzed in chapter 6.

In our attempt to assess regime evolution and the present institutional sustainability of water regimes, we have seen that all six European water regimes described evolved from simple regimes during the 19th and first half of the 20th century to complex regimes after World War II. From the 1950s on resource demands increase strongly and various new use types and functions are added to the regime extent. This is due to a rapidly growing population and related economic growth, industrialization and urban expansion. In the 1960s we see that growing attention for natural aspects of water resources was followed by the incorporation of environmental aspects into water management in the 1970s, and ecological aspects in the 1980s. In the 1980s, besides surface water issues, groundwater issues were also came into the spotlight. Around 1985 we see the first attempts towards integrated water management in most countries. However, this does not imply that an integration attempt directly changes the regime of a country from a complex into an integrated one. France and the Netherlands have established the most integrated regimes. The regimes of the other countries should be typified as complex regimes (high extent but low or medium coherence). However, all these countries (including France and the Netherlands) struggle with complexity and all suffer to various degrees from fragmentation. So we might better conclude that the French and Dutch regimes are less fragmented than the others.

With respect to coherence, we distinguish between the external coherence of public policies and property rights, and the internal coherence of the property rights subsystem and the public policy subsystem - each considered separately. The French and Dutch regimes in particular are integrated in terms of a high internal coherence of the public policy subsystem. They are still struggling to improve external coherence between their public policies and existing property rights. Although both countries have developed a strong public domain (in 1992 water became a ‘res nullius’ in the Netherlands and France proclaimed water an object of national heritage, which could be interpreted as proclaiming that it is ‘state property’), they still have problems with effectuating use rights that interfere with the policy objectives of water management (for instance, land use rights in floodplains in the Netherlands, and agricultural water use rights in France). Countries

like Italy and Spain have formally proclaimed that waters are public and belong to the public domain (Italy in 1994; Spain in 1985), but Italy suffers from a low internal coherence of its public policy subsystem, while Spain has not been able to eliminate pre-existing private property rights over water. Furthermore, the long term character of Spanish water use concessions and the allowance of inter-basin transfers are detrimental to the public good claim on water resources. The Spanish regime therefore suffers from external incoherence between property rights and public policies, as well as incoherence within the property rights subsystem. Switzerland has also developed a strong public domain, but the national regime suffers from internal incoherence of the public policy subsystem (based on three separated policy communities) and from external incoherence between federal policies and the rigid property rights structure which is strongly in favor of protecting disposition rights by the cantons and existing concessions for hydropower generation. In Belgium the picture is mixed due to the autonomy that the regions possess to develop their own water regime. The regime in Wallonia seems to be more public policy driven, while the regime in Flanders is more property rights driven. Belgium especially suffers from a relatively slow development of extent, which appears especially from the late recognition that surface water protection policies had to be effectively implemented. This is especially due to the process of institutional reform (federalization) which severely delays the evolution of the Belgian water regimes.

In all six countries we noticed in general a strongly increasing complexity of bundles of property rights and a strongly evolving public domain in terms of a communalization of water ownership and use rights. We also noticed that in Western European countries, even in the early 19th century, water resources and the benefits they could generate were never entirely subject to private property. There have always been restrictions on private ownership and private use rights by the legal definition of some public domain. However, during the 20th century, and especially after World War II, an increased nationalization or communalization of water resources can be perceived, in spite of the ownership arrangement. States are increasingly controlling the access to water resources and are allowing more and more users to claim some form of access. Since the 1970s, new forms of access are especially being given to recreational, environmental and ecological use functions of water bodies. On the other hand, in terms of restricting private use rights, it still appears to be difficult for Western European states to get a grip on water use rights that cause diffuse water pollution or water depletion, and on land use rights in floodplains that indirectly contribute to problems of flooding as well as droughts. So the public domain of these countries is still

weak in terms of restricting private property in these aspects, and thus national regimes are weak on external coherence in this respect.

Considering the public policy subsystem of resource regimes and its internal coherence, we distinguished again the five dimensions of governance (1. multi-level; 2. multi-actor; 3. multi-perspective; 4. multi-instrument; 5. multi-resource).

With respect to the multi-level dimension we concluded that most countries are struggling to develop an effective structure for co-governance between the various administrative levels involved in water management. The French and Dutch structures are the most elaborate; Belgium has set its final structure just recently (1993); Spain is struggling with interventions in the autonomous regions from the central level (inter-basin transfers); Italy is weak on providing integration from the central level; and Switzerland is struggling with incoherence between federal attempts to integrate and a strong cantonal autonomy, on which the implementation of federal initiatives depends completely.

With respect to the multi-actor dimension, we see in all countries an increased participation of new users, environmental NGOs, and the general public in water issues. However, the degree to which this participation is institutionalized varies a great deal among the countries: participation is more institutionalized in the Netherlands, France and Switzerland than it is in Belgium, Spain and Italy.

With respect to the multi-perspective dimension we conclude that all countries are rather similar in the evolution of extent. Although there are great ambitions for water management in all countries, the effectiveness of this ambition very much depends on the two dimensions related to the availability of policy instruments and resources for implementation.

With respect to the multi-instrument dimension and considering the adoption of integrated water legislation as an important indicator, we see that the Netherlands and France have adopted such streamlined legislation in 1989 (Netherlands) and 1992 (France), considering the resource as an integral one (in terms of quantity, quality, surface and groundwater, as well as the ecological aspects of the water system). Italy and Switzerland show attempts at integrated legislation in 1989 (Italy) and 1992 (Switzerland). Although these attempts have an integral appearance, they are based on an incomplete integral approach. Belgium and Spain have not yet developed integrated legislation.

With respect to the multi-resource dimension we conclude that countries show great variation. The availability of resources for implementation partly depends on the creation of an effective structure for co-governance between the various administrative levels. It also depends significantly on the

availability of money for implementation, important indicators of which are the public expenditure per capita on water management and the application of full cost recovery of water services. We noticed that the Netherlands, France and Switzerland have a much greater public expenditure and have more strictly applied the full cost recovery principle than Belgium, Spain and Italy.

12.3 Conditions determining governance shifts

In chapters 4, 5, 6, and 7 we also dealt with the third question of this dissertation: *How can these water governance shifts be explained in terms of institutional conditions that determine - as intermediate mechanisms - the change effects of external triggers?* In chapter 2 we introduced three mechanisms that explain mutual adjustment within a governance structure and thus the effect of change triggers on a governance structure. In chapter 3 we formulated - based on those three mechanisms - hypotheses on conditions that effect regime change towards integration, and we developed a set of indicators for each mechanism. In this section we summarize to what extent we found support for the formulated hypotheses and the included indicators. We first recapitulate the three hypotheses.

Hypothesis ('value condition'): *The more the dominant set of values in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime into that direction.* As values and value-based institutions that are in favor of an integrated water resource regime the following could be considered:

- a strong value placed on community spirit, including willingness to restrict individual autonomy to achieve equitable distribution of water access rights;
- a cooperative policy style (with participatory values), including openness of the water policy community to rival interests;
- a strong environmental awareness in society, including a protective orientation and openness of the legal system to 'protective interests';
- common adherence to the polluter pays principle and the principle of full cost recovery.

Hypothesis ('cognition condition'): *The more the dominant cognitive reference frame in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime into that direction.* As paradigms and cognition-based institutions that are in favor of an integrated water resource regime the following could be considered:

- a common understanding of water problems in terms of resource sustainability and not in terms of isolated problems that can be resolved with curative solutions (treatment of the symptoms);
- a water planning tradition and the presence of a supportive learning system (in the sense of national statistics, science and research);
- the ability to adapt existing water institutions to an expanding extent (to innovate within existing water institutions and broaden their scope).

Hypothesis ('power condition'): *The more the power configuration of the water sector in a nation is in favor of an integrated water resource regime, the easier triggers will have a chance to change a regime into that direction.* As indicators of a power configuration that is supportive to an integrated water resource regime the following could be considered:

- a tradition of effective co-governance between central and decentral authorities (in which central authorities take responsibility for integration and decentral authorities are equipped with sufficient resources for the implementation and the differentiation to specific circumstances);
- a tradition of citizen participation and public debate on water issues (in which participation is not restricted to general elections, but in which participation rights are instituted regarding water policy making and planning);
- a strong environmental policy sector (with environmental divisions at all administrative levels and environmental subdivisions in all relevant ministries and water administrations);
- a strong position of 'green' NGOs.

In chapter 5 we assessed the progress for various countries made in terms of regime change towards integration. We concluded that, while all countries show attempts towards integration, they vary in the degree to which these attempts have improved the institutional sustainability of the national water resource regime. The Netherlands, France and Switzerland were relatively early in their attempts at integration, while Belgium, Spain and Italy are lagging behind in very different ways. How can we explain this in terms of our hypotheses, and what support do we find for the relevance of the indicators we distinguished?

As far as the *value condition* is concerned, the progress in the Netherlands and France can be explained by a strong value placed on community spirit (including a willingness to restrict individual autonomy), by a cooperative policy style, a strong environmental awareness in society, and a common adherence to the polluter pays principle and the principle of full cost recovery. The progress in Switzerland is mainly explained by a strong value placed on community spirit (at federal level, not at cantonal

level, where the willingness to restrict individual autonomy is almost absent), a cooperative policy style and a strong environmental awareness in society, as well as a strong willingness to adapt to EU standards and directives, due to strong economic and trade relations with the EU. The last indicator is not mentioned in our hypothesis, but may explain why Switzerland in the late 1990s decided to adopt the polluter pays principle and the principle of full cost recovery in the field of water quality policy. Switzerland has lately adopted and applied both principles, but from the beginning it has invested a lot in wastewater treatment with contributions from general budgets. Countries like Belgium, Italy and Spain (which entered the EC much later, in 1985), have not done this. Concerning the value condition, their delay - at least until the mid 1980s - can be explained by a weaker community spirit, a lack of cooperative style, weaker environmental awareness and no adherence to the polluter pays principle and the principle of full cost recovery.

Related to the value condition, severe restraints on regime change, mentioned for Spain and Switzerland, are private property rights and long-term water use concessions. These especially affect the willingness to restrict individual autonomy to achieve equitable distribution of water access rights. In Spain's case, there have been several attempts (especially by means of the 1985 Water Act) to eliminate private property rights on water resources and to advance the expiration date of such rights and water use concessions. Since these attempts had a limited effect, the 1999 amendment of the 1985 Water Act introduced a water market in the sense that concession holders may sell their surplus to other concession holders in order to achieve more efficiency. In Switzerland too, the property rights structure is very strong and a source of resistance to regime change. Water use concessions for hydropower generation have been granted for periods of up to 99 years. Many of them can only be amended voluntarily. By contrast, in countries with a stronger developed public domain (Netherlands, Belgium, France, and Italy since 1994), we see that private property rights and concessions are much less of a restraint.

As far as the *cognition condition* is concerned, the progress of the Netherlands and France can be explained by a common understanding of water problems in terms of resource sustainability, strongly developed water planning embedded in a wider policy planning tradition and the ability to adapt existing water institutions to an expanding extent. Switzerland is also characterized by a pro-active attitude in resource protection, but it lacks a water planning tradition and deals with water problems isolated from each other. The ability to adapt existing water institutions to an expanding extent is also weak. The three separate water policy communities appear to be very

persistent and only tend to open up under very heavy pressure. Belgium started to develop the distinguished institutional conditions related to cognition much later, in the 1990s. Spain and Italy are weak in an integrated understanding of water resource problems, they have poorly developed water planning and also relatively poor developed ability to adapt existing water institutions to an expanding extent.

Related to the cognition condition, all countries experienced the restraint of a traditional engineering approach in water management, resulting in artificial solutions for water resource problems and, as a result, all generated other resource problems. For instance, engineered systems for irrigation and drainage lead to improvement for specific purposes, but they also cause water depletion and disrupt watercourse ecosystems. In Spain we see that the very uneven seasonal and geographical distribution of water supply and demand has led to the construction of an extensive water storage and redistribution infrastructure. In the Netherlands, we see that the need to protect the land from high water and the tradition of artificially draining low-lying areas has given the country a complex hydraulic infrastructure. The flow and level of almost every water system in the country is artificially controlled. In many countries we see that the traditional approach to providing flood protection has been strongly biased in favor of providing engineered measures (embankments, canalization, and so on) to keep floodwaters away from human settlements.

As far as the *power condition* is concerned, we identified in chapter 5 three types of triggers that in fact refer to indicators for this condition: (1) integrative capacity at the national level and co-governance between central and regional authorities; (2) democratization and participation developments and the role of green NGOs; (3) the strength of the environmental policy sector in a country.

Concerning the integrative capacity at the national level, we have seen that in the cases of the Netherlands and France these countries have centralized water management to a large extent and created an influential role for the national level. In the case of Belgium we have seen a lack of co-ordination at the national level, and gridlock in water management due to institutional reform. In Belgium the process of federalization has significantly restrained regime developments during the period from 1970 until 1993. Since the process of regionalization was completed in 1993, the regions have started to develop integrative capacity on their own. In the case of Spain we see incoherence in the national water regime due to intervention of national authorities in the water regimes of the autonomous regions. While the regionalization process begun in 1978 allowed regions to develop their own integrative capacity to deal with water management, the National

Hydrological Plan of 2001 allows interbasin transfers between regions, thereby resisting sustainability arguments of some affected autonomous regions. In Italy we noticed that due to a void at the national level until 1986, water management as well as the implementation of European water policy was left to regional and local authorities. Only after 1986, with the birth of the Ministry for Environment and the subsequent creation of national and regional environmental agencies, has there been an attempt to create a national dimension in water quality policy. But the EU on the one hand and the regions on the other had already occupied most of the policy space. The national attempts towards integration (1989, 1994, 1999) are incoherent, since they reflect the tensions between the empowerment of the regions and of the local municipalities which are intrinsic to the Italian state reform. In Italy a process of decentralization started with the creation of regions in 1972. Since then the regions as well as local authorities have been gradually empowered. However, until now, there have been continuous tensions between the empowerment of the regions and of the local authorities, which seems to be intrinsic to the Italian State Reform. Also in Switzerland, the main obstacle to integration efforts seems to lie in the traditional Swiss federalist system which assigns responsibilities for policy implementation in many areas to the cantons. To conclude, it seems that the Netherlands and France have developed a more coherent institutional structure for co-governance between central and regional authorities in dealing with water management, in the sense that a strong integrative capacity is organized at the central level while setting the framework for water management at the regional level. It seems to be crucial that national authorities do make strategic use of decentral organizations at water basin level (like the Water Boards in the Netherlands and the River basin Committees and Water Agencies in France), which deal with all aspects of water management and not only with quantity or quality issues (like the Drainage Basin Authorities in Spain, which are only dealing with water distribution, or the separate decentral institutions which Italy created for quantity management in 1989 and quality management in 1999).

We also reported for all countries the importance of democratization and participation developments, and the position of environmental and nature conservation NGOs. In the Netherlands water management started to become politicized in the 1960s, resulting in a paradigm change of the traditional engineering approach adopted by the state water authority and the regional water boards. In Belgium environmental groups became influential in the 1990s, especially after the Declaration of Rio in 1992 and the participation of green parties in the national cabinet in 1999. In the Netherlands, Belgium, and France, planning has been an instrument to allow participation of new users and to deal with rivalries. In the Netherlands and

France participation of users is institutionalized in water boards and river basin committees, to which they may elect representatives. The country report on Spain reports the entrance of environmental NGOs in the policy arena in the 1990s, in combination with the creation of a new environmental ministry in 1996. When a plurality of interests enters the policy arena, it openly clashes with the traditional approaches of water policy. This is especially a clash between the traditional approach of supply management and interbasin transfers versus the approach stressing the importance of demand management. In the country report on Italy, an increasing importance of environmentalists is reported, although their role is still quite minor. In Switzerland, the political system traditionally affords considerable weight to non-public actors through the right of referendum and popular initiative (direct democracy). During the 1960s, 1970s and 1980s there has been increasing pressure from groups in society to progress with water quality protection with the help of further subsidies for the construction of wastewater treatment plants.

We finally reported for all countries the importance of the role of an environmental ministry, and the dedication of the national government to environmental issues and protective interests. The Netherlands, Belgium, France and Switzerland all established an environmental ministry around 1970, while Italy established one in 1986 and Spain in 1996. In the case of Belgium, however, environmental policy was delegated to the regions in 1980. Institutional reform has delayed the effective operation of environmental departments in the Belgian regions. In the case of Spain, it also had a kind of environmental department before 1996, albeit a rather fragmented one. For the Netherlands, France and Switzerland it seems that the active role of a national environmental ministry has been important for the dedication of the national government to environmental issues and protective interests. In the cases of Belgium, Italy and Spain the country reports mention that the entrance of an environmental ministry into the water policy arena has triggered regime change in terms of the recognition of environmental and ecological aspects of water systems.

In chapters 6 and 7 we explored a different set of conditions, applied in the comparison of institutional regimes at water basin level. The listed conditions provide, separately and as a set, favorable or unfavorable conditions for regime changes in the direction of more integration (extent and coherence). We formulated a hypothesis that attempts to change regimes into a more integrated status would have relatively more success when:

– There is already a longer tradition of thinking in terms of cooperation in the water management sector or such thinking is built during the case early enough to influence later stages of the case history.

- There is a common understanding that the counteracting (side) effects of non-integrated water management harm sustainability and that this sooner or later will have to be stopped (joint problem).
- There is a notion of possible joint gains from coherence, so-called 'win-win situations' (joint opportunities).
- There is a credible threat of a (potentially) dominant actor accumulating power and altering the public governance pattern in his own way and for his own interest when no solution is reached (credible alternative threat).
- There are well functioning institutions that provide fertile ground for coherence attempts (institutional interfaces).

In chapter 7 we found - on the basis of comparing empirical studies of twelve case areas in six European countries - that of the separate conditions (and the force of change agents) the *joint opportunities* and the *institutional interfaces* conditions stand out in explaining the various forms of regime changes.

In chapter 6 we considered the conditions that have been most important in the Dutch case studies. We concluded that the tradition of integrated thinking, which started in the 1960s, and the much older tradition of consensus and mutual respect have been influential in the evolution of water basin regimes towards more complexity and integration. Although problem perspectives in the cases started to diverge widely, and the joint problem perspective has been mostly absent as a condition, in some cases the presence of joint opportunities or a credible alternative threat has been important as a condition for achieving a breakthrough. If we would relate this to any of the conditions that we mentioned in chapter 3, it could best be linked to the value condition, and especially to the indicator of cooperative policy style (with participatory values), including openness of the water policy community to rival interests. Dutch water regimes are based on a deliberation of interests through planning procedures, rather than by means of redistributing property rights. It fits in a tradition in Dutch politics of rival political streams searching for accommodation or joint opportunities and trying to avoid alternative threats (Lijphart 1968). The reverse side of the medal is that this cooperative style may restrain integration in the sense of external coherence between the policy subsystem and the property rights subsystem. For instance, the cooperative style resulted in a conflict between the Dutch government and the European Commission around the implementation of the EU groundwater directive, as discussed in chapter 8. The EC preferred the Dutch government to intervene more by means of redistributing farming rights instead of a policy based on mineral accounting and more self-regulation.

In all cases we studied in chapter 6, institutional interfaces have been a most favorable condition, in the sense that national policy documents and national initiatives have created a legal path for integration and a stimulating policy context for change at water basin level. This conclusion supports the image of the Netherlands as a so-called 'decentralized unitary state', in which a strong tendency towards subsidiarity and decentral autonomy exists, as long as it fits within a nationally harmonized approach. The history of Dutch water management has shown that national interventions in regional and local water management always followed events that threatened the water safety of the country at a supra-regional scale. Although the Dutch have started to anticipate climate change through water management at a basin scale and by water boards as basin authorities, it is to be expected that the national authorities will again intervene powerfully after future calamities.

If we would relate 'institutional interfaces' as itself a condition to any of the conditions that we mentioned in chapter 3, it could be linked to the power condition (institutionalization of co-governance, institutional position for policy brokers, institutional representation of rival interests), but also to the cognition condition. Institutional interfaces could help develop a common understanding of water problems, appear as planning system, or refer to the adaptation of existing institutions to an expanding extent. An example of the last appearance may be found in chapter 8, where we demonstrated how the agricultural sector, the environmental sector and the drinking water sector incorporated expertise to deal with rival interests. In this context it is important to notice, as we concluded in chapter 6, that the water basin scale has become more central in the Dutch cases. It refers to an increasing understanding of water problems in terms of resource sustainability rather than in terms of isolated problems that can be resolved with curative solutions. It also refers to an expanding expertise of water institutions and increasing incorporation of rival values.

12.4 Demarcation between public and private

In chapters 5 and 11 we dealt with the fourth question of this dissertation: *What are the implications of governance shifts for the demarcation between the public and private domain?* In chapter 5 we already reported the further communalization of property rights on water and the expansion of the public domain as one of the main water regime developments of the 20th century. This culminated in the 1980s and 1990s when several countries debated a fundamental redefinition of public and private domains. States like the Netherlands, France, Spain and Italy made explicit legislative statements that

water belongs to the state or the public, and that use concessions (as private or common property) need public control. In 1992, the Netherlands revised its civil code, formally proclaiming that water cannot be owned, not even by the State, because it is considered to belong to the public. In the same year, France formally proclaimed water an object of national heritage, which could be interpreted as proclaiming that it is 'state property'. In 1994, Italy formally proclaimed that all waters are public and belong to the public domain. Spain did the same in 1985, but it has not been able to eliminate pre-existing private property rights over water. However, in the same period there was a debate in many countries, induced by the introduction of an open European market in 1992, that water services should be liberalized and that more market forces should be permitted. The EU preference for a liberalized market within EU-frontiers, also including a disapproval of public subsidies for market activities, and resulted in a controversy with the preference of national stakeholders to further communize property rights in the water field.

There are obvious contradictions with respect to opinions on the demarcation between the public and the private domain of water resources. In chapter 3 we quoted that "one of the most controversial issues is the difference between water as a social right and water as a commodity. Water could be both, and could be neither. Water is not a social right in the sense that everyone is entitled to get as much water as they wish. But water is a social right as long as it is the basis for life. Similarly, water is not a commodity in the sense that everyone is entitled to own it like one owns other commodities. But water is something precious and finite, therefore tradable and under economic evaluation (…)" (Lugaresi 2000: 76-77). In chapter 11 we discussed the privatization debate on water services as it developed in the Netherlands. We analyzed this debate as a discussion between defenders of the private domain (the market) and defenders of the public domain. Advocates of privatization believe it is the best way to save on utility costs and to increase their transparency. Opponents believe that the Dutch water sector already provides high quality services for low prices, while including an additional public performance that is not attractive for the market to take care of. The analysis in chapter 11 aimed to clarify this debate and to undo it from its ideological traits by making a distinction between the public performance, the efficiency performance and the commercial performance of water services supply. We argue that the performance of water service providers should not only be assessed in terms of efficiency, but also in terms of the effects on the water system (to be considered as a public performance). Furthermore, the protection of 'small customers' and the affordability of prices for water services are considered to be tasks that should be always in public hands.

We concluded that privatization preferences are often rooted in a discourse that could be typified as 'economic rationalism'. Privatization preferences are not only triggered by political pressures (national or European), but also by an unfavorable financial situation (need for extra investments) and a belief that the public sector operates inefficiently. It is based on high expectations of efficiency improvements in a market situation. It also expects better accountability and cost transparency in a market situation. We emphasized however that the question should not be if the public or the private sector performs better, but how the performance of public goods and services can be improved. Water services should be evaluated or assessed not only on efficiency performance, but also on public performance. The cost transparency and accountability of these performances should increase in a privatized situation as well as in a situation where the public sector delivers water services. The success of privatization depends at least on the performance of a complementary public regulatory regime. Without privatization, a public agency could also improve its efficiency and try to become more competitive with other service providers.

An interesting statement we quoted in chapter 11 is that the Netherlands assumes a common good in the drinking water supply debate, whereas water management in England and Wales argues about drinking water as a private good. In the first place this is explained by the waterboard's strong voice in this debate. The manifesto against privatization, which influenced the debate in parliament, was initiated by influential dike reeves (Waterkring, 1998). Secondly, there are historical reasons why the Netherlands emphasize the collective dimension of water. Water management is much more existential for the Dutch than it is for England and Wales (Dicke 2001: 227). Obviously, the Dutch expansion of the public domain and the tradition of expropriation based on compensation, as we described in chapter 4, have their origins in 'value conditions' like community spirit and a willingness to set aside individual autonomy; a protective orientation and openness of the legal system to 'protective interests'; a cooperative policy style and openness of the water policy community to rival interests. This type of water governance - strongly based on participatory values - has been labeled as 'community based governance' (Toone 2004: 9).[1]

The previous statement does not imply that the Dutch approach of water governance rejects each form of economic rationalism. To clarify this, we

[1] Toonen regards the Dutch waterboard as a historical and classical example of 'community based governance', which nowadays gets internationally support as a desired option for institutional development in the field of common pool resource management.

quote some more features that belong to the economic rationalism based discourse according to Dryzek (1997). "Markets are systems based on commodity exchange, in which goods, services and financial instruments are exchanged for each other. Markets work smoothly to the extent that participants in transactions can be confident that they do in fact have a right to sell or buy the good in question - in other words, they have property rights (…). If we are to have markets in environmental goods, then we need private property rights in these goods too. According to economic rationalism, specification and enforcement of these rights is the main task of government when it comes to environmental matters." (Dryzek 1997: 103-104*)* In fact, economic rationalism advocates that the regulation of environmental problems begins with the attribution and redistribution of property rights. This principle comes rather close to the assumption in this dissertation that governance becomes more integrated, and thus improves resource sustainability, when coherence increases between the policy subsystem and the property rights subsystem of a water regime. We found that in the Netherlands and the other European countries we studied, it is common practice to attribute property rights to water users and redistribute them among rival users and use functions. Of course, a crucial difference with 'full economic rationalism' is that the commodity exchange is not fully in the hands of private actors. Government sets the conditions on which commodity exchange is permitted. In this context, Dryzek adds that "even in the United States, it must be said, the privatizers have had little impact on the content of public policy. Mostly they rail from the sidelines. More influential, and in more countries, have been the economic rationalists who advocate not wholesale privatization and private property rights, but rather the use of market-type mechanisms and economic incentives to induce environmentally appropriate behavior (…). Economic rationalists enamoured of markets have often turned to the next best thing: government-managed markets, and failing that quasi-market incentives." (Dryzek 1997: 108) We may conclude on the basis of our case studies in this dissertation that the Netherlands is a good example of a country where economic rationalism is largely applied to the public sector water management. In cases of surface water pollution as well as groundwater pollution government identifies polluters and restricts their activities by means of emission standards (emission rights!) and emission charges. Together with France and Germany, the Netherlands is internationally known as a case where government makes use of per-unit pollution charges in their repertoire of environmental policy instruments. In all three countries revenue raised by charges is earmarked for projects to improve water quality (Hahn 1995; Anderson; 1999). In chapter 10 we demonstrated that the Dutch government has firmly chosen to restrict farming rights by attributing emission quota, whereas the US federal and

Florida state governments shy away from redistributing farming rights. They only intervene by attributing a liability to groundwater polluters, which in practice is not very effective because of a difficult burden of proof on the side of water users. Finally, we noticed in chapter 11 that the Dutch water sector has always made an effort of providing high quality services against low prices, based on full cost recovery. Through mergers and various efficiency measures, often induced by national government and provincial authorities, the water sector has significantly improved its efficiency performance within a construction of public ownership. Most recently, benchmarking and water cycle cooperation have become common practice for water supply companies as well as water boards in the Netherlands.

12.5 Role of non-governmental actors

In chapters 8, 9, and 10 we dealt with the fifth question of this dissertation: What institutional lessons can be learned from governance arrangements in which non-governmental actors do play an influential role? We focused on the agricultural pollution of groundwater sources that are needed for drinking water supply as a special case of water governance. One of the most interesting features of this case is that it allowed us to look closely at the role of two non-governmental actors in water governance that are rather well organized: the agricultural sector and the water supply sector. The case study demonstrated the limited control capacity of governmental actors and their dependence on the self-organization of private and semi-private sectors in society. The structure of groundwater governance includes institutional gaps in the Netherlands and several other European countries that have been bridged by negotiated agreements between water suppliers and farmers. Water supply companies want farmers to fulfill higher requirements in water catchment areas by stimulating them to certain preventive measures. It is a case of over-compliance with formal regulations where the one ground water user asks the other, rival ground water user to provide an environmental service beyond the reference level that has been set by government. These negotiated agreements are examples of institutional arrangements on the edge of the public and private domain. In fact, this is an example of 'external coherence' between the public policy subsystem and the property rights subsystem of the groundwater resource regime in the Netherlands. Drinking water policy has not been designed to redistribute farming rights in such a way that drinking water policy objectives can be met. In chapters 8 and 9 we explained how these negotiated agreements between water suppliers and farmers are established in a setting of specific motives and resources (including property rights!) on both sides, and within a national context of

dynamic problem perceptions, regulations and networks. Negotiated agreements are interpreted as a transfer of resources based on resource dependency and resource susceptibility. At first glance, this seems to be precisely the case of pollution for which Coase (1960) demonstrated it does not even matter who has the right, the polluter or the sufferer from pollution, so long as it is legally clear (Kuks and Neelen, 1991). A perfect case in terms of economic rationalism discourse, because it seems that the market participants in transactions can be confident that they do in fact have a right to sell or buy the environmental service in question. However, looking more closely, we see that this is a government-managed market in which government requires farmers in catchment areas and water supply companies to negotiate with each other and settle an agreement. Otherwise government itself will impose an arrangement. An interesting aspect is that the alternative arrangement by government works as a 'credible alternative threat' condition, which is one of the conditions that we distinguished in chapter 7. This seems to be an argument for the hypothesis that a private bridge over a public gap only appears on the condition that the involved private actors experience a 'credible alternative threat'.

What other conditions seem to be decisive for governance arrangements by non-governmental actors? In chapter 9 we concluded in terms of the 'value condition' that a strong value on community spirit, a cooperative policy style and a strong environmental awareness in society have been important for the acceptance of restrictions on farming practices to reduce environmental pollution. Despite farmers' protests, the agricultural sector has committed itself to a nationwide approach to reduce the amount of fertilizers and pesticides on agricultural soils to save the environment. Dutch adherence to the polluter pays principle has been set aside to break the initial resistance on the farmer's side. In this case the solution has been that, in accordance to the EU borderline between 'polluter pays principle' and 'polluter being paid', compensation to farmers only applies in cases of over-compliance where society asks farmers to provide an environmental service beyond the reference level. With respect to the 'cognition condition', important elements have been a common understanding of water problems in terms of resource sustainability, and the ability of the environmental, agricultural and water supply sector to adapt to an expanding extent and broaden their scope. Considering the 'power condition', co-governance between the European, national and provincial levels has been important, resulting in an effective multi-level governance approach of the environmental problem in question. Also important has been the strong role of the national environment ministry that has been able to open up the agricultural policy community, which was used to operating as a strong iron triangle. The agriculture ministry discovered that the agricultural sector would only survive in an era with

increasing environmental protection if it opened up its policy community and accepted the influence of environmental policy makers in the administration of agricultural affairs. On the other hand, environmental policy makers, and later the water supply sector, realized that they would only have such influence on the basis of a confidence relation with the agricultural sector.

In chapter 10 we compared the Dutch case of groundwater governance with a similar case in the American state of Florida. The reason for comparing the governance structure of groundwater and drinking water protection in these cases was the remarkable similarities in the problems underlying both states' policies. Despite similarities in terms of context, we found conspicuous differences in terms of governing this problem, which we tried to explain in terms of the three mechanisms or conditions we distinguished in chapter 2.

The first assumption is that adjustment arises from the tendency of actors to act from a set of consistent values. In Florida, this mechanism relates primarily to the value placed on freedom; the equivalent in the Netherlands is the value placed on community spirit. Of course, this is a relative difference. For example, in Florida, this value is expressed in the many small-scale water-supply systems and an aversion to public utilities. It is also expressed as an antigovernment sentiment and a dislike of generic regulations. This weakens the position of the environmental department and forces them to take a voluntary incentive-based approach, and it leads at all levels of government to measures geared to specific conditions. It is also expressed in the different meanings attached to the administrative concepts of New Federalism in the United States and subsidiarity in the EU. New Federalism recognizes the autonomy of local politics and believes that centralized levels of government add little value. Subsidiarity, in principle, recognized collective values and states that collective decisions should be taken at the level at which the common interest is served, and accepts the limitations this view places on individual autonomy.

The second assumption is that adjustment arises from the tendency of actors to use a common frame of reference to interpret cognition. In the case study, this mechanism mainly relates to the way the policy problem of "groundwater contamination by pesticides and nitrates" is interpreted. In Florida, this problem is interpreted mainly in terms of public health, which leads to a curative approach involving cleanup measures and defining water-abstraction areas where drinking water consumers can be regulated. In the Netherlands, the problem is interpreted mainly in terms of long-term sustainability, in which the concern is the need for a lasting and preventive solution. Water-abstraction areas, for example, are identified for the purpose of ensuring extra regulation of activities that may be a source of pollutants.

Preventive measures to control sources of groundwater pollutants are also implemented outside these areas.

The third assumption is that adjustment arises from the dependence of actors on each other's resources. Such dependence is clearly expressed in the demarcation of powers between administrative levels and between administrative actors. A striking feature in Florida is that the lower levels of government (both the counties and the water management districts) operate largely autonomously, whereas in the Netherlands, these layers of administration (municipalities, water boards, provinces, and national government) execute many of their tasks jointly. Moreover, in Florida, the ability of the environmental department to act remains limited to setting environmental quality standards and their enforcement; there is little support for measures aimed specifically at target groups that go beyond a voluntary, incentive-based approach. The department is totally subordinate to the agriculture department or to the water management districts, certainly as far as agriculture is concerned or where control over land use is involved. In the Netherlands, the environment ministry has been able to break the power monopoly held by the "iron triangle" in the agriculture sector and has been accepted as an influential partner in the administration of agricultural affairs.

On both sides of the Atlantic, in fact all over the world, the challenges posed to water management are compelling. A discussion that narrows down to the 'market or state' issue will inevitably miss the point. It is likely that only innovative and complex ways to join the forces of many public and private actors can provide the governance power modern water management needs to be a vital force.

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Summary in Dutch

Water Governance en Institutionele Verandering

In deze dissertatie over 'water governance en institutionele verandering' vatten we 'governance' op als collectieve actie. Dit houdt in dat we niet alleen acties van overheidsorganen, maar ook de betrokkenheid en participatieve uitingen van niet-publieke actoren in de beschouwing betrekken. Voorts omvat het perspectief van deze dissertatie dat we niet alleen kijken naar het 'actie aspect' van collectieve actie, maar ook naar de complexiteit van de institutionele context waarin collectieve actie is ingebed en tot stand komt. De focus op institutionele verandering houdt in dat we geïnteresseerd zijn in de ontwikkeling van het publieke domein, de interactie met het private domein, en de verschuivende grenzen tussen beide domeinen. Ten behoeve van het onderzoek zijn vijf centrale vragen geformuleerd:

1. Hoe kunnen we de elementen van een water governance structuur operationaliseren, als we de veranderingen in governance structuren willen begrijpen?
2. Welke belangrijkste institutionele veranderingen hebben zich voltrokken in water governance, zoals waargenomen voor Nederland en de bredere Europese context?
3. Hoe kunnen deze veranderingen in water governance worden verklaard in termen van institutionele condities die als intermediaire mechanismen de effecten van externe veranderingsfactoren bepalen?
4. Welke gevolgen hebben de gesignaleerde governance veranderingen voor de begrenzing tussen het publieke en het private domein?
5. Welke institutionele lessen kunnen we leren van governance arrangementen waarin niet-publieke actoren een bepalende rol spelen?

Het begrip 'governance' krijgt een steeds grotere plaats binnen de bestuurswetenschappen. Daar is ook reden toe. Wanneer het bestuur van een bepaald beleidsterrein tussen verschillende landen of perioden wordt vergeleken heeft men niet genoeg aan de beschrijving van de beleidsinhoud,

opgevat als een geheel van doeleinden en middelen. Hetzelfde geldt wanneer men de bestuurlijke context van implementatieprocessen wil kenschetsen, bijvoorbeeld in de zogeheten 'instrumententheorie'. De eigenschappen en daarmee de activiteiten en interacties van overheden en doelgroepen worden ook beïnvloed door bestuurlijke aspecten als de organisatie van en hulpbronnen voor de uitvoering, de vigerende probleempercepties, de positie van actoren in netwerken en de verhoudingen tussen verschillende niveaus van besturing. Hoewel het woord steeds meer wordt gebruikt, zien we dat het begrip 'governance' in de literatuur nog op buitengewoon uiteenlopende wijze wordt ingevuld. In een poging tot synthese hebben we dan ook eerst nagegaan welke hoofdelementen, behalve de beleidsinhoud, daarbij worden genoemd. Vervolgens hebben we geprobeerd uit een aantal beleidswetenschappelijke benaderingen een zo compleet mogelijk beeld te destilleren van de inhoud van deze elementen, die tezamen een 'governance structuur' vormen.

De elementen van governance die we onderscheiden zijn de volgende:
1. Niveaus (niet meer zonder meer bestuursniveaus): governance gaat uit van het doorgaans multi-level karakter van beleidsvoering.
2. Actoren in het beleidsnetwerk: governance gaat uit van het multi-actor karakter van beleidsvoering.
3. Probleemperceptie en doeleinden (dus niet meer alleen de doeleinden): governance gaat uit van het multi-facetted karakter van de problemen en doeleinden voor de beleidsvoering.
4. Strategieën en instrumenten: governance gaat uit van het multi-instrumentele karakter van beleidsstrategieën voor de beleidsvoering.
5. Hulpbronnen en organisatie van de uitvoering: governance gaat uit van de complexe multi-resource basis van de beleidsuitvoering.

We onderscheiden drie sociale mechanismen die wederzijdse aanpassing tussen de elementen van een governance structuur genereren en die voor doorwerking zorgen van externe veranderingsfactoren. Deze mechanismen zijn gebaseerd op de begrippen doeleinden, informatie en macht als relevante aspecten van sociale interactie.
- Ten eerste komt wederzijdse aanpassing deels voort uit de neiging van actoren om hun waarden en normen op elkaar af te stemmen en onderling consistent te maken.
- Ten tweede komt wederzijdse aanpassing deels voort uit de neiging van actoren om hun cognities passend te maken binnen een gezamenlijk interpretatiekader.
- Ten derde komt wederzijdse aanpassing deels voort uit de wederzijdse afhankelijkheid van actoren van de inzet van elkaars hulpbronnen.

Vervolgens hebben we in dit proefschrift een analytisch perspectief toegevoegd dat zich richt op 'property rights' ten aanzien van water. Property rights kunnen zowel betrekking hebben op de eigendomsrechten als de gebruiksrechten ten aanzien van water. Property rights bepalen de toegankelijkheid en beschikbaarheid van watersystemen als natuurlijke hulpbron voor de verschillende gebruikers en gebruiksfuncties. Beide perspectieven - het governance perspectief en het property rights perspectief - zijn vervolgens verenigd in het concept 'water regime'. Een water regime wordt beschouwd als een sociale institutie waarbinnen publieke en private domeinen met elkaar in interactie zijn. Het property rights perspectief benadrukt dat overheidsbeleid dient rekening te houden met de property rights van individuele personen en zelfregulerende actoren in de samenleving. Dit hoeft niet alleen maar een beperking in te houden, en kan ook als een kans worden benut. We ontwikkelden en regime theorie over de interactie tussen de governance structuur en de property rights structuur als subsystemen van een water regime, waarbij we het 'regime bereik' en de 'regime coherentie' als beoordelingscriteria voor de duurzaamheidbijdrage van een water regime hebben geïntroduceerd. In dit verband introduceerden we ook het begrip 'institutionele duurzaamheid' waarmee water regimes kunnen worden getoetst. Een toegenomen bereik en een toegenomen coherentie duiden op een hogere institutionele duurzaamheid van een regime. Aldus kunnen verschillende typen water regimes (of fasen in de ontwikkeling van een regime) worden onderscheiden. In het algemeen zullen water regimes zich ontwikkelen van eenvoudige naar complexe regimes. Een regime wordt meer complex naarmate het rekening heeft te houden met een grotere variëteit aan bestuurlijke schalen, actoren, percepties, beleidsinstrumenten en hulpbronnen die voor de beleidsuitvoering nodig zijn. Wanneer de complexiteit van een regime is toegenomen is het niet vanzelfsprekend dat er een doorontwikkeling plaatsvindt naar een geïntegreerd regime. Een complex regime kan evenzeer de verschijningsvorm aannemen van een gefragmenteerd regime.

We zijn ook ingegaan op de politieke context waarin regimes functioneren en zich ontwikkelen. Daarbij hebben we de drie eerder genoemde sociale mechanismen uitgewerkt tot hypothesen omtrent condities die het effect van externe factoren op regimeverandering zullen bepalen.

1. Veranderingshypothese over de waarde conditie: *Hoe meer de dominante set waarden van een land ten gunste is van een geïntegreerd water regime, des te eenvoudiger zullen externe veranderingsfactoren het regime in die richting kunnen veranderen.* Relevante waarden en aan waarden gerelateerde instituties zijn de volgende:

- Een sterke waarde toegekend aan gemeenschapszin, met inbegrip van de bereidheid om individuele autonomie te beperken om zo een meer rechtvaardige verdeling van toegangsrechten tot water te kunnen bereiken.
- Een coöperatieve beleidsstijl (met participatieve waarden), met inbegrip van een open houding van sociale verbanden van waterbeleidsmakers ten aanzien van rivaliserende belangen.
- Een sterk milieubewustzijn in de samenleving, met inbegrip van een beschermende oriëntatie en openheid van het rechtssysteem inzake 'beschermende belangen'.
- Een breed gedragen instemming met het principe 'de vervuiler betaalt' en het principe van kostenterugwinning.

2. Veranderingshypothese over de cognitie conditie: *Hoe meer het dominante cognitieve interpretatiekader van een land ten gunste is van een geïntegreerd water regime, des te eenvoudiger zullen externe veranderingsfactoren het regime in die richting kunnen veranderen.* Relevante paradigma's en aan cognities gerelateerde instituties zijn de volgende:

- Een breed gedragen interpretatie van water problemen in termen van duurzaamheid van natuurlijke hulpbronnen en niet in termen van geïsoleerde problemen die met curatieve middelen (symptoombestrijding) kunnen worden opgelost.
- Een traditie op het gebied van waterplanning en de aanwezigheid van een kennisgericht ondersteunend leersysteem (in de betekenis van nationale statistieken, wetenschap en onderzoek).
- Het vermogen om instituties voor waterbeheer aan te passen aan een toegenomen regimebereik (het vermogen om te innoveren binnen bestaande instituties voor waterbeheer en hun expertise te verbreden).

3. Veranderingshypothese over de hulpbronnen conditie: *Hoe meer de hulpbronnenconfiguratie van de water sector in een land ten gunste is van een geïntegreerd water regime, des te eenvoudiger zullen externe veranderingsfactoren het regime in die richting kunnen veranderen.* Relevante indicatoren voor de hulpbronnenconfiguratie zijn de volgende:

- Een traditie van effectief medebewind (co-governance) tussen centraal en decentraal bevoegd gezag (waarbij het centraal gezag voldoende inspanning levert om integratie te bewerkstelligen en het decentraal gezag is toegerust met voldoende hulpbronnen voor de implementatie en voor de differentiatie naar specifieke omstandigheden op lokaal niveau).
- Een traditie van burgerparticipatie en publiek debat over wateronderwerpen (waarbij participatie niet beperkt blijft tot algemene verkiezingen, maar evenzeer inspraakrechten zijn geïnstitutionaliseerd in processen van beleidsvoering en planning).

- Een sterke milieubeleidsector (met afzonderlijke milieudepartementen op alle bestuurlijke niveaus en milieustafafdelingen binnen de ministeries en overheidsorganen die bij waterbeheer betrokken zijn).
- Een sterke positie van groene non-gouvernementele organisaties (natuur- en milieuorganisaties).

In het eerste deel van deze dissertatie is het theoretisch analysekader uitgewerkt in termen van governance, property rights, regimes voor natuurlijke hulpbronnen, en institutionele verandering.

Het tweede deel van de dissertatie is opgebouwd uit meerdere studies naar water regimes in een zestal Europese landen. Hoewel de Nederlandse situatie centraal staat, is ervoor gekozen om deze te plaatsen in het perspectief van gelijktijdige ontwikkelingen in België, Frankrijk, Spanje, Italië en Zwitserland. De analyse van regimeontwikkeling en veranderings-condities is zowel op nationaal niveau als lokaal (stroomgebied)niveau verricht. Er worden lessen getrokken in termen van de drie veranderingshypothesen en de wijze waarop de onderscheiden condities in de verschillende landen een rol hebben gespeeld bij regimeontwikkeling.

In het derde deel van de dissertatie staat als speciale casus van water governance centraal de agrarische verontreiniging van grondwaterbronnen die nodig zijn voor de drinkwatervoorziening. Deze casus stelt ons in staat om de rol van de landbouwsector en de drinkwatersector als goed georganiseerde non-gouvernementele organisaties nader te bestuderen. We gaan met name in op de wijze waarop drinkwaterbedrijven landbouwers hebben kunnen aanzetten tot preventieve bescherming van grondwaterbronnen. Voor een deel is dat via zelfregulering gerealiseerd, in aanvulling op formele regelgeving die door de centrale en provinciale overheid is neergezet. De Nederlandse casus is vervolgens geplaatst in het perspectief van vergelijking met de Amerikaanse staat Florida, waar een soortgelijke problematiek speelt. Verschillen in aanpak tussen beide staten worden aan de hand van de drie veranderingshypothesen geanalyseerd.

In het vierde en laatste deel van de dissertatie besteden we aandacht aan het debat dat ten aanzien van marktwerking in de watersector is gevoerd. Dit debat wordt vanuit de regimeontwikkeling naar een steeds sterker publiek domein en een steeds meer beperkt privaat domein op het gebied van water als natuurlijke hulpbron beschouwd. Daarbij wordt ingegaan op het onderscheid tussen de publieke prestatie en de bedrijfsprestatie van waterbedrijven en waterorganisaties. Ook komen aspecten als kostenterugwinning en ketengerichte samenwerking in dit verband aan bod.

Notes on previous publication and co-authorship of chapters

Chapter 2

This chapter has been previously published as:

- Hans Bressers and Stefan Kuks, Governance patronen als verbreding van het beleidsbegrip (Governance patterns as an extension of the policy concept). In: *Beleidswetenschap (Journal of Policy Science)*, 15 (2001) 1, pp. 76-103.
- Hans Th.A. Bressers and Stefan M.M. Kuks, What Does "Governance" Mean? From Conception to Elaboration. In: Hans Th.A. Bressers and Walter A. Rosenbaum (eds.), *Achieving Sustainable Development: The Challenge of Governance Across Social Scales*, New York / Westport / London: Praeger, 2003, pp. 65-88.

Chapter 3

Parts of this chapter have been previously published as:

- Ingrid Kissling-Näf and Stefan Kuks, Introduction on institutional resource regimes. Comparative framework and theoretical background. In: Ingrid Kissling-Näf and Stefan Kuks (eds.), *The evolution of national water regimes in Europe. Transitions in water rights and water policies.* Dordrecht / Boston / London: Kluwer Academic Publishers, 2004, pp. 1-24.

Chapter 4

This chapter has been previously published as:

- Stefan Kuks, The evolution of the water regime in the Netherlands. In: Ingrid Kissling-Näf and Stefan Kuks (eds.), *The evolution of national water regimes in Europe. Transitions in water rights and water policies.* Dordrecht / Boston / London: Kluwer Academic Publishers, 2004, pp. 87-142.

Chapter 5

This chapter has been previously published as:

- Stefan Kuks, Comparative review and analysis of regime changes in Europe. In: Ingrid Kissling-Näf and Stefan Kuks (eds.), *The evolution of national water regimes in Europe. Transitions in water rights and water policies.* Dordrecht / Boston / London: Kluwer Academic Publishers, 2004, pp. 329-368.

Chapter 6

This chapter has been previously published as:

- Dave Huitema and Stefan Kuks, Harbouring water in a crowded European delta. The IJsselmeer and the Regge in the Netherlands. In: Hans Bressers and Stefan Kuks (eds.), *Integrated governance and water basin management. Conditions for regime change and sustainability.* Dordrecht / Boston / London: Kluwer Academic Publishers, 2004, pp. 59-98.

Sections 3 and 4 (case descriptions) were written by Huitema. Sections 1, 2 and 5, in which the cases are analyzed and positioned in the national context, were written by Kuks.

Chapter 7

Parts of this chapter have been previously published as:

- Hans Bressers and Stefan Kuks, Geïntegreerde regimes en duurzaam gebruik van natuurlijke hulpbronnen (Integrated regimes and sustainable use of natural resources). In: *Beleidswetenschap* (Journal of Policy Science), 17 (2003) 3, pp. 232-259.
- Hans Bressers, Doris Fuchs and Stefan Kuks, Institutional resource regimes and sustainability. Theoretical backgrounds and hypotheses. In: Hans Bressers and Stefan Kuks (eds.), *Integrated Governance and Water Basin Management. Conditions for Regime Change and Sustainability.* Dordrecht / Boston / London: Kluwer Academic Publishers, 2004, pp. 23-58.
- Hans Bressers and Stefan Kuks, Integrated governance and water basin management. Comparative analysis and conclusions. In: Hans Bressers and Stefan Kuks (eds.), *Integrated Governance and Water Basin Management. Conditions for Regime Change and Sustainability.* Dordrecht / Boston / London: Kluwer Academic Publishers, 2004, pp. 247-266.

Chapter 8

This chapter was previously published as:

- Stefan M.M. Kuks, Policy Framework - The Netherlands. In: Geerten J.I. Schrama (ed.). *Drinking Water Supply and Agricultural Pollution. Preventive Action by the Water Supply Sector in the European Union and the United States*. Dordrecht / Boston / London: Kluwer Academic Publishers, 1998, pp.149-190.

For this dissertation an introductory section was added.

Chapter 9

This chapter was previously published as:

- Stefan M.M. Kuks, Control Capacity - The Netherlands. In: Geerten J.I. Schrama (ed.). *Drinking Water Supply and Agricultural Pollution. Preventive Action by the Water Supply Sector in the European Union and the United States*. Dordrecht / Boston / London: Kluwer Academic Publishers, 1998, pp.191-230.

For this dissertation a concluding paragraph was added.

Chapter 10

This chapter was previously published as:

- Stefan M.M. Kuks and Hans Th.A. Bressers, Managing Water Resources in Florida and the Netherlands: The Impact of National Orientations on Multi-Scale Governance. In: Hans Th.A. Bressers and Walter A. Rosenbaum (eds.), *Achieving Sustainable Development: The Challenge of Governance Across Social Scales*, New York / Westport / London: Praeger, 2003, pp. 109-134.

Chapter 11

A first draft of this chapter was written as an advisory report by the Advisory council for research on spatial planning, nature and the environment (RMNO) in the Netherlands. It has been published as:

- S.M.M. Kuks, State of the art van kennisvragen voor de watersector. In: Raad voor het Milieu- en Natuuronderzoek (RMNO), *Institutionele veranderingen in de nutssectoren: kansen voor natuur en milieu*. Advies van de RMNO - nummer 146. Rijswijk, april 2000, pp. 34-48.

In its almost present state this chapter was previously published as:

- Stefan M.M. Kuks, Verankering van de waterketen. Een beschouwing van de publieke taak in de watersector en de implicaties van marktwerking en ketengerichte samenwerking. In: H. van Duivenboden,

M. van Twist, M. Veldhuizen, R. in ‘t Veld (red.), *Ketenmanagement in de publieke sector*. Utrecht: Lemma, 2000, pp. 71-89.

- Stefan M.M. Kuks, The privatisation debate on water services in the Netherlands. An examination of the public duty of the Dutch water sector and the implications of market forces and water chain cooperation. In: Fritz Holzwarth, R. Andreas Kraemer (Hrsg.), *Umweltaspekte einer Privatisierung der Wasserwirtschaft in Deutschland.* Dokumentation der Internationale Fachtagung vom 20. und 21. November 2000 in Berlin, Berlin: Ecologic, 2001, pp. 81-112.

For this dissertation section 7 was added.

About the author

Stefan M.M. Kuks (1961) works as senior research associate and lecturer at the University of Twente within the faculty of Business, Public Administration and Technology, in particular the Center for Clean Technology and Environmental Policy (www.utwente.nl/cstm). His research and educational work is focusing on institutional aspects of water management. Next to his university affiliation, Stefan Kuks is an elected member in the executive committee of the Waterboard Regge and Dinkel (www.wrd.nl) since 1999. He holds responsibility for the portfolio 'finance and economic affairs'.

Stefan Kuks studied Public Administration and Public Policy at the University of Twente from 1980 to 1988. He specialised in policy evaluation, policy design and policy communication. He graduated with a master's thesis on the Evaluation of Manure Policy in the Netherlands. During his study, he worked from 1983 to 1985 as junior consultant and interim-secretary on a formal evaluation of the Dutch Art Council in The Hague, as part of the project 'Reorganisation of the State Service', supervised by the Ministry of the Interior.

After his graduation in 1988 he joined the Center for Clean Technology and Environmental Policy (CSTM) at the University of Twente. From 1988 to 1989 he developed a course on Environmental Policy for the Dutch Open University in Heerlen. From 1989 to 1992 he worked as lecturer and course developer in the MBA Program 'Environmental Management' at the University of Twente. During a five-month period in 1992 and 1993 he was visiting researcher at Auburn University in the United States, with a travel grant from the Dutch Science Foundation (NWO). In 1993 he became director of the MBA Program 'Environmental Management' at the University of Twente, which he continued until 2000. During the period 1990-1995 he co-authored various books in the field of environmental management in industries.

In 1993 he initiated together with prof. Hans Bressers the European research project 'European Water Supply Authorities Preventing Agricultural Pollution', which got funding from the 4th Framework Program for European Research. From 1993 to 1996 he worked as a researcher on the Dutch case study within this project. In 1995 he was a visiting researcher at the University of Florida in the United States, with a travel grant from the Netherlands Institute of Government (NOB). This has been the preliminary start for a dissertation study on water governance.

In 1999 he initiated together with prof. Hans Bressers the European research project EUWARENESS (European Water Regimes and the Notion of a Sustainable Status; www.euwareness.nl), which successfully applied for funding from the 5th Framework Program for European Research. From 1999 to 2003 he has been daily coordinator for this project, in which more than 20 researchers from six European countries participated. He was also responsible for the Dutch case study and - together with Bressers - for the comparative work. This work resulted in two international books on water resource regimes and integrated water resource management, published with Springer (Kluwer Academic Publishers) in 2004.

From 2002 to 2005 he works as co-researcher in the European research project AQUADAPT (Strategic tools to support adaptive, integrated water resource management under changing utilization conditions at catchment level: a co-evolutionary approach; www.aquadapt.net), also based on the 5th Framework Program for European Research. Since 2003 he participates in the European Cluster on the Human Dimension in Water Management, in which many European projects in the field of socio-economic research on water management cooperate.