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Resources Engineering**

CREATING PATHWAYS FOR STAKEHOLDER PARTICIPATION IN WATER MANAGEMENT

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SUMMARY

Att förvalta vattenresurser på ett hållbart sätt är viktigt för välbefinnande och överlevnad för nuvarande och kommande generationer. Både mänskliga och ekologiska system karakteriseras av förändring och komplexitet, och därför har förståelsen för att förvaltningen av dessa system måste vara flexibla och anpassningsbara ökat. De globala trenderna för vattenförvaltning pekar åt samma håll: mot ett mer holistiskt, decentraliserat, och integrerat sätt att förvalta vattenresurser. Vikten av att involvera allmänhet och berörda intressenter har understrykts inom både forskning, lagstiftning och politik. Ett exempel är EU:s ramdirektiv för vatten som menar att nyckeln till en god tillämpning av direktivet hänger på hur väl medlemsstater lyckas integrera berörda intressenter och allmänhet i förvaltningen. Många frågor som forskningen berör är hur, när och vilka som ska delta i vattenförvaltningen. Men en stor utmaning är fortfarande att gå från ord till handling. Syftet med denna studie är att utforska färdvägar till att integrera berörda intressenter i vattenförvaltning. Särskilt med fokus på hur dessa vägar skapas, vilka sociala mekanismer som är viktiga för att respondera på förändring, och hur institutionella arrangemang kan generera deltagande. Dessutom, hur relaterar resultaten av studien till den svenska tillämpningen av deltagande enligt Vattendirektivet? Studien är baserad på resultaten från två artiklar, vilka gemensamt avhandlar tre olika fallstudieområden i Sverige. De tre områdena är två avrinningsområden i Skåne, i södra Sverige och ett avrinningsområde söder om Stockholm. Gemensamt för de två artiklarna är att studierna fångar upp begrepp som tid och förändring genom att studierna omfattar nedslag under olika tidsperioder, eller genom att följa utvecklingen i ett område under en längre tidsperiod. Data samlades in genom litteraturstudier, intervjuer, enkäter och andra officiella dokument. Resultatet visar att möjligheter till att byta färdväg gällande intressenters deltagande i vattenförvaltning, kan uppstå av sociala eller ekologiska förändringar. Sociala mekanismer som ledarskap och tillit, är viktigt för att investera i gemensamma och nya mål. För att sedan upprätthålla riktning på den nya färdvägen krävs institutionella arrangemang som uppmuntrar och möjliggör intressenters deltagande i vattenförvaltningen. Här är horisonellt samarbete viktigt, t ex mellan kommuner. Studien visar också på vikten av överbyggande organisationer eller individer som kan medla mellan olika intressenter, och har en förståelse för olika typer av kunskap. Resultaten av studien indikerar också att arvet av institutionella arrangemang kan påverka den framtida riktningen på vattenförvaltning, speciellt med avseende på att anpassa sig till nya förändringar såsom nya krav på intressenters rätt att delta i vattenförvaltningen. De institutioner som en gång har gjort en större anpassning och förändring i de institutionella arrangemangen verkar ha lättare att anpassa sig till ytterligare förändringar. Traditionella institutionella arrangemang såsom vattenvårdsorganisationer, kan vara mindre lämpliga för att leva upp till de nya kraven enligt Vattendirektivet, och den höjda ambitionen gällande förvaltningen. Nya institutionella arrangemang kan dock ha goda förutsättningar att integrera de nya kraven redan från början. Den svenska tillämpningen av Vattendirektivet innebär bland annat att lokala vattenråd ska etableras i avrinningsområden. Många av de redan etablerade vattenråden är dock skapade av traditionella vattenvårdsorganisationer, och risken är att de inte anpassar sin förvaltningstradition mot deltagande av ytterligare intressenter. Riktlinjerna för vattenråd säger heller ingenting om vem som bör skapa och leda vattenråden. Med tanke på att ledarskap och överbyggande organisationer visade sig viktiga i denna studie, så kan det innebära en risk för stagnering istället för förändring.

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LIST OF PAPERS

I. Franzén, F., Kinell, G., Walve, J., Elmgren, R., & Söderqvist, T. (2011). Participatory social-ecological modeling in eutrophication management – the case of Himmerfjärden, Sweden. *Ecology and Society* 16(4):27.

II. Franzén, F., Hammer, M. & Balfors, B. (2012). Institutional arrangements for stakeholder participation in water management – an analysis of two Swedish catchment areas. Manuscript.

ABSTRACT

The role of stakeholder participation has been increasingly recognized as important in water management. The EU Water Framework Directive (WFD), adopted in 2000 requires Member States to fulfill three levels of participation; information, consultation and active involvement. This thesis focuses on the third level of participation; where concerned groups, organizations or individuals are involved in co-designing or co-thinking of water management. This thesis uses case studies in Sweden to explore pathways for stakeholder participation in catchment-based water management, focusing on how the opportunity for stakeholder participation is created; social mechanisms important for responding to change; and how institutional arrangements can generate stakeholder participation.

The result of the study shows that opportunities for changing track towards more participatory water management could be triggered by either social and ecological changes or surprises. However, in order to take the opportunity to change, social mechanisms such as leadership and social capital, is crucial. The legacy of institutional arrangements affects how water management adapts to new requirements and surprises. Some old patterns might clash with new approaches of participatory and adaptive water management. The results show the importance of creating links crucial to generate stakeholder participation. Municipalities are important actors in catchment-based water management, as well as bridging organizations that can be seen as independent by participating stakeholders. Based on these results, the solution to realize active involvement of stakeholders suggested by the Swedish Water Authorities is discussed. The result suggests that there are some important challenges to overcome, regarding institutional arrangements that could encourage stakeholder participation in water management.

Key words: stakeholder participation; water management, EU Water Framework Directive; institutional arrangement; adaptive governance, eutrophication.

1. INTRODUCTION

1.1. Water governance in change

Water management is crucial to ensure sustainability and a decent livelihood for current and future generations. Yet, the global community has caused several significant water management failures. The desiccation of the Aral Sea (Micklin, 2007), the cod collapse of the Atlantic Cod outside Canada (Myers et al, 2007) and the contamination of the Baltic Sea (Elmgren, 1989) all illustrate the complexity of governing water – an element that is in constant motion just like the emissions and resources within it. The cases have also shown the long-term complications that

mismanagement implies. The pressure on water resources is caused by globalization of trade and economic systems, over-consumption and population growth as well as the lack of political, legal and institutional reforms necessary to deal with the current situation (Duda & El-Ashry, 2000). However, the growing understanding of natural and human systems as interdependent and nested in social-ecological systems, which are non-linear, complex and changeable (Berkes & Folke, 1998), has also entailed the awareness of environmental governance to be flexible, adaptive and prepared for change (Gunderson & Holling, 2002; Dietz et al, 2003; Folke et al, 2005; Kenward et al,

2011), and that there is no such thing as a universal solutions to all environmental problems (Ostrom, 2007). An adaptive management approach is open for learning and new knowledge, and its management pathway should be able to change direction in order to respond to change (Folke et al, 2005).

Consequently, water governance throughout the world is going through a period of change or paradigm shift, towards more integrated and participatory approaches (Pahl-Wostl et al, 2007). Saleth & Dispar (2000) identify common trends of institutional change of water governance, based on national case studies covering the continents of Africa, Asia, Australia, Europe and South America. Despite cultural, economic and ecological differences of the countries studied, there are some common trends such as decentralization and privatization, as well as integrated water management approaches. These approaches are also found in the Ecosystem Approach which includes guiding principles that are a part of the Convention on Biological Diversity agenda since 1995. These principles recognize approaches such as: ecosystems must be managed within the limits of their functions; decentralization to lowest appropriate level; involvement of the public and users; and integration of different sources of knowledge (CBD, 1998). Following this, the World Summit in Johannesburg 2002 on Sustainable Development emphasized the need of integrated water management approaches based on drainage basins, under the principles of good governance and public participation (Rahaman & Vallis, 2005). Another example of a global agreement linked to these trends is the United Nation's Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, signed 1998. Also, the EU Water Framework Directive adopted in 2000 follows the call for integrated water governance and stakeholder participation (European Parliament, 2000).

The importance of stakeholder participation in water management can be justified for two main reasons; democracy (Arnstein, 1969; Pateman, 1970); and effectiveness (Ostrom, 1990; Visser, 1999). However, the arguments for inclusion of stakeholder participation in natural resource management generally, are not univocal. Whilst some studies emphasize its importance for good governance and sustainable natural resource use (Ostrom, 1990; Dietz et al, 2003; Olsson et al, 2004), others question its ability to lead to ecological effectiveness, and encourage more studies on the issue (Lundqvist, 2004; Newig, 2005). Stakeholder participation in relation to water management is a current topic, but several questions are still unanswered and important to explore, not least how to go from words to actions. Relevant questions include how stakeholder participation is going to be developed and operationalized, and how it can lead to improved implementation of water quality objectives.

1.2. The EU Water Framework Directive

The EU Water Framework Directive (WFD) was adopted in 2000, and aims at achieving good status in all inland (groundwater and surface water) and coastal waters by 2015 (European Parliament, 2000). The WFD replaced a number of directives which covered water issues; in order to reach a more holistic common water policy (Kaika, 2003). The WFD is legally binding through the setting of environmental quality standards for surface and groundwater. The WFD suggests, following global trends, holistic management of waters according to their natural boundaries. This has implied a development of new administrative map of Europe, consisting of River Basin Districts (RBDs) as well as a establishment of new institutional arrangements (Kaika, 2003; Hammer et al, 2011). Additionally, the WFDs requirement on public participation and stakeholder involvement is seen as a key factor for successful implementation and is compulsory for Member States:

“The success of this Directive relies on close cooperation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public, including users.” (European Parliament, 2000, preamble 14).

In the guidance document to the WFD, public participation is divided into three levels: information, consultation and active involvement (European Commission 2003). The two first levels shall be ensured, and the third level shall be encouraged. However, how to ensure the requirements of participation is mainly up to Member States (Mouratiadou & Moran, 2007), which means that they should develop their own strategies for participation processes. Therefore, there are many studies exploring how stakeholder and public participation could be realized in the implementation of the WFD, involving issues such as if, who, when and how stakeholders should be involved in the process. Lundqvist (2004) brings up the trilemma of effectiveness, participation and legitimacy. Other studies explore proper decision support systems, participatory techniques and dialogue strategies (e.g. Jonsson et al, 2005; Giupponi 2007; Andersson et al, 2008); or the role of social learning in participation processes (Mostert et al, 2007; Borowski et al, 2008; Pahl-Wostl et al, 2008). Hence, there are many previous studies that explore and suggest different tools for participation processes that could be developed.

1.3. Water governance in Sweden – past and present

The municipalities have played a key role in Swedish water management, due to their strong impact on physical planning (Lundqvist, 2004). Water institutions organized according to catchment boundaries have existed in Sweden, since at least the 1950's (Galaz, 2004). These water associations have traditionally been a collaboration of municipalities, industries and other interested organizations. However, despite growing acknowledgement environmental issues and increasing pressure on water resources, the water associations'

scope of activities has mostly remained with monitoring (Gustafsson, 1996). One of the reasons discussed, is that the water associations have never gained status as legitimate planning actors; thus they have no political power and no clear role in decision-making (Lundqvist, 2004). As a result of WFD implementation, Sweden is divided into five RBDs, each governed by a regional Water Authority (RSAAF, 2006). The Water Authorities are responsible for developing management plans for the RBDs. Thus, in some sense this has led to a power shift in water governance from municipalities to Water Authorities, while, simultaneously there is a call for decentralization and stakeholder participation. Furthermore, Sweden consists of 119 smaller catchment areas and the Water Authorities have proposed the establishment of new water institutions, called water councils. The water councils are considered to be one of the main tools to ensure public participation (SWA, 2008), especially regarding third level of participation according to the WFD: active involvement. This level is not as well institutionalized in Swedish practice as the two other levels (Jonsson, 2005). In the proposition on WFD implementation in Sweden from 2002 (SOU, 2002:105) it was suggested that municipalities would be responsible for initiating local water institutions, such as water councils. However, this suggestion has not been realized, and municipalities have no clear role regarding the current institutional arrangement of catchment areas, which may affect their formerly role in Swedish water management (Hedelin, 2005; Andersson, 2011). The initiative of establishing a water council should preferably come from the local level; nevertheless, County Boards and Water Authorities can assist with the establishment (SWA, 2008). The water councils should for instance work as a conflict solving forum, suggest plans for water management, and comment on the Programmes of Measures produced by the Water Authorities.

Many studies on Swedish implementation of the WFD and especially on participation

processes were conducted in an early phase of implementation (e.g. Lundqvist 2004; Lundqvist et al, 2004; Hedelin, 2005; Jonsson et al, 2005). Thus, the integration and operationalization of the new requirements on stakeholder participation was not fully developed by the Water Authorities. In fact it is still in its cradle in many parts of Sweden. However, Andersson (2011) explored the institutional interplay on local and regional levels, based on the new water governance structure, entailed by the WFD.

1.4. The eutrophication challenge

One of the main challenges for the Swedish implementation of the WFD is reaching the environmental objectives linked to eutrophication impacts in coastal waters. Eutrophication is one of the main concerns in the entire Baltic Sea Region, caused by nitrogen and phosphorus leakage mainly from land. The agriculture is one of the main polluters of nitrogen and phosphorus and two of the case study areas in this thesis are situated in one of the most intense agricultural areas in Sweden. About 40% of the nitrogen and phosphorus originate from the agriculture (SEPA, 2008). One of the measures that have been proposed to meet the challenge is construction and creation of wetlands and buffer zones in the agricultural landscape (European Commission, 2003b; Arheimer, 2004). This measure is already today partly subsidized by the Swedish government; however it requires willingness and participation of farmers, since it is currently a voluntary measure. Wetland creation is not the only voluntary measure that has to be applied in the agriculture to reach the Swedish goals of the EU Water Framework Directive implementation. Therefore, farmers and other actors causing nutrient leakage will be key groups to incorporate into management.

Hence, even if eutrophication effects are noticed and monitored in water, the problem is very much a landscape issue. Participation processes linked to landscape issues and farmers have been explored in for example: Stenseke (2009) who for instance

show that different top-down policies are inconsistent and to some extent hinder effective local participation; Söderqvist (2003) who explore the motives of farmers to participation in wetland creation; and Wilson and Hart (2000) who also study farmers' motives to participate.

1.5. The aims of the study

The overall aim of my research is to explore pathways for active stakeholder participation in catchment-based water management. The focus is not on the participation process itself; rather how the opportunity for stakeholder participation is created; which social mechanism that are important for responding to change; and how institutional arrangements can generate stakeholder participation. Hence, change and adaptiveness are key words in the study, which is captured in the concept of pathways which can be described as the responses to change and the direction of management. The aim is particularly linked to the new requirements on stakeholder participation entailed by the implementation of the WFD. Neither the environment, nor human systems are stable and linear. Therefore, the water governance has to adapt to feedbacks from the ecological and social systems and be able to cope with new information. Eutrophication impacts could be seen as a feedback from the ecological system, and the new requirements from the WFD could be seen as new social (legal) conditions to adapt to. This study explores management responses to both ecological and social change.

The WFD implies managing water according to natural boundaries, i.e. river basins and catchment areas. This has led to, and will lead to establishment of new water institutions. In some parts of Sweden, catchment-based water institutions have been active since the 1950s and forward. In other areas of Sweden no such institutions are established yet, but might be a consequence of the implementation of the WFD. This thesis uses case studies from different areas in Sweden to illustrate these different stages of institutional development

on catchment-based level. The particular aim is to study if the legacy of institutional arrangement concerning stakeholder participation in water management matters, i.e. to study how appropriate old, current or newly established water institutions may be for changing pathway towards participatory water management. Another particular aim is to examine if, and how, science and policy integration approach can change pathways towards participatory water management. And finally, the research aims at comparing the results of the case study applications, with the ongoing implementation of the WFD in Sweden, in order to explore how decision-makers have solved important issues. Hence, following research questions are important for this study:

- What creates opportunities for changing pathways?
- Which social mechanisms are important for changing the direction of the management towards a more participatory and effective approach?
- How can institutional arrangement be designed in order to generate stakeholder participation?
- How do these results correspond to the Swedish implementation of the WFD regarding stakeholder participation?

2. THEORETICAL FRAMEWORK

The theoretical framework of this thesis is based on three main issues, which are linked in many ways; (i) the theories of participation in natural resource management, and (ii) the research on adaptive governance and pathways, and (iii) the social mechanisms mechanisms for building capacity.

2.1. Participation in natural resource management

2.1.1. Defining stakeholder participation

The literature on public and stakeholder participation is vast and touches many different scholars and disciplines. Early studies and milestones in the participation literature focused mainly on the power and democratic aspect of public participation.

Arnstein (1969) presented a participation ladder consisting of eight steps from “manipulation” to “citizen control”. “Arnsteins ladder” is cited in many later works on participation; however more recent studies have presented participation ladders that are more usable for this thesis (see Fig. 3). Pateman (1970) also contributed to the issue of participation, where she advocated a more participatory democracy approach. Hence, these early works focused on the societal dimension of participation and therefore involved mainly social scientists. The scientific sphere that is interested in the issues today is much broader.

Even though the issue of public and stakeholder participation in natural resource management still covers the issue of democracy and empowering of the people, it also covers the issue of effective management, i.e. it employs both social and ecological dimensions of sustainability and therefore it works as an appropriate issue to explore the links between the natural and social systems. There is no commonly adopted typology or terminology of participation studies, for instance public participation and stakeholder participation is occasionally used as synonyms and sometimes as different term. The public participation could then be seen as participation of individuals, whereas stakeholder participation could be seen as participation of representatives from organizations, groups and institutions (Earle et al, 2010). In this study the term stakeholder participation is used, distinguished from public participation, to emphasize that the study explores the role of active participation of concerned actors that are directly affected by the implementation of the WFD or earlier water quality policies.

The meaning of the word “participation” is essential here. It can be seen as one-way communication such as a simple top-down information flow, i.e. the authorities inform specific stakeholders or the public about new plans to be implemented. Or the opposite; the authorities need information or opinions from especially interested or

affected stakeholders or publics. But participation can also involve a two-way communication between different poles, either as a common learning process influencing decisions or directly involved in decision-making. Fig. 1 illustrates a participation ladder including some levels of participation which are relevant for this study.

The ladder presents different levels of participation, going from “information” to the highest level of participation “self-control”, where information is the simple one-way communication mentioned above. The self-controlled level could be illustrated by some of Ostrom’s examples self-evolving intuitions for governing a common resource (e.g. in Ostrom, 1990). Thus, in cases where people share the management of a common resource they are depending on.

In this thesis, the role of “co-thinking” and “co-designing” is explored, to highlight the focus on stakeholder participation in water management, and especially in relation to the requirements of the Water Framework Directive. The WFD presents three levels of public participation; information, consultation and active involvement. Hence, the two first levels correspond to the two first levels at the participation ladder (Fig. 1). Since this thesis focuses on the third level “active involvement” it should presumably correspond to some of the other levels. Which of the levels it should correspond to

is not certain, since Member States are free to achieve this level as they prefer. But, it is unreasonable to believe that it is self-control by the publics or stakeholders that the states want to achieve.

However, the study will also touch upon a stakeholder participation level that is difficult to relate to the presented ladder. It is the voluntary participation leading to actions; i.e. stakeholders that voluntarily carrying out measures to increase water quality, for example farmers that create wetlands on their farms. They are not involved in decision-making and they are not self-controlling formally, however in this case one could argue that they are. At least they are the real implementer of this suggested measure, yet it might have been proposed by another instance at a higher intuitional level. But since the examples of wetland creation in this thesis involve farmers to design and implement this measure, it could also be seen as a part of the “co-designing” and also “co-thinking” levels.

2.1.2. Arguments for stakeholder participation

The arguments and reasons for participation of concerned stakeholders in natural resource management are many, however not univocal. They can all be divided into two main groups of reasons; democracy and effectiveness reasons. Other terms have also been used, but they cover the corresponding

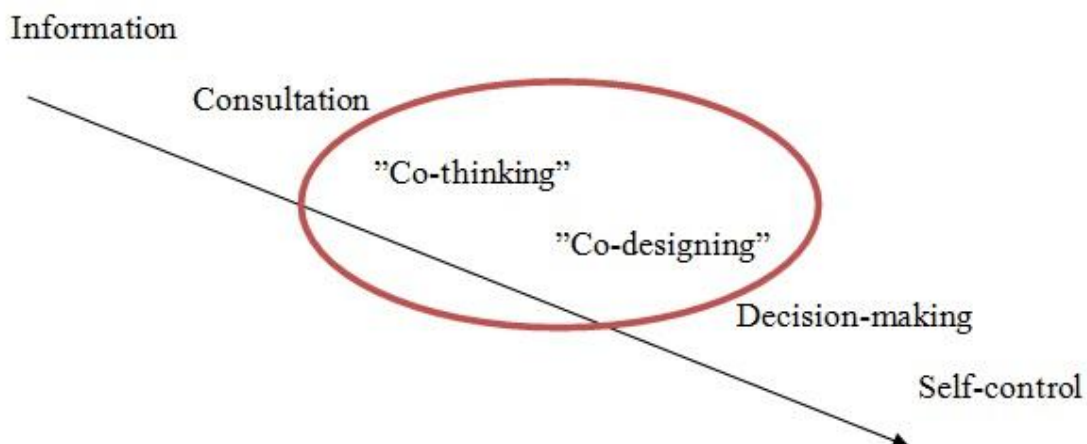


Figure 1. A participation ladder, adapted from Earle et al, 2010.

groups of reasons: Webler & Renn (1995) divide them into normative and functional reasons, while Newig (2005) divide them into effectiveness and legitimacy. Yet, the reasons within these two groups of arguments are highly interdependent and linked. For instance, an individual that experience possibilities to influence decisions about his or her direct environment (strengthen democracy) could also tend to accept trade-offs or own efforts to reach environmental targets (effectiveness). Exactly these two reasons; democracy and effectiveness, could also be held as risks when trying to develop and change towards more participatory governance. Participation of stakeholder could imply risks of different power resources – who is actually herd in participatory processes? The power relations can result in strong groups taking advantages of decentralization processes (Stenseke, 2009). And for the other reason: effectiveness – the participatory processes takes time and resources and can lead to ineffectiveness instead (Lundqvist 2004).

Commonly mentioned reasons for stakeholder participation are: (i) strengthen democracy and transparency in decision-making (Pateman, 1970) i.e. people have the right to be informed and affect decisions about the environment, most obviously emphasized in the Aarhus Convention (1998); (ii) increased acceptance for policies and regulations (Visser, 1999), since people tend to better accept things that are not happening suddenly and unadvertised (iii) cost-effective implementation of policies and programmes (Munch, 1998), if people are accepting movements they tend to oppose them the less (iv) incorporation of local ecological knowledge (Olsson, 2004; Folke et al, 2005), if involving local stakeholders the management could include previously unknown data from local expertise; and (v) management better adapted to local conditions of the social-ecological system (Ostrom, 1990; Berkes & Folke, 1998).

2.2. Adaptive governance of social-ecological systems

Human and natural systems are linked and nested in complex systems, i.e. social-ecological systems (Berkes & Folke, 1998). The term stress the fact that a partition between social and ecological systems is only imaginary and the way towards sustainable solutions of natural resource use comes when we understand both dimensions, and most important the interactions between them (Folke et al, 2005). Gunderson & Holling (2002) presents a comprehensive attempt to link economics, ecology, institutions and organizations, and evolution and complex systems in order to better understand mechanism and factors which are important for building capacity in social-ecological systems. Or put differently; to build capacity for resilience, which is a key concept here. The concept of resilience stress the fact that social-ecological systems are not linear and stable; but they can be more or less prepared, resistant or adaptable for change. Building capacity for resilience could also be seen as changing the management trajectories along a new more adaptive and sustainable path (Folke et al, 2005). One could argue that a community with adaptive management is open for learning, surprises and new knowledge, and the direction of its management pathway should be able to change direction. In an adaptive manner, crises could be seen as a possibility instead of an obstacle.

2.3. Social mechanisms for building capacity

The nature have formed human livelihood, but human behavior also change the environment. Some social mechanisms are important for building capacity for resilient social-ecological systems. In this section the focus is on the social dimension of natural resource management, and some of the important concepts for this study are presented, including social mechanisms that have proved to be important when building capacity.

2.3.1. Institutions and institutional memory

Institutional arrangement is a crucial human factor that drives environmental change (Dietz et al, 2003). However, institutions are not an isolated factor in determining social behavior and the outcome of natural resource management; nevertheless, they are one of many key parts explaining it (Ostrom, 2005). North (1990) defines institutions as "... the rules of the game in a society or, more formally, are the human devised constraints that shape human interaction." And Ostrom (2005) described institutions as: "Broadly defined, institutions are the prescriptions that humans use to organize all forms of repetitive and structured interaction..." The institutional arrangements for water management are not deeply explored in participation research, especially not what it entail in terms of stakeholder participation. Galaz (2004) argues that creating appropriate institutional arrangement for Swedish water management is one of the most important factors for allowing fruitful collaboration between state agencies and local stakeholders.

Regarding the institutional legacy; groups or institutions can share memories of practices, experience, knowledge or norms, which here is referred to as institutional memory (Olsson et al, 2004). The institutional memory can facilitate adaptive management approaches, by using experience of learning, or the opposite; the memory can block learning processes and innovation by "bad" memories of collective achievements, as in Galaz (2005).

2.3.2. Social networks and trust

The characteristics of social interactions have an impact on the possibilities of building capacity for adaptive management and resilience. Informal social networks have gained interest in natural resource management research, for example those studies that are linked to participation (Bodin et al, 2006). This development has also entailed more studies on social networks, where network analysis is applied, and henceforth called social network analysis (see for instance Lauber et al, 2008; Crona &

Hubacek, 2010; Sandström & Rova, 2010). Social network analysis facilitates comparison between different studies, which have been a complication within the sustainability field since it lacks common frameworks. The basis of network analysis is identification of nodes (individuals, organizations, etc.) and links (relations, collaborations etc.) between the nodes. The social network analysis can reveal the overall structure of the social network, and point out crucial links, pros and cons within the network structure such as information flows, ability to incorporate different kinds of knowledge etc. (Janssen et al, 2006).

2.3.3. Trust and social capital

A key mechanism in all social interaction is trust. Trust makes people invest in collective actions (Pretty, 2003). The level of trust between individuals in a group or network is captured in the concept of social capital. But the concept also involves common bonds, norms and relationships. Ostrom (2005) holds trust as one of the most important factors for successes in natural resource management and governance of common pool resources. It is simple to understand the importance of trust; however the question of how it could be created or accumulated is far more difficult. Kaika (2003) discuss this topic in relation to the implementation of the EU Water Framework Directive. She argues that the implementation demands new institutions to emerge, which should force changes in the social capital. But given the top-down approach of creating social capital, it can create resistance instead, and collide with the existing social capital.

2.3.4. Social and collective learning

Another important mechanism linked to trust-building is social learning. It has become more frequently studied in relation to stakeholder participation processes and water governance (Borowski et al, 2008; Pahl-Wostl et al, 2008). In natural resource management, it could be seen as based on three main ideas; stakeholders should be involved in natural resource management; this management demands organization; and

the management of natural resources is a learning process (Mostert et al, 2007). Learning is a key word in adaptive management approaches: a learning-by-doing approach has to be allowed in order to adapt to ecological and social feedbacks (Gadgil et al, 2000). A learning approach also relates to the need of include local ecological knowledge into adaptive management, i.e. local stakeholders with specific information of a local ecosystem, history of use etc. (Folke et al, 2005).

2.3.5. Key roles

Key roles in natural resource management research are widely explored; thus similar (however not identical) concept of key roles is mentioned: leadership, stewards, entrepreneurs, bridging organizations etc. Leadership is one of the most frequent proposed factors in studies of successful natural resource (Ostrom, 1990; Ternström, 2005), and the opposite lack of leadership for failures or hindering social learning (Mostert et al, 2007). Leadership seems to be most significantly important in early stages of changes or adapting to crises, before the process have turned into practices and management procedures (Folke et al, 2005). Thus, leadership is important to give the management a new direction: a new pathway. In some studies the role of stewards is emphasize; i.e. individuals with appropriate social skills to transform knowledge from different sources and lubricate collaboration between different stakeholders (Olsson et al, 2004). Additionally, the role of bridging organizations is also stresses as important in adaptive management approaches (Hahn et al, 2006). Further, Meijerink and Huitema (2010) explore the role of policy entrepreneurs for adopting transitions in water management, based on case studies around the globe.

3. METHODS

This thesis is based on the results from two case study applications, involving three catchment areas: The study in Paper I used a participatory modeling approach of social-ecological appraisal of policy options for

nitrogen management in Himmerfjärden study area, south of Stockholm, Sweden. A research team worked with a local stakeholder group during four years in building simulation of these policy options. The study in Paper II was based on a comparison between the institutional arrangements in Kävlinge River catchment area and Rönne River catchment area in the southernmost parts of Sweden. The comparison was based on three checkpoints in time, in order to study similarities as well as differences of institutional arrangements. Recalling the aims of my research: to explore pathways for stakeholder participation in catchment-based water management, the methodology applied in Paper I and II supported the research aims in following ways: the case study methodology allowed a deeper and broader study of each study area; the three case study areas illustrated three different cases in term of legacy of institutional arrangement around water management; all case studies capture the issue of time and change; the case studies represent different kind of stakeholder participation, yet all case study areas are catchment areas with significant eutrophication impacts.

3.1. Case studies

Case study research can be used for giving a more explicit picture of an issue or phenomena for the study concerned. The study case can be specific, typical or in another way be interesting; however the motivation for the choice of case study is important (Yin, 2003). In the following section the motivation for the choices of case studies will be presented. Paper I involves one case study area, whereas Paper II involves two case study areas and an analytical comparison. A literature review provided information of the case study areas, but also suggestions of existing knowledge and data gaps. Additionally new data was gathered by using interviews, questionnaires, and other documentation.

3.1.1. Motivation of case studies

The case study in Paper I is the drainage basin (catchment area) for the

Himmerfjärden, southwest of Stockholm, Sweden. The study was a part in the research project SPICOSA, which presented an approach of science and policy integration in integrated coastal zone assessment in 18 coastal zone areas in Europe (Hopkins et al, 2011). One of the tools used in the project was participatory social-ecological modeling, which was supposed to be based on mainly existing data. Hence, the choice of Himmerfjärden was based in part on the availability of data for the study area. The work in the study area was supposed to show ecological, economic and social aspects of eutrophication impact of Himmerfjärden. However, Himmerfjärden study area also illustrates some typical, and some specific coastal issues. A range of different interests and human activities in the area cause the typical pressure on a coastal area; increasing population (of the Stockholm region) causing increased demands on permanent and recreational housing, sewage treatment and water related recreation. Summed with current human activities such as industries and agriculture, it implies a range of typical coastal stakeholders with different agendas and opinions on land and water use in the area. A specific, yet not unique, concern for the area is a large-scale sewage treatment plant serving 280 000 people, situated in the area, causing a direct discharge of treated wastewater to this coastal area.

The case study application in Paper II involves two case study areas: Kävlinge River and Rönne River catchment areas, respectively. The areas are situated in the southernmost parts of Sweden in Skåne County. This area is characterized as the most intense and productive agricultural areas in Sweden, which implies that this area has to deal with significant amount of nutrient leakage from the agriculture causing eutrophication impacts in lakes, rivers and the sea (recipient). This was also the reason that new management plans were proposed in both these both case study areas in the middle of the 1990s by local water associations. These plans involved wetland creation and were therefore dependent on

farmers' participation to create wetlands, and the management plans were nearly identical. The areas are also similar in location, size, ownership structure and land-use activities. However, the outcome of the proposed management plans was totally disparate, both in terms of changes in institutional arrangement and environmental goal achievements. Thus, the areas were chosen in order to explore the role of institutional arrangement for realizing stakeholder participation in water management.

3.2. Questionnaires

In both case studies (Paper I and Paper II) questionnaires were conducted to a targeted group of individuals. In both cases the targeted group consisted of stakeholders involved in, or affected of water management in the study areas. The choice of conducting questionnaires was based on several advantages in terms of the data that was intended to be gathered. Firstly, the questionnaire format allows the researcher to give respondents a standardized interview, i.e. questions are asked exactly the same way (Brace, 2008). This facilitated a comparison of the respondents' answers, without uncertainties concerning how the questions were asked. Indeed, the respondent could perceive the questions differently anyhow, but in that case the question should be clear and well formulated. Secondly, the questionnaires allowed reaching targeted individuals in different places in the case study areas at the same time. And thirdly, the questionnaire format allows the respondent to reconsider his or her answers, and also to be anonymous if he or she wants.

For the study in Paper I two questionnaires were provided to the targeted stakeholder group. The first questionnaire was provided in the initial stage of the project, and covered questions on the respondents concern of the most urgent water quality issue in Himmerfjärden, and its social, economic and ecological impact. Questionnaire two, which was provided in the end of the project, repeated the questions of the first questionnaire, and

included additional questions of stakeholders' own experience of the project. The specific aim was to capture changes in stakeholders' answers, i.e. to study changes in knowledge, and to get the stakeholders' own view of the participation. The questionnaire for the study in Paper II was provided to the working groups of the water institutions in the case study areas. The questions covered the issue of collaboration between different stakeholder/actor groups in the areas, respectively. The aim was to study similarities and difference in institutional arrangements, which was illustrated by the collaboration patterns in the areas. The result was analyzed by using a social network analysis, described in section 3.4.

3.3. Interviews and other documentation

Since the questionnaire targeted a specific and local group of stakeholders, complementary interviews were conducted in order to put the case studies in a broader context. A semi-structured interview format according to Kvale (1996) was applied, which in addition to standardized questions (as in questionnaires) also allow for openness and follow up questions. The interviews provided an initial context and presentation of the purpose of the interview, followed by thematically as well as dynamic questions (Kvale 1996). The interviews were mainly conducted for Paper II, in terms of filling knowledge gaps (Holmström, pers.comm.; Carlsson, pers.comm.; Egerup, pers.comm.; Vartia, pers.comm.).

In Paper I, documentation from the stakeholder group meetings were used to evaluate the research process. The minutes from the meetings were written by the research team, but sent out to the participants in the stakeholder group for comments. The purpose of the minutes was to document the discussions during the stakeholder group meetings. Hence, these minutes were used in the evaluation of stakeholders' suggestion on the research process.

3.4. Other methods applied

Paper I employed a participatory modeling approach in connection with a science and policy integration project (see www.spicosa.eu). Participatory modeling has been used in water management in Sweden before (see e.g. Jonsson et al, 2007; Andersson et al, 2008). The basis for the method is to involve stakeholder in a modeling process either by deciding modeling focus, the aim of the model, crucial components of the model or giving input data to model. The results in Paper I was based on this science and policy integration project, however the analysis concerns the participation process and its outcomes, which methods are presented in section 3.1-3.3.

In Paper II a social network analysis was applied to analyze the results of the questionnaire presented above, used in for instance Lauber et al (2008). The methodology provided a structural framework for analyzing the collaboration patterns in each case study area; an illustrative picture of the collaboration patterns facilitating a comparison of the networks in the two water institutions and; enable comparison with previous research of social network structures for a development of resilient social-ecological systems.

The synthesis of the studies which is presented in this thesis was based on a literature review. The targeted issues for this review were studies on participation in natural resource management in general, participation related to the implementation of the WFD, water governance, adaptive governance and social aspects of sustainability.

4. RESULTS

In this section the main results from Paper I and Paper II are presented. Paper I involves the case study area of Himmerfjärden south of Stockholm, and the Paper II involves two case study areas in the southernmost parts of Sweden (see Fig. 2). Paper I focus on participation of representatives from different local stakeholders including; farmers, industry, municipality and nature

conservation organization, in a research project dealing with modeling of policy options for nitrogen management. Paper II focuses on changes in institutional arrangements in two catchment areas in southern Sweden. A management plan was suggested in both areas in the middle of the 1990s, and was based on a wetland creation in the agricultural landscape. Hence, this study deals with participation of farmers, as means to reach water quality targets; whereas the participation in Paper I could be a basis for future collaboration and action to reach a better water quality.

4.1. Paper I – Participatory social-ecological modeling in eutrophication management – the case of Himmerfjärden, Sweden.

This paper deals with a science and policy integration approach conducted in the coastal study site Himmerfjärden, south of Stockholm, Sweden (Fig. 2). The approach followed a system approach in which local stakeholders and a study site team constructed an integrated simulation model of a crucial coastal management issue (see Hopkins et al, 2011). The stakeholder group established consisted of a broad range of representatives from; municipalities, Stockholm County Board, industries, farmers, land owners and a local nature conservation organization, and pinpointed eutrophication and nitrogen enrichment as their main concern. The researchers in the study site team and the stakeholder group organized six meetings during four years to work with the integrated model and formulating potential options to deal with nitrogen enrichment in Himmerfjärden. The purpose of this paper was to study how the approach used affected stakeholders in terms of social and knowledge gains, and how the scientific results was affected by the stakeholder participation process. The methods used to study the impact of stakeholder participation were analyses of minutes from the six meetings and two questionnaires made to the stakeholders; the first in the initial stage of the project, and the second in the end of the project. The

result showed that the modeling approach helped identifying interesting and currently relevant management scenarios, and facilitated communication of the likely ecological, economic and social effects of these scenarios. The research and modeling process clearly gain from stakeholder participation, for instance by stakeholders adding relevant options for nitrogen management in the simulation model. One of these options was seen as unrealistic due to high costs, but on the other hand it presented the only option to reach WFD water quality standards. In addition, participating stakeholders also reported social gains in terms of network building. Several of the participants have started the initial discussions of establishing a Water Council to deal with water quality issues in Himmerfjärden. Hence, the research and modeling process clearly strengthened the social capital in the Himmerfjärden area, and created a basis for future collaboration regarding water management. Also, our results of science and policy integration indicated that the study site team assumed a leadership role, which is a commonly recognized factor in successful natural resource management.

4.2. Paper II – Institutional arrangements for stakeholder participation in water management – an analysis of two Swedish catchment areas

This paper focuses on an analysis of institutional arrangements for stakeholder participation in water management; more specifically in encouraging voluntary creation of wetlands in the agricultural landscape. The study involved two catchment areas in the southernmost part of Sweden: Kävlinge River catchment area and Rönne River catchment area (Fig. 2), with different institutional arrangements and management approaches concerning stakeholder participation and water quality objectives. Since the particular focus was on changes in institutional arrangements, the study was based on three different checkpoints in a timeline from the middle of

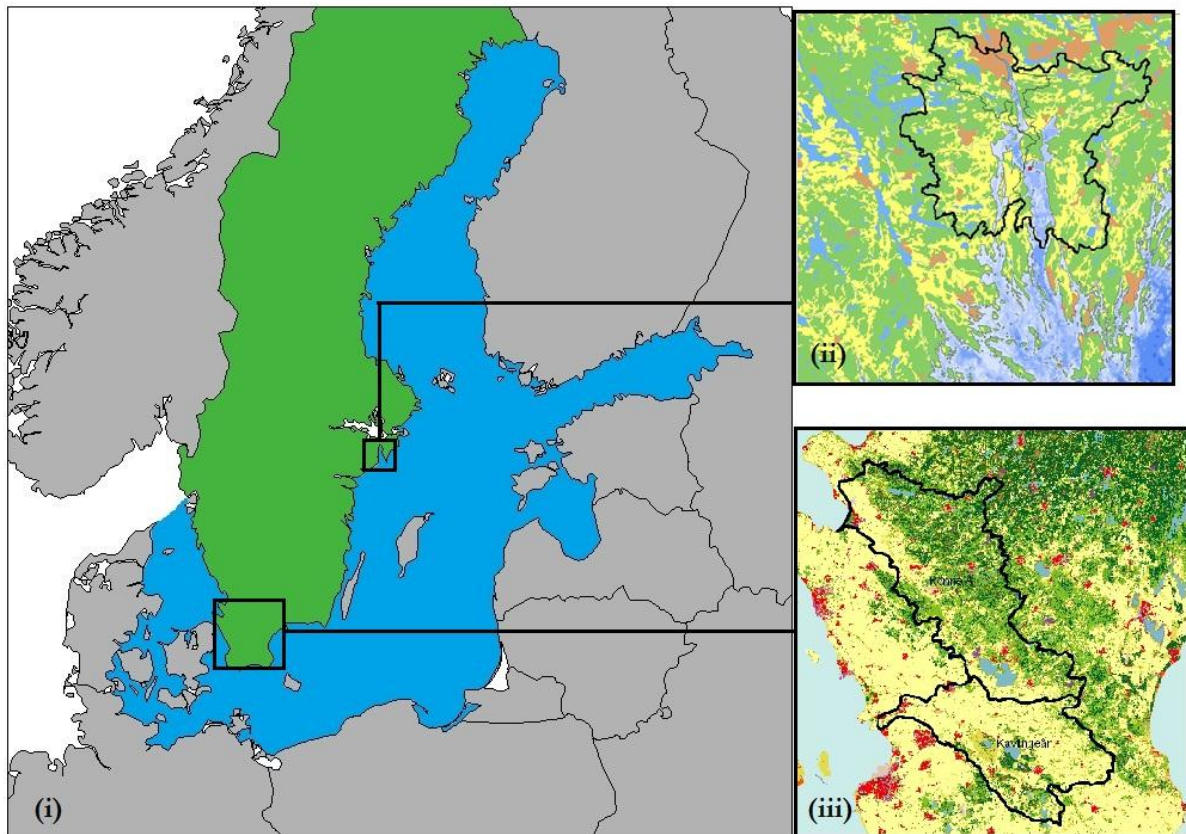


Figure 2. Case study map: (i) the case study areas position in the Baltic Sea Region, (ii) Himmerfjärden case study area, and (iii) Rönne River (upper area) and Kävlinge River (lower area) case study areas. The colors in the case study map (ii and iii) indicate blue = water, green= forest, yellow=arable land, orange/red=urban area. ©Lantmäteriet, permission I 2011/0094

the 1990s to recently. In the mid-1990s the water associations in both areas conducted management plans of ambitious wetland projects to deal with the nutrient leakage from the agriculture. Literature studies and interviews were carried out to investigate this time period. In 2007 a questionnaire was sent to operating working groups in both water institutions to study collaboration and networks in each study area. The result of the questionnaire was analyzed by using network analysis. In 2011 interviews were conducted with representatives from the Water Authorities in order to get a broader picture of the situation of local water institutions in the implementation of the WFD. The starting position for the study was the knowing that in Kävlinge River catchment area the wetland project was implemented and its goals achieved, and in the Rönne River

catchment area it was never realized at all. The result indicated that the situation in the mid-1990s were fairly similar in both areas; the management plans proposed were nearly identical and were both conducted by one consultancy group and planned by the local water associations in both areas. However the interviews indicated that there were representatives from the municipalities in Kävlinge study area who were pushing the development forward in order to establish a new water institution to deal with the implementation of the project. And on the contrary, that lack of leadership hampered the attempts to establish a similar institution in Rönne study area. Subsequently, the network analysis based on the survey conducted in 2007 revealed two different patterns of integration and collaboration of the water institutions. The institutional arrangement in Rönner River catchment

area was characterized by low horizontal integration and centrality; and in Kävlinge River catchment area, by high horizontal and vertical integration. The result indicated that strong collaboration horizontally in combination with an independent actor bridging stakeholders vertically, were crucial factors for water institution enabling stakeholder involvement. These results indicate that old, traditional water institutions might not be appropriate bases for new requirements or policy demands, such as those employed by the WFD. The interviews conducted with the Swedish Water Authorities in 2011 confirmed this. Instead, the newly established water institutions in Southern Sweden are more active and innovative than those who are based on old institutions. The current development in the case study areas also illustrates some differences: In Rönne River catchment area a water council has been established; however the representatives of this institution are nearly identical with the representatives in the water association. In Kävlinge River catchment there is an ongoing process of establish a water council, where the current institutional arrangement including the old water association, are proposed to be a part of a new greater organizational structure.

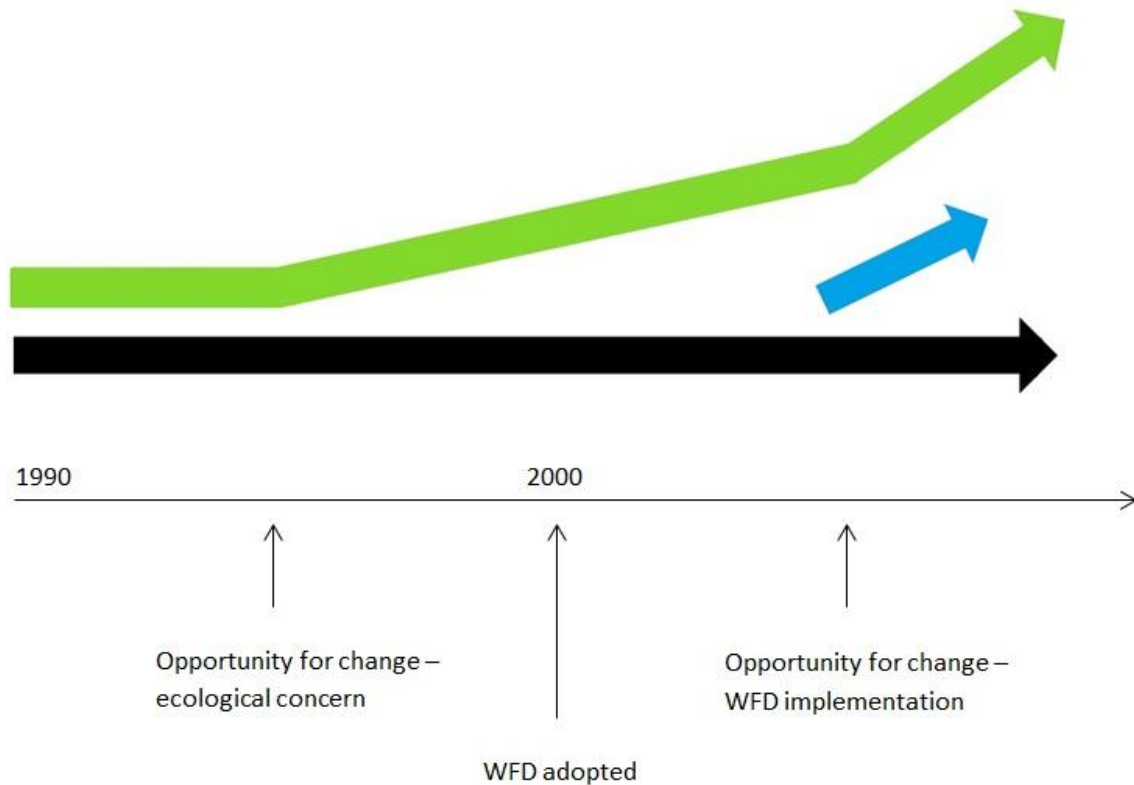
4.3. Summary

The results from the papers illustrated three different pathways of stakeholder participation in water management, and also different ways of responding to change. They also illustrate a difference in the legacy of institutional arrangement based on catchment level. The cases capture the issue of time and change in following ways: in Paper I a research team followed the stakeholder group in four years and the effects on stakeholders of the research process was studied. In Paper II the study focus on different check point in time, revealing both similarities and differences of institutional arrangements and stakeholder participation procedures. In terms of pathways for stakeholder participation in water management, they could represent three different patterns which are illustrated

in Fig. 3. The x-axis illustrates a timeline, from the 1990s into the future. The y-axis can illustrate the adaptiveness to response to changes or surprises. The figure is a qualitative illustration, which means that it does not illustrate a quantitative measurement of how adaptive the institutions are. The research in this study explored two phases of change: the ecological concern in the middle of the 1990s which entailed new management plans in Kävlinge and Rönne river catchment areas; and the implementation of the WFD which is an ongoing process. The green arrow can illustrate the pathway of Kävlinge River catchment area, which direction changed after the proposal of the management plan in the first opportunity for change. The implementation of the WFD has also implied suggested changes in the institutional arrangement. The black arrow can illustrate Rönne River catchment area, which institutional arrangement did not change after the management proposal in the middle of the 1990s. Currently a new water council has been established, but with similar representatives as the traditional water association. The blue arrow can illustrate the pathway of Himmerfjärden. The area had no legacy of institutional arrangement on catchment basis, therefore the arrow starts in relation to the implementation of the WFD. This overall illustration of the results in Paper I and Paper II, will be further examined in the discussion section.

5. DISCUSSION

The overall aim of this study was to explore pathways for stakeholder participation in catchment-based water management; in particular how the opportunity for stakeholder participation is created; which social mechanism that are important for responding to change; and how institutional arrangements can generate stakeholder participation. Furthermore, how the results of the study relates to the ongoing implementation of the WFD. The summarized results from Paper I and Paper II illustrates different pathways of



Figur 3. Pathways of institutional arrangements and stakeholder participation in catchment-based water management in the case study areas.

stakeholder participation in water management. It is here discussed in the following main aspects; opportunities for changing track; adapting to change - generating stakeholder participation; and these results in relation the implementation of the WFD.

5.1. Opportunities for changing track

Decisions we make today might have a great impact on our possibilities to adapt to future challenges, whether they are good or bad. They may change the direction for water governance on which pathway we travel. The new rules which the implementation of the EU Water Framework Directive entail, aim at guiding the society to more effective water governance. The implementation calls for innovation and new institutional to emerge (Kaika, 2003). Opportunities for changing track and allowing for innovation and novelty can be caused by ecological and social crises (Folke et al, 2005). But adapting to changes is not automatically generated

when crises occur. This section discusses different opportunities for change, and social mechanisms pushing the water management in a new direction: a new pathway.

Fig. 3 illustrated different opportunities for change in the case study areas, during the recent 20 years. In Kävlinge River and Rönne River catchment areas the urgent ecological status of the rivers and their recipients entailed the local water associations to establish a new water management, based on the participation of farmers in creating wetlands. Hence, an ecological concern called for action. In Himmerfjärden case study the opportunity for change was triggered by the research project, however the opportunity to continue the collaboration is very much based on the implementation of the WFD, since it calls for local stakeholder participation and water councils to be initiated. In an adaptive manner crises or abrupt changes could be seen as opportunities (Folke et al, 2005), but which

are the social mechanisms important for this worldview and causing adaptation in these case studies?

The results of both Paper I and II indicate that leadership is an important factor for responding on change in water management. In Paper I the scientific team assumed a leadership role, in arranging stakeholder group meetings in Himmerfjärden and involving stakeholders in a science and policy research process. The stakeholder group was recruited at a consultation process initiated by Swedish authorities, and was deepened into a more active process due to the research project; corresponding to the co-designing and co-thinking steps in the participation ladder (see Fig. 1), and to the WFD level active involvement (European Commission 2003). Thus, the participation process studied in Paper I was not a formal procedure in the Water Authority's regime, and shall therefore not be assessed as such. However, the collaboration has led to an establishment of a Water Council for Himmerfjärden drainage basin, after the research project ended in early 2011. Hence, the area have now future possibilities of creating new institutional arrangements for water management in the area, adapted to the call for stakeholder participation and catchment-based water management. The result of Paper I also shows how the research process enhanced the social capital and social learning among participants, and created new social networks. This could also have been as an important explanation that the group of stakeholders continued working together towards a formal water council.

The result in Paper II indicates that the leadership was important for the institutional change in Kävlinge River catchment area, in early 1990s. And also, that lack of leadership was a potential reason for the lack of change of institutional arrangement in Rönne River catchment area, where the wetland project was never realized. In both these two cases, the ecological urgency of growing eutrophication impacts was the call to act, which resulted in similar management plans

of wetlands creation. Yet, the result of these plans turned out differently. These cases show clearly how different respond to ecological change, alter diverse directions of future management.

5.2. Adapting to change – generating stakeholder participation

The initial change to adapt to new circumstances is crucial, but the new pathway does not solve it all, regarding stakeholder participation in water management. Stakeholder participation has to be organized and arranged in some way (Mostert et al, 2007). In this section the results of Paper I and Paper II are discussed with regard to how institutional arrangements could entail or hinder stakeholder participation, especially regarding legitimacy and effectiveness. The arrangements for stakeholder participation also involve creating crucial links between different stakeholder groups. This aspect or procedure of setting the arrangement for stakeholder participation is crucial for creating opportunities for effective stakeholder participation, i.e. where the process also leads to environmental goal achievements.

5.2.1. The legacy of institutional arrangement

The case studies in Paper I and Paper II illustrate three different patterns of institutional arrangements regarding water management according to drainage basin boundaries. Rönne River catchment area (Paper II) illustrates an area where a traditional water association have been monitoring the area since the 1970s. The institutional arrangements in the area have not changed much. Kävlinge River catchment area (Paper II) also illustrates an area where a water association have been monitoring the since the 1950s, but where the institutional arrangements was broadened in the 1990s due to the implementation of the management plan of wetland creation in the area. Himmerfjärden drainage basin (Paper I) (catchment area) illustrates an area without a history of water association or institutional arrangement

according to the drainage basin, until recently when a water council was initiated due to a research project on participatory modeling in the area.

It is earlier argued that old water institutions might not be appropriate for the new requirements on stakeholder participation (Pahl-Wostl et al, 2008). The result in Paper II shows how the traditional water institutions in southern Sweden might not be appropriate for the new requirement that the EU Water Framework Directive entails, neither on stakeholder participation nor on effectiveness of environmental goal achievements. In Rönne River catchment area a new institutions was never established in the 1990s, and the management continued to deal with mostly monitoring. This institution's legacy of old patterns of practice, mainly monitoring activities, does not seem to be an appropriate collaboration platform for the broadened management issues, also concerning actions (wetland creation) dependent on stakeholder participation. Galaz (2005) argue that the failure of creating a new institution in this area is partly explained by the collective memory in the area blocked learning processes and therefore also the potential to adapt to change. After the implementation of the EU Water Framework Directive gained in importance, the institution is now developed into a Water Council, however without broadening the representatives of stakeholders (see Fig. 3).

In the Kävlinge River catchment area a new water institution was established, where the old traditional water association still remains and is a part of the overall organizational structure. The social network analysis on both Kävlinge and Rönne River catchment areas illustrated a similar network structure regarding the old water association, i.e. these associations had both important links and collaboration with municipalities and industries. The new institution in Kävlinge River catchment area illustrates a good example of how water institutions could deal with actions incorporating stakeholder participation leading to actions for increased water quality. The ecological concern raised

almost ten years before the EU Water Framework Directive was adopted, and the changes in the institutional arrangements seems to have entailed an overall better preparation for the new requirements of the WFD. In other words; they changed the direction of their pathway of water governance years ago, which seems to help them today.

The Himmerfjärden case study area lacked formal institutional arrangements regarding water management at a drainage based boundaries. However, the result of the science and policy approach in Himmerfjärden seems to have triggered an establishment of a water council for the area. The initiation of the water council has the potential of generating stakeholder participation in water management in the area. However, even if the participation process was successful (rewarding for both participants and the research process) it is still an open question whether the water council will gain legitimacy and agree on actions and achieve environmental goals. Yet, they have the possibility of adapting to the new requirements given by the implementation of the WFD, since they begin their history of institutional arrangements with the notion of its purposes.

The role of change both in term of institutional arrangement and stakeholder participation practices seem to be important to adapt to new requirements in terms of fulfilling environmental quality standards: socially (legally) and ecologically. Based on the results of institutional arrangements of the studied cases, one could argue that old patterns of institutional arrangements might be an obstacle for adapting to the new requirements of the WFD, and that the once adapted and broadened institutional arrangement is fairly well prepared for new changes, and finally, that the area with a totally new institutional arrangement has the potential of adapting well, as illustrated in Fig.3. The interviews with representatives from two Swedish Water Authorities indicate that these new institutions, lacking earlier history of catchment-based

institutions, might be better off in terms of generating stakeholder participation, than the old institutions, which are normally collaboration between municipalities and industries (Carlsson, pers. comm.; Egerup, pers.comm.; Vartia, pers.comm.). For example, these new institutions seem to be better in incorporating a wider range of stakeholders. The old institutions might carry an institutional or collective memory, meaning that it knows what practices that have worked well and those which have not worked. They follow their pathway of feasible practices, even in the new phase of social and ecological change. The new institutions thought, do not have any institutional memory, neither good nor bad, thus novelty and innovation is a need for getting somewhere at all, in the water management practices and stakeholder participation processes. Also the old, traditional water institutions may also be constraint by the organization's statutes (Holmström, pers.comm.)

5.2.2. Creating important links

Stakeholder participation might not always be positive, successful or effective in terms of environmental goal achievements. For instance, Human and Davies (2010) show how the disparity between stakeholders' and scientists' perceptions hampered the process of involving stakeholder in the planning process of scientific programmes. Lundqvist (2004) also emphasize this issue, and refers to a trilemma between participation, effectiveness and legitimacy in water governance. However, social network studies show the importance of creating the right connections to improve natural resource management (Crona & Hubacek, 2010). The results of this thesis suggest that this is one important aspect of stakeholder participation in water management; to create the right links between crucial stakeholder groups. In this case it is also important for the legitimacy of the institutional arrangement, and finally for effectiveness.

The social network analysis in Paper II illustrates the patterns of formal collaboration in Kävlinge and Rönne case study areas. In the comparison there are

many differences, yet one of the most significant is the collaboration between municipalities. The network structure between the municipalities in Kävlinge River catchment area is dense, i.e. the collaboration is lively, while, the result for Rönne River catchment area reveals no formal collaboration between municipalities. The institutional arrangement in Kävlinge is based on an agreement policy between all nine municipalities in the area (Ekologgruppen, 2004). This is important, since the municipality involvement can give the institutional arrangement legitimacy and direct possibilities of financing actions. The results from Paper I are not comparable with the results in Paper II, since different methodologies were applied. Yet, the importance of participating representatives from municipalities was important also here. For example, in the procedure of scenario building, i.e. the choice of policy options to simulate and study, the representatives from the agricultural sector found it important to include policy options also for private sewers and sewage treatment plant, i.e. measures that the municipalities are responsible for. This minimized the conflict risk in the stakeholder group, and the process could follow in a constructive manner. Based on the result of Paper II, the contacts between municipality representatives in Paper I can also be important in future water management. Yet, the role of municipalities in the Swedish implementation of the WFD is ambiguous (Hedelin, 2005; Andersson, 2011). The establishment of the Himmerfjärden water council will not automatically lead to ecological effectiveness and goal achievements as in Kävlinge River catchment area. The municipalities must then play a role as financier and give the water council a voice in decision-making.

Another significant difference from the result of the social network analysis in Paper II was the presence of a bridging organization in Kävlinge River catchment area. This organization had formal collaboration to almost all other stakeholder groups that the study covered; especially

lively collaboration with the farmers. This organization lubricates the function of the institutional arrangement by being a link between different stakeholder groups. The role of bridging organizations for adaptive management has been emphasized (Hahn et al, 2006). The result in Paper I shows how the scientific team involved acted as a facilitator in leading the process in an initial stage. Folke et al (2005) discuss the potentially new role of the scientist in decision-making in adaptive systems of rapid change. They argue that the scientists go from objective specialists, to deliver knowledge to managers and become one of several actors in the learning process. Rowe & Frewer (2009) mention the “independence criteria” for assessing feasibility and effectiveness of different public participation techniques. It implies that facilitators and managers leading a participation process is independent, or at least is seen as independent by participating stakeholders or public.

The results of this thesis indicate that a facilitator that is acceptable for concerned stakeholders, is important for lubricate institutional arrangements based on stakeholder participation. The facilitator could be a local engaged stakeholder – as in the case of Kristianstad Vattenrike (Hanh et al, 2006), a scientific team – as in Paper I, or even the Water Authorities informing about new requirements and potential of the new water management.

5.3. WFD implementation - opportunities for new pathways?

Summarized, the results indicate on some important finding regarding changing track to new pathways towards participatory and adaptive water management: Opportunities for change could be triggered by either social and ecological crises or surprises, as earlier suggested (Folke et al, 2005). Hence, to respond to this change in an adaptive manner, social mechanisms such as leadership and social capital is important. The legacy of institutional arrangement seems to affect how water management could adapt to new requirements and

surprises. Some old patterns might clash with new approaches of participatory and adaptive water management. And finally, the results show how the importance of creating links which are crucial to generate stakeholder participation. Municipalities are important actors in catchment-based water management, as well as bridging organizations that could be seen as independent by the participating stakeholders.

So, does the Swedish implementation of the WFD imply opportunities for generating stakeholder participation? This is not a trivial question and the research in this thesis could not cover the issue fully. However, following sections discuss some of the institutional challenges that the result of this study point out. And also present some important future studies for filling knowledge gaps on the issue of stakeholder participation in water management.

5.3.1. Institutional challenges

The implementation of the WFD in Sweden could entail opportunities for changing pathways towards active stakeholder participation in water management. But as discussed above, taking opportunity requires leadership, social learning and social capital. The development on guidelines on active stakeholder participation and establishment of water council do not solve the question of leadership, rather the opposite: No one is suggested or appointed as taking a leading role in establishment of water councils. However, the Water Authorities in some River Basin District have been active in pushing this development. The result is that some new institutions have been established, but in many catchment areas the water councils is solely a new name of the old water associations. The result of this thesis indicate that some of the old problems of making these associations go from monitoring to planning for measures is then still current. Thus, the new solution for stakeholder participation regarding water councils does not fully cope with this issue. Likely wise to the old water associations, the water councils will not automatically be given legitimacy. That raises the question of

the incentives of participating, and the type of participation the Water Authorities request. Furthermore, does the implementation of the WFD imply a decentralization process, when a power shift has moved some responsibility from municipalities to Water Authorities? The result of the thesis regarding the role of independent actors and bridging organizations is not considered in the implementation. This could of course be a difficult task: who is seen as independent and by whom? A future challenge for the water governance in Sweden, and for other nations striving for a more participatory and adaptive water management is going from requirements, to practices, to formal intuitions and finally to actions and goal achievements. But that depends highly on what the agenda for stakeholder participation is based on; fulfillment of legal requirements, enhanced democracy, ecological effectiveness or all of them.

5.3.2. Future studies

Different aspects on stakeholder participation in water management need to be explored and further studied, and much is still to be discovered. Many attempts of incorporating the WFD requirements on stakeholder participation are still in its cradle. Further studies could explore what type of stakeholder participation that is requested from top levels (authorities) and from local level (both municipalities and users, such as farmers)? Does the implementation of the WFD entail decentralization? And how could the institutional arrangement be designed so to encourage stakeholder participation? This thesis shows the importance of establishing right connections, in order to making the participation process work. In order to further explore the right connections studies exploring the current trust among institutional levels and between different stakeholder groups would be important.

This thesis covers some of the aspects important for generating stakeholder participation and adapting to change, mostly regarding social mechanisms such as leadership, trust and institutional

arrangement. But another aspect is the incentives for stakeholder to participate. What factors increase the willingness to participate? For instance, the inclusion of the agriculture sector will be an important next step in the implementation phase. Here, much more effort could be made to understand best practices for participation; attitudes among farmers and trust for authorities and other stakeholder groups; motivation for participation etc.

Another interesting field is the interface between science and policy. How can scientific results be useful in practice? How can for example, the knowledge of the importance of leadership and bridging organizations be formalized into water management? And how can the scientific procedures be incorporated in policy development?

6. CONCLUSION

Water management is an important issue to obtain a decent livelihood for current and future generations. Participatory, adaptive and integrated approaches are common trends for water management worldwide. However, a challenge is how such approaches can be realized, moving from words to actions. This study explores pathways for creating and generating stakeholder participation in catchment-based water management, especially regarding the requirements for participation entailed by EU Water Framework Directive. The research focused on social mechanisms, institutional arrangements and management practices for realizing stakeholder participation. The research was based on two papers including three case studies of Swedish catchment areas, with different legacy of institutional arrangement and practices for stakeholder participation in water management. The results indicated on some important finding regarding changing track to new pathways towards participatory and adaptive water management: Opportunities for change could be triggered by either social and ecological crises or surprises. Hence, to take the opportunity social mechanisms such as leadership and

social capital is crucial. The legacy of institutional arrangement seems to matter on how water management could adapt to new requirements and surprises. Some old patterns might clash with new approaches of participatory and adaptive water management. And finally, the results show how the importance of creating the crucial links to generate stakeholder participation. Municipalities are important actors in catchment-based water management, as well as bridging organizations that could be seen as independent by the participating stakeholders. If comparing these results and the solution on how to realize stakeholder participation entailed by the Swedish implementation of the WFD, some questions arise: Leadership is a significant factor for changing pathway in this study and supported by earlier research, so how come the suggested water councils are lacking guidelines concerning this issue? How are the roles of old institutions supposed to be solved by new guidelines? The procedure of changing European and Swedish water governance towards a more participatory and integrated approach has only begun. Fundamental changes take time. It will surely be an interesting and challenging struggle to change pathways to facilitate formalized stakeholder participation in water management.

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