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Cooperation – a possibility or a barrier on the path to sustainable water management?

- Exploring the role of cooperation in the Water Framework Directive from a local perspective

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Abstract

The Swedish municipality Laholm has faced problems regarding water quality, mainly nitrates, herbicides and pesticides from agriculture and nearby railways. Consequently a conflict between different water users in the region has evolved. Since everyone can use water resources, but no one is responsible to protect it, misuses easily occur. Despite that actors benefit from cooperation, they continue to maximise their own share on the behalf of the collective. Thus, it has been argued that water issues must be solved through cooperation between stakeholders, which result in a more effective and sustainable management of water resources.

Cooperation is one of the key concepts of the ongoing implementation of the EU Water Framework Directive. The aim of the Directive is to, through cooperation, secure that water of 'good status' is attained and maintained in all waters within the European Union.

The overall aim of this paper is to explore the capabilities of cooperation in order to achieve the set targets in the WFD and consequently improve the water quality and secure a sustainable water management in the municipality of Laholm. To address the aim of the paper both a literature review and qualitative interviews have been used. Additionally, system analysis works as a tool through out the whole paper in order to explain and illustrate concepts, behaviours and relationships.

The conclusion is that cooperation is necessary in order to solve the water issues in the municipality of Laholm and to achieve the targets of the WFD. However, due to the character of the Directive, the cooperation process is likely to be both lengthy and inefficient. The WFD is an attractive directive with new and unique approaches that in theory works fine. The real world is more complex, why the path to achieved targets will not be as smooth as in theory.

Keywords: Water issues, Sustainable Water Management, Water Framework Directive, Cooperation, PPP, Sweden, the municipality of Laholm

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1 Introduction

The Swedish municipality Laholm has due to individual interests of water use faced problems regarding water quality. The main issues concern pollution from nitrates, herbicides and pesticides, which mainly arise from agriculture and nearby railways. Consequently, there is an existing conflict between water quality, agricultural production and weed control of railways in the municipality of Laholm (I3). The situation in Laholm is, however, far from unique. Water has been the source of conflicts for all times, both locally and nationally, as well as globally (Clarke, 1991:90-110). Water is a complicated resource indeed and according to Lundqvist (2004b:17) conflicts do occur when different actors claim water resources for individual purposes. This is a consequence of the unique character of water. Water can not be created or replaced (Clarke, 1991:90) and can not, in most cases, be owned or utilised of a single actor (Lundqvist, 2004b:17).

Water is a so called 'common pool resource', meaning that different users can utilise the resource, but no single actor can control it as a whole. Thus, an action from a single user impacts the other actors, including both negative and positive effects. It also means that everyone can use the resource, but no one is responsible to protect it, why a misuse easily occurs (Lundqvist, 2004b:17-19). Misuse of this kind often results in a 'social dilemma'. All actors know that they would benefit from cooperation at a level that makes the resource sustainable. However, they continue to gain as much as possible since every actor benefits more from maximising their own share on the behalf of the collective rather than favour the collective. As a consequence, everyone eventually loses (Lundqvist, 2004b:17-19). Water as a social dilemma is an example of the classical concept of 'the tragedy of the commons' stated in the 1960s. According to Hardin (1968:38) "Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons."

To avoid this misuse it has been argued that water must be seen in a holistic perspective and more attention must be given to protection and maintenance of water as a common and transboundary resource (Hägerhäll Aniansson and Vidarve, 2003). Concepts as participation and cooperation are widely spread in environmental policy today and water management is not an exception. Increased cooperation between stakeholders is believed to result in a more effective and sustainable management of water resources (Galaz, 2004a:117).

The implementation of the EU Water Framework Directive (WFD) in Sweden that currently is in progress, deals with the concept of cooperation. The Directive relies a great deal on the belief that different water users and other stakeholders will cooperate in order to encourage sustainable water management¹ (Galaz, 2003). The overall aim of the WFD is to secure that water of 'good status' is attained and maintained in all waters within the European Union (SEPA, 2002a) and the central strategy to reach that goal is cooperation (EC, 2002a). Cooperation is required on both international levels, i.e. between Member States, and on national levels, as well as locally. Participation from all actors, including non-governmental organisations and local authorities, such as municipalities, industry and citizens (Galaz, 2003) involved in the water management process is also of great importance to make the Directive successful (EC, 2002a).

A central approach in the WFD is that river basins instead of administrative borders are considered. In order to understand the impact of the aquatic ecosystems and to solve water issues the whole

¹ In this paper, the concept of sustainable water management will follow the well known definition of sustainability also known as the Brundtland Commission: Sustainable water use is "*use which meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Nixon et al., 2000, p. 5).

river basin must be taken into consideration. This approach requires that different actors within a certain river basin must manage their water in close cooperation. Cooperation and measures in order to achieve the target of good status will, however, require financial resources. Thus, a central part of the Directive is the *Polluter - Pays – Principle* (PPP), meaning that the polluter is responsible to pay for their pollution. According to the WFD prices for both pollution and usage of water have to be decided and within the year of 2010 the Member States are obliged to present a functioning working price policy for a more efficient and sustainable use of water (Hägerhäll Aniansson and Vidarve, 2003).

Furthermore, the WFD states a frame without a strict working plan and consequently creates opportunities for a future water management from a bottom-up perspective. The purpose is that the best solutions are to be taken locally in order to achieve both cost effective solutions and improved water quality. Every river basin has its own history and requires unique solutions, why local initiatives and decision making are important factors. The knowledge, experiences and desires of the different actors should be collected in an active process and participation should characterise the whole process from problem definition to measures taken. As a consequence the municipalities in Sweden will have a central role in the process to a sustainable water management. Most of the contacts with citizens, organisations and companies take place within the municipalities and they are also responsible for fundamental political decisions. The engagement of the municipalities will therefore play an important role in the future water management in Sweden (Svenskt Vatten, 2005a).

Thus, the municipality of Laholm has a central role in the cooperation process in order to follow the instructions in the WFD, but the Directive also opens up possibilities to solve and prevent water issues in the region. Cooperation is the key concept in the Directive (Hägerhäll Aniansson and Vidarve, 2003), why communication between different actors and water users will be a vital factor in the work towards a sustainable water management in the municipality of Laholm.

The new approach considering river basins and promoting cooperation presented in the WFD is an attractive idea and essential in order to achieve sustainable water management in Europe. The question of how smooth and efficient the cooperation process, involving many actors with different interests in the use of water is, remains, however, to be answered.

1.1 Objectives and scope

The overall aim of the paper is to explore the capabilities of cooperation in order to achieve the target of the WFD and consequently improve the water quality and secure a sustainable water management in the municipality of Laholm.

The case of the municipality of Laholm is used to illustrate and exemplify the role and importance of cooperation between municipalities, organisations and local actors in order to achieve water of good status and maintain a sustainable water supply for future generations.

The paper is roughly divided into three parts. The first section (chapter 3 and 4) provides background information about the municipality of Laholm and the water issues identified in the region. Additionally, water as a resource is explained, as well as two main water problems, water shortage and water pollution. Sustainable water management is also included in this part. The aim of the first section is:

- To give a background to the case of the municipality of Laholm
- To explain why water resources must be managed in cooperation

- To give a deeper understanding to the need of a new water directive (WFD) in Europe

The second part (chapter 5 and 6) describes the WFD and the role of cooperation. Apart from giving a background to the Directive and the process of cooperation the aim of this section is:

- To determine the possibilities and barriers regarding cooperation in general
- To explore the possibilities of cooperation in order to achieve the set targets in the WFD

In the last part (chapter 7) the water issues in the municipality of Laholm is discussed on the basis of previous literature and interviews used in the paper. Additionally, cooperation in order to achieve sustainable water management is discussed and the objectives of this part are therefore:

- To identify the possibilities and barriers regarding cooperation to solve the water issues in the municipality of Laholm
- To evaluate the concept of cooperation on the path to sustainable water management

1.2 Hypothesis

The hypothesis is that cooperation and the PPP will result in improved water quality and a sustainable water supply in the municipality of Laholm, Sweden. Since water is movable and non-owned, cooperation between municipalities or actors within a municipality is required to achieve the set target of the WFD. The PPP encourage the polluter to take measures to reduce their emission costs, which through cooperation will improve the water situation in the region.

1.3 Limitations

The aim of the paper is to evaluate the concept of cooperation and is therefore not evaluating the WFD itself. The focus is on cooperation at the local level, i.e. cooperation between municipalities, organisations and local actors. Hence, cooperation between Member States in the European Union is not taken into consideration.

The municipality of Laholm is used as an example to illustrate how conflicts between different water users can evolve and to identify the possibilities and barriers with cooperation in order to solve the problem. Because of geographical and geological differences, as well as differences in trade, industry and economy, between municipalities in Sweden and also between Sweden and other countries the conflicts highlighted in the paper might vary if other parts of Sweden or the rest of the world were studied. The concept of cooperation and its role to solve water issues is, however, valid for all kinds of conflicts regarding water.

The analysis and discussion is concentrated on two major actors since they are responsible for the major pollution in the municipality. The author is, however, aware of that further water users are involved in the municipality of Laholm.

2 Methods and Materials

To address the objectives of the study both descriptive and analytical methods are used. A literature review is done for the descriptive part of the paper, whilst qualitative interviews are used both for background information and analysis. System analysis works as a tool through out the whole paper in order to explain, illustrate and visualize concepts, behaviours and relationships.

Both primary and secondary data is used in the paper. Secondary data is used to give a background to the case of Laholm, the Water Framework Directive and to the water issue as a whole. Additionally, primary data is used to describe the case of Laholm.

To evaluate the role of cooperation in the WFD and the possibilities and barriers of cooperation, in order to improve the water situation in the municipality of Laholm, a literature review is done and primarily data, through qualitative interviews, is applied.

2.1 Methods for research

Roughly, there are two main research methods, namely quantitative methods and qualitative methods. Quantitative research is based on numerical analysis, while qualitative research is characterised by understanding of situations (Hartman, 1998:273). To address the objectives of the paper and attain deeper knowledge in the studied area the qualitative research method is used in the paper. The analysis of the paper is a combination of the literature review and the results from the interviews. Thus, the results and conclusion are primarily based on the author's interpretation, which results in a subjective analysis.

2.1.1 Interviews

The qualitative interview is a sensitive and powerful method, which is useful when collecting experiences and facts from the every day life of the respondent. Through the interview, the respondent can communicate their situation to others from their own perspective, with their own words (Kvale, 1997: 32-42).

Interviews used in the paper are unstructured and to a low extent standardised. Unstructured in the manner of that open questions are used, which encourage discussion. Unstructured interviews are suitable in qualitative analysis of the results and give the respondents much freedom in answering the questions (Patel and Tabelius, 1987). As a consequence of the unstructured character of the interviews used in the paper, the additional questions differed between the respondents.

In the paper the questions were asked in the same order, which indicates some form of standardisation. Additional questions were given to the respondent at the local level to attain background information of the municipality of Laholm. The form of the six interviews was distributed as follows: three personal interviews, one telephone interview and two email interviews. Since the interviews were done in different ways, the amount of information also differed. The personal interviews resulted in more discussions and additional questions than the telephone interview, while questions asked by email resulted in a more standardised and structured interview, without additional questions. Consequently, information from the personal interviews and the telephone interview (I1-I4) is more frequently used in the paper. In order to achieve the same amount of information from the respondents the same kind of interviews, preferably personal interviews, should have been used.

The respondents interviewed in the paper are all involved in the process of implementing the WFD in some way and are represented locally, regionally and nationally. To be able to evaluate the role of cooperation in the WFD and to get a better understanding about the WFD in Sweden, personal knowledge from central, regional, as well as local levels is believed to be of importance. The respondents also differ in occupation in order to achieve knowledge and opinions from different backgrounds.

In qualitative interviews, the reliability is dependent on the knowledge and the interpretation of the interviewer (Kvale, 1997:213). Misinterpretation might therefore occur in the interpretation of the respondents answers. To reduce the risk of misunderstanding all personal interviews have been recorded. The interview question is critically examined, and irrelevant questions are left out, in order to attain data valid for the purpose of the study. Additionally, only respondents connected to water issues and the WFD are used in the paper in order to attain relevant information and increase the validity of the study.

Each respondent is given a code (I1-I6) in order to differentiate between literature and information from the interviews. Name and title of the respondents can be seen in the reference list in page 44.

2.2 System analysis

The purpose of using system analysis in the paper is to give an overview of the water issue, the WFD, the water situation in the Municipality of Laholm and how different factors affect and intervene with each other. Another intention of using system analysis is to illustrate the consequences of different actions and decisions taken in order to fulfil the requirements of the WFD.

System analysis is a useful method when analysing system behaviour (Haraldsson, 2005). In addition, system analysis involves the mapping of system structure and identification of system components and causal links and the method is helpful when simplification of complex systems is necessary.

Causal Loop Diagrams (CLD) is a tool and a way of thinking in causes and effects (Haraldsson and Sverdrup, 2004). CLDs are used to understand the role of certain behaviours in a system to develop strategies to work with, or counteract this behaviour. The relationship between the cause and the effect in a CLD is illustrated by an arrow from the cause to the effect. A plus sign indicates that the cause and the effect change in the same direction, whereas a minus sign illustrate that the cause and the effects changes in the opposite direction.

The letter R (see figure a) inside a loop illustrates a reinforcing loop, meaning a loop that is reinforcing behaviours in the same direction, which can be either an increase or a decline. The letter B (see figure b) in the loop indicates that it is a balancing loop, which moves the system towards equilibrium (Haraldsson, 2004). In figure 1 a basic CLD example can be seen.

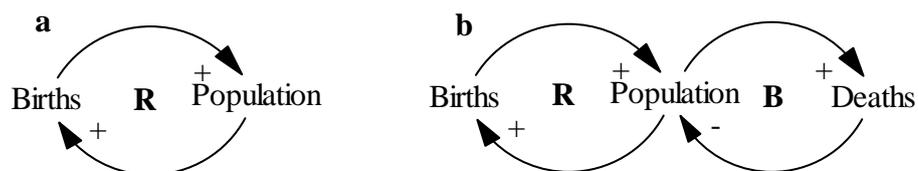


Figure 1. Examples of CLDs with balancing and reinforcing loops.

As can be seen in the CLD (Figure 3), the two main causes of decline in water quality in the municipality of Laholm are nitrates as a consequence of use of fertilisers from agricultural production and pesticides and herbicides, caused by weed control of railways and agriculture. As a result of extensive agriculture production in the region, high concentrations of nitrates have been found in the water (I3). When water containing nitrates end up in the ocean it contributes to eutrophication, which is believed to be the most severe water issue in Sweden at the time. Nitrates are also harmful for human health. Nitrate can be transformed into nitrite in the body, which reduces the body's capacity to take up oxygen. Concentration of nitrates exceeding 10 mg/l is believed to be harmful for humans, especially for small children (SEPA, 2002b).

Another vital issue is herbicides and pesticides that were found in highest concentrations in Knäred's water catchment and in Skottorp's water catchment. In one of the wells six different herbicides and pesticides was discovered in the water and consequently had to be closed down (I3). Herbicides and pesticides are harmful for many aquatic organisms and some of them also cause algae bloom, which in turn contributes to eutrophication (Wivstad, 2005).

The agriculture sector alone is not, however, responsible for pollution of pesticides and herbicides. When it comes to herbicides activities from another actor, namely the Swedish Railway Association (Banverket) is more likely to be the cause of these issues. Railway sprayed with herbicides is located 30-40 meters away from the two water catchments where pesticides and herbicides have been found in high concentrations. The main line between Malmö and Gothenburg used to pass by the well in Skottorp's water catchment that had to be closed down and the railway from Hässleholm to Halmstad passes Knäred's water catchment (I3).

There are existing regulation and economic instruments, such as taxes and fees in Sweden in order to reduce the amount of fertilisers, pesticides and herbicides (SEPA, 2000; Svenskt Vatten 2002). Reduction of fertilisers and pesticides might limit the agriculture production and in turn the profit (I3). To compensate the loss of profit there are to a certain extent subsidies available. These subsidies are among others founded by the Swedish Government and the European Union (SEPA, 2000). The CLD illustrates that economic instruments, such as taxes and fees reduces the profit and therefore increases the subsidies. Non – monetary regulation also limits the profit through the use of herbicides, pesticides and fertilisers and in turn agriculture production. In the CLD it is assumed that less profit from the agriculture sector increases the subsidies and in turn the profit, which indicates that as long as the agriculture sector is subsidised the system is running.

Economical instruments on usage of fertilises, pesticides and herbicides (SEPA, 2000) is favourable in the way that it limits the use of hazard substances, which can be seen in the CLD. Since taxes and fees decreases the profit, it is most likely that the usage of fertilisers herbicides and pesticides reduces. However, taxes of this kind might limit the willingness to take measures in order to prevent leaching. Despite that a farmer, for example, take measures to prevent leaching of the substances he/she uses, and by that improves the water situation, the profit will not increase, i.e. the farmer does not gain from the improvement of the situation. To a certain extent there is, however, possible to be subsidised by the EU for preventive measures, such as growth of catch crops and creation of wetlands (SOU, 2002:105:327), which despite of the tax system increases preventive action by farmers.

A further factor that can result in that more measures to prevent reduced water quality are taken is pressure from authorities. In Sweden there are 15 *environmental quality objectives* established by the Government and the overall goal of Swedish environmental policy is to solve all major environmental problems facing the country within one generation (within the year of 2020) (SEOC, 2004a). The objectives are the target for all public environmental work in Sweden and the aim is to attain a sustainable society for future generations. Seven of the fifteen objectives are closely related to water and the success of the objectives is crucial in order to achieve sustainable water

management (Hägerhäll Aniansson and Vidarve, 2003). At least two of the objectives related to water are not believed to be achieved before the time limit of year 2020 and it is obvious that great contributions are required in order to solve the environmental problems in Sweden, not least at the local level (SEOC, 2004b). According to Alkan Olsson (2005) many of the objectives are unrealistic and it requires a lot of efforts in the municipality in order to achieve them. The WFD has a new approach (I1) that might be beneficial for the municipality of Laholm in order to both reach the Swedish environmental quality objectives, to achieve the target of the WFD and consequently improve the water situation in the municipality.

Most of the pesticides that have been found in the municipality of Laholm are, however, banned today and Banverket is, for example, no longer allowed to use pesticides within a protection area. This means in the long run that the agriculture sector is a bigger threat when it comes to pollution from herbicides and pesticides. Additionally, the water quality problems in the water catchments in the municipality of Laholm are probably also caused by polluted water outside the protection areas or even outside the municipality (I3).

Worth attention is the political situation in the municipality of Laholm. The two dominating parties in the municipality represent agricultural interests, which is partly responsible for the water issues in the municipality. The situation for the politicians is difficult since it is their members or voters they have to take decision against. Many of the politicians are facing the dilemma of both being in the municipal council and at the same time represent agriculture organisations. The agriculture sector also generates job opportunities, why it can be difficult to take measures against the sector (I3).

The CLD illustrates the need of cooperation between different actors and municipalities. The problems faced in the municipality of Laholm also highlights the fact that water is continuously moving, why water protection areas within one municipality can not solve the entire problem. The key of the WFD is cooperation (Hägerhäll Aniansson and Vidarve, 2003) and cooperation can be used as a tool to both improve the water quality in Laholm and solve conflicts. According to Svensson (2005) there are no forced measures that have to be taken in order to reach the target set in the WFD. The Member States are, however, obliged to cooperate and cooperation is the only way to go in solving these issues (I2).

As mentioned before WFD focuses on river basins and not administrative borders. Laholm is part of the river basin of Lagan which means that Laholm has to cooperate with all the municipalities and included actors within the river basin. Hence, it is not enough to only cooperate within the municipality in order to follow the WFD.

3.1 The river basin of Lagan

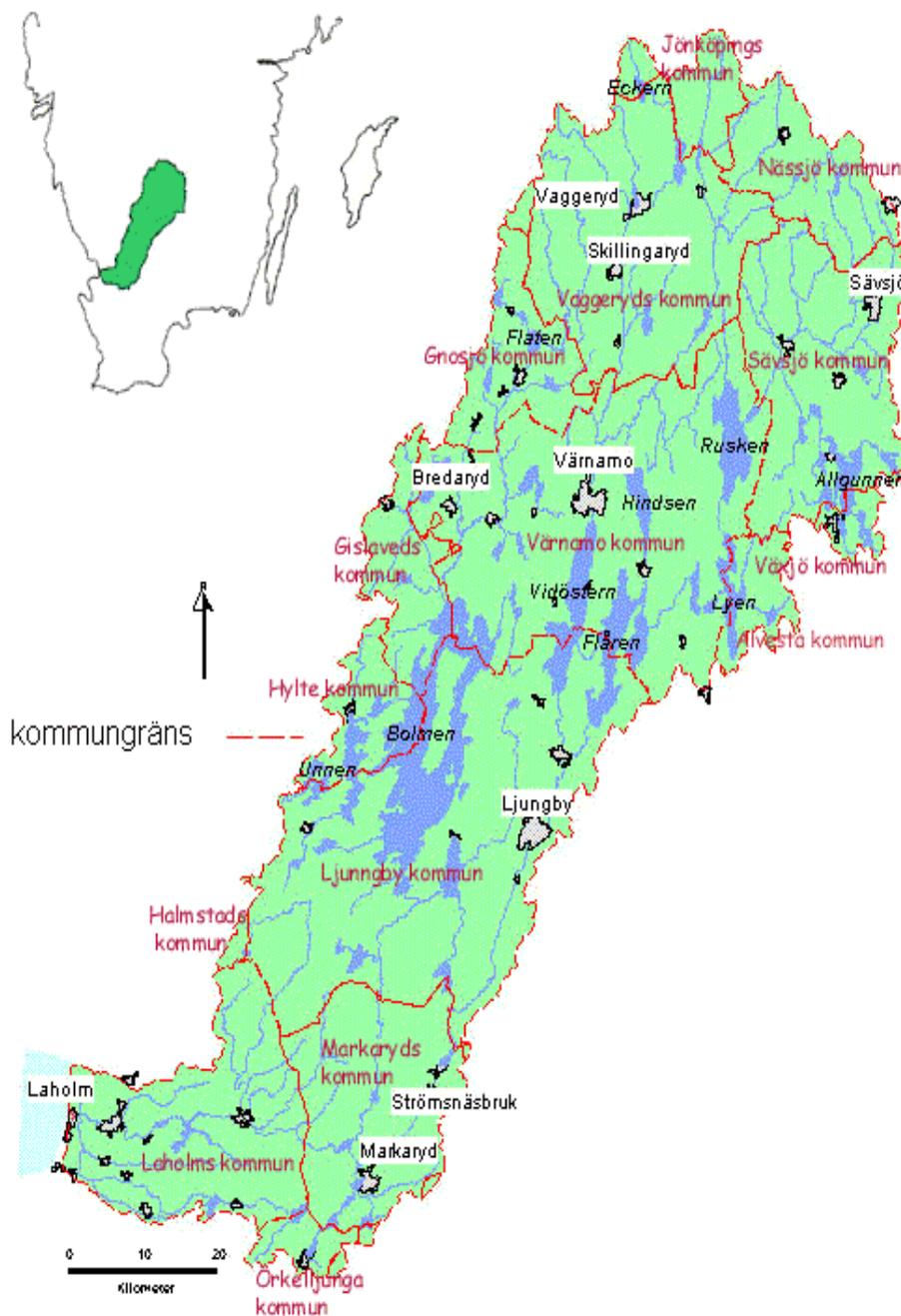


Figure 4. The river basin of Lagan

Individual measures within the municipality alone will not lead to improvements, why all actors included in the river basin must be involved in the process to improve the water quality and secure a sustainable water management in the region.

River Lagan is the biggest watercourse in southern Sweden and holds an area of 6454 km². The river basin, which can be seen in figure 4, includes four different counties and fifteen municipalities. Lagan is one of the richest areas in precipitation in Sweden. Most of it falls in the western and southern parts, where 900-1000 mm of rain is normal. The area is exposed to acidification in both water and land. On average, 90 m³ flows from Lagan to the Laholm bay every second, which gives an annual flow of 3 milliards of m³ (Lagans Vattenvårdsförening, 2005).

Apart from municipalities, the river basin of Lagan includes actors, such as industry, agriculture and fishery conservation association with different interests regarding water resources. Cooperation in order to follow the WFD and to improve the water situation in the municipality of Laholm is therefore essential.

4 Water – a vital resource

“Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such” (EU, 2000:1) Water is a unique resource that in most cases can not be owned. It is a movable necessity for all life and the total amount of it is fixed. Thus, it can not be increased or decreased (Clarke, 1991:19). Despite that water is vital for life on earth it is often taken for granted.

The following chapter intends to give a background to the water concept and its character in order to get a better understanding to the EU Water Framework Directive, described later in the paper (chapter 5). Since water quality and quantity have central parts in the directive (EU, 2000), water shortages and water pollution are introduced in section 4.3 and 4.4.

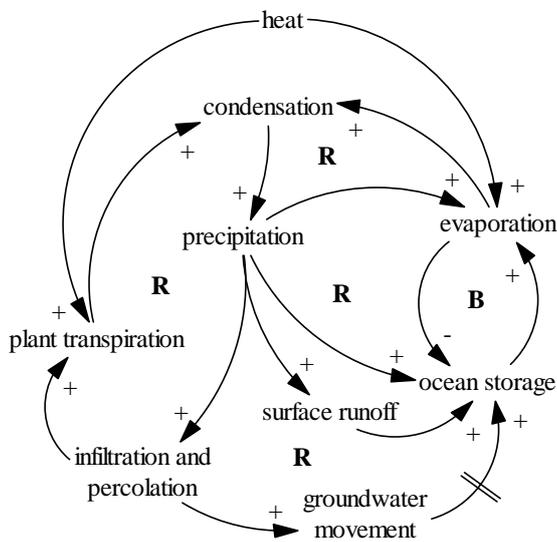
4.1 Water – a necessity for life

Our planet is a water planet and about 70% of its surface is covered by water and most organisms mainly consist of water. In the weight of a tree, for example, 60% is water and most animals, including humans, are about 50-60% of water. Thus, water is a necessity for all life on our planet (EC, 2002a). Water also serves as a key resource in development in order to create and maintain welfare (EC, 2002b) and is an important factor in sculpting the surface of the earth, moderating climate and diluting pollutants (Miller; 2000:112).

However, only a small fraction of the water in the world is available as fresh water. About 97% of the water exists in the oceans, which means that no more than 3% of the water is good for drinking. Most of it is, however, locked in glaciers and inaccessible for use (Clarke, 1999:8). To make it even more evident, if the water supply in the world were 100 litres, fresh water available would correspond to 0.003 litres, or one-half of a teaspoon.

Despite the fact that the amount of freshwater available seems distressing, the supply is rather generous. Water is part of a continuous recycling process (the hydrological cycle, see figure 5) and as long as it is not overloaded by wastes or over abstracted it will provide a constant supply (Miller, 2000:311-312).

4.2 The hydrological cycle



The hydrological cycle involves several processes, namely to collect, purify and distribute the fixed amount of water that exists on the earth. The main processes are evaporation that transforms water into water vapours, plant transpiration, evaporation from plants, condensation that forms water vapour into droplets and precipitation. However, more precipitation that reaches the ocean evaporates and only about one third of all rainfall ends up in a river or stream (Clarke, 1991:10). Further important processes to get the cycle running is infiltration, percolation and runoff that transports the water. As can be seen in the CLD there is a delay (illustrated by two lines crossing the arrow). In this case the delay indicates that the groundwater movement is much slower than the speed of runoff from the surface to the ocean and that it passes other watercourses before ending up in the ocean (Miller, 2000: 112).

Figure 5. Simplified CLD of the hydrological cycle

The hydrologic cycle is powered by solar energy, why the factor 'heat' can be seen in the model. Evaporation is at its maximum when the surface water is warm, the air is dry and at high wind speed (Schwedt, 2001:74). This self sufficient system is, however, continuously producing water unless it is not disturbed in any way (Miller, 2000:112-113). According to Miller (2000:112-113) this is unfortunately the reality today.

4.3 Water shortage

The amount of water available in a country depends on the precipitation rate and on the total flow from and to its neighbours. Water available varies both seasonally and between countries or between regions within a country. The amount of water varies from year to year and even during longer periods due to climate variations. Uneven distributions of water results in some countries having plenty amount of the resource, whilst others suffer from water shortages and droughts (Nixon et al., 2000). The causes of scarcity of freshwater supply can be divided into four groups, namely dry climate, drought, desiccation and water stress. Desiccation occurs when the soil parches because of activities, such as deforestation and overgrazing. Water stress means low per capita of water due to an increased number of people relying on a limited source of water supply (Clarke, 1991:2).

Since the 1970s the scarcity of water has increased by prolonged drought and if global warming develops as predicted, severe droughts might become even more common in already vulnerable regions of the world. In most of the countries where water shortage occurs, lack of water is not the main cause, but wasteful and unsustainable use of available supplies. A further problem is that the largest rivers in the world are located far from agricultural and population centres where the water is a necessity. Africa has, for example, a total runoff much larger than Europe, but a large fraction of

the runoff ends up in the Atlantic Ocean and is not accessible for people in water poor regions in North, South and East Africa (Miller, 2000:315-316).

4.4 Water pollution

“Water pollution is any chemical, biological, or physical change in water quality that has a harmful effect on living organisms or makes water unsuitable for desired uses” (Miller, 2000:533). When it comes to pollution of groundwater it takes time before the pollutants reaches the water and ends up in the water catchment. At the same time it means that when groundwater once gets polluted it takes long time until the groundwater catchment is restored (Knutsson and Morfeldt, 2002:149). The situation in the municipality of Laholm is a good example of this. The problems the municipality of Laholm faces today are due to discharges caused maybe 10-15 years ago (I3).

According to Knutsson and Morfeldt (2002:149-150) anthropogenic water pollution can be divided into four different groups. *Polluted substances spread by accident*, i.e. leakage from transport. Even small substances can be harmful for aquatic organisms and result in undrinkable water. Continuous leakage from sewage pipes and fertilisers have in many places resulted in high concentrations of nitrates and bacteria. Pollutions spread by accident were the cause of a resent water quality issue taking place in the municipality of Laholm. In this case concentrations of E. coli bacteria resulting in undrinkable water was found in one of the water catchments. *Intentionally spread chemicals*, such as fertilisers and pesticides in order to get a greater outcome from agriculture and forestry, which in turn have lead to undesirable effects in the groundwater. This is exactly the case in the municipality of Laholm, where herbicides, pesticides and fertilisers from the agriculture production creates an undesirable water situation. *Deposition of waste*, mainly from households and industry. The most crucial pollutants are heavy metals and organic waste. *Operations mobilising substances in land and water*. Drainage ditching, groundwater abstraction and water regulation are all examples of actions, which might interfere with the balance of the groundwater.

Groundwater pollution brings greatest harm to an existing or presumptive water catchment. It is, however, not only groundwater that is affected by groundwater pollution, but surface water and the water supply are also affected of polluted groundwater (Knutsson and Morfeldt, 2002:150). Despite the fact that water recycles and seems to be an endless resource (Nixon et al., 2000), the consequence of pollution is that [...] “water availability looks much more problematic” (Clarke, 1999:24). Previous reasoning indicates that even if the amount of water is enough in both the municipality of Laholm and Sweden in general, the quality must be good enough so it does not harm the aquatic life or the quantity of water available for use.

4.5 Sustainable water management

Since water is continuously recycled sustainable use of water might not be a major concern, but it is also known that water is a scarce resource in many regions of the world and that the quality of the water is far from satisfying in many places. Thus, sustainable use of water is a crucial factor for both present and coming generations.

A non-sustainable water use, resulting in water shortage and declined water quality, will sooner or later degrade the whole water system. Even though mankind continuously impact the ecosystem negatively, the continued function of the system is vital. Since water is such an important resource and humans are dependent on it the conflict might seem irrelevant, but since the demand for water

According to Lundqvist et al. (2004:207) water is not a product that can be produced, packaged and distributed, but rather a heritage that everyone is responsible to manage and maintain. Since water can be seen as a heritage, which has no clear owner conflicts often evolve. The conflicts mainly concern the right to water and how it best can be used. Thus, regulation in order to create a long-term sustainable management regarding water as a collective heritage is required. Not only the best available technique has to be taken into consideration, but also social, economic and democratic factors. To achieve sustainable water management it is important that every actor involved take their responsibility in the water management process. The water activity must also be organised in a way that make all actors dependent on water as a collective heritage included in the decision making process concerning the resource (Lundqvist et al., 2004: 207-208).

The implementation of the WFD is a step in the right direction towards a sustainable water future. The Directive “promotes sustainable water use based on a long-term protection of available water resources” (EU, 2000, p. 5). The dependency on water in combination with a continuously increasing demand makes it vital to protect it. Hence, there is of great concern to secure that the WFD is implemented in an effective way to make sure that future generation can utilise water of good quality (EC, 2002a).

5 The EU Water Framework Directive

The following chapter provides a background to the WFD and how it will influence Sweden and the municipality of Laholm. In order to get an understanding of why a new water directive is needed, the first section (5.1) describes the water situation in Europe.

5.1 The water status in Europe

The water status in Europe is not as threatened as in many other regions in the world, but the water quality is far from satisfying (EC, 2002a). The water supply in Europe is from a statistical point of view pleasing, but the fresh water in Europe is unevenly distributed, which indicates severe water shortage in some regions, especially during dry periods (Hägerhäll Aniansson and Vidarve, 2003). According to Nixon et al. (2003) 18% of Europe's population live in countries that are water stressed.

Over abstraction of groundwater supplies is extensive in many countries (Hägerhäll Aniansson and Vidarve, 2003), but water supply is more than amount of water. The quality of the water is also a crucial factor and has to be high enough to avoid health risks when using it (Bergström, 1993). In many regions in Europe the groundwater is polluted by nitrate, pesticides, heavy metals, hydrocarbons and chlorinated hydrocarbons that definitely can harm aquatic organisms and human health.

Apart from water shortages, over abstraction of groundwater supplies results in sinking groundwater levels. As a consequence, wetlands parch and today almost half of the wetlands in Europe are threaten by sinking levels of groundwater (Hägerhäll Aniansson and Vidarve, 2003). Another issue related to groundwater over abstraction is intrusion of saltwater into fresh water supplies in costal cities (Nixon et al., 2003). This problem already exists along the coasts of the Mediterranean Sea, the Black Sea and the Baltic Sea (Hägerhäll Aniansson and Vidarve, 2003).

Problems regarding surface water are also worth attention. More than 20% of the surface water within the European Union is threaten by pollution. The situation for the most polluted rivers has, however, improved since the 1970s, but eutrophication due to emissions of nitrogen and phosphorous is an increasing problem in all waters in Europe (Hägerhäll Aniansson and Vidarve, 2003). Another alarming issue concerning surface water in Europe is the presence of endocrine disrupted substances, which has resulted in sexual disruption of aquatic animals (Nixon et al., 2003).

Many of the European countries are dependent on other countries for water supply and some countries extract more than half of the water from neighbouring countries. It is obvious that the risk of conflict is higher the greater the dependency is (Hägerhäll Aniansson & Vidarve, 2003).

Sweden and the municipality of Laholm do not suffer from *water shortage* worth attention, but as can be seen in the case of Laholm, *water pollution* is a problem that affects the water quality in the region. However, if the quality of water is not satisfying enough for the aquatic life and for use the amount of water is an issue in its self, meaning that if the water is polluted and useless it does not matter how much that is available.

5.2 Background of the WFD

The EU Water Framework Directive came into force in December 2000 and provides a frame for all water management and water conservation within the union (Lundquist, 2004a:46). The process to a

complete directive has, however, been long and complicated. Almost ten years past before the Member States could agree on a new comprehensive water policy and legislation for the European Union (Hägerhäll Aniansson and Vidarve, 2003).

Directives for bathwater, fishing-waters shellfish-waters and groundwater, the amount of EU-directives dealing with water quality have been extensive. A uniform legislation in the area has been a necessity for a long time and in addition, a regulation regarding the ecological status of water resources has been missing (SEPA, 2002a). As a consequence, collecting all the fragmented parts of the legislation considering water into one directive became an important factor. The European Commission prepared a basis for discussion, where a frame for European Union's Member States was suggested. After extensive consultations the European Commission introduced a proposal that would result in a new common and uniform policy considering water (Hägerhäll Aniansson and Vidarve, 2003). Already adopted regulation was included in the new directive and at the same time, new obligations for the Member States were added. Some of the existing directives will gradually be discontinued, whilst others will operate as before (SEPA, 2002a).

Despite that the WFD derives from already existing directives concerning different kind of waters, there are, new and unique approaches in the Directive. In WFD, water policy is for the first time seen in a comprehensive view, including new targets and a higher ambition than before. The Directive is a framework setting the targets and the timeline, but not the way to reach these targets.

The WFD has today a central role in the European environmental law, in policies for sustainable development and in water policies as a whole, both within the union and at a global level (Hägerhäll Aniansson and Vidarve, 2003).

5.3 The aim of the WFD

An EU directive is aimed at the Member States and is legally binding. However, the directive only indicates the target, which shall be achieved and not how they will be achieved. The countries involved usually get a certain time assigned to implement the directive, meaning that national legislation and regulations that fulfil the requirements of the directive will be instituted (Gierow et al., 2001:56).

The WFD includes all waters except from open sea, and the focus is water quality. An important factor is that the water quality shall not decline and preventive actions instead of only reparations and improvements are highlighted.

The overall aim of the WFD is therefore to secure that water of 'good status' [...] "including both a chemical and ecological perspective, for quality, quantity and pollution levels" (Galaz, 2003:2), is achieved and maintained within the European Union by the year of 2015 (SEPA, 2002a). The purpose is to "[...] establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater". Ecologically sustainable water consumption shall be promoted through long-term protection of water sources, considering both quality and quantity (EU, 2000, p. 5). In addition, the target is to prevent decreased water quality even though the decline results in water that still is referred to as 'good status' (SEPA, 2002a).

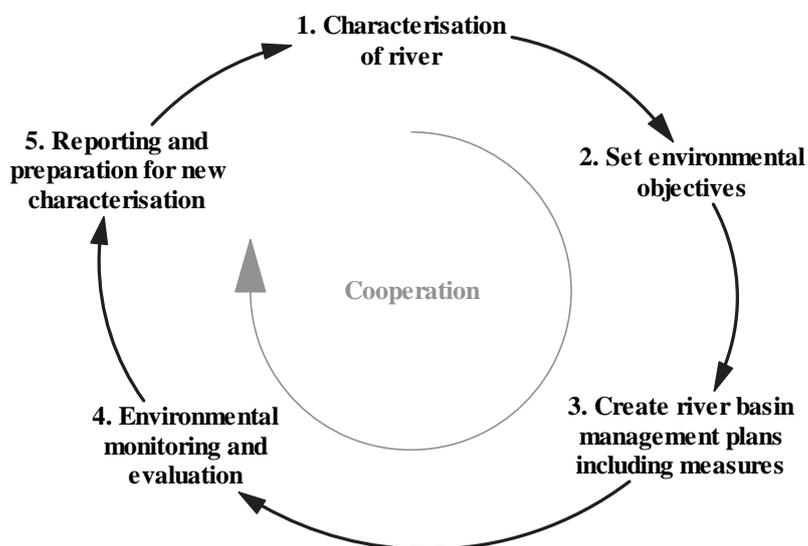
5.3.1 Good status

The aim of the WFD is to achieve and sustain water of *good status*, but what does it really mean? According to the Directive the Member States are obliged to achieve certain environmental quality objectives. All water is classified in relation to the variance from the natural state of the water. A

small divergence is, however, accepted. In the WFD, environmental objectives regarding *good surface water status* and *good groundwater status* are to be achieved (SEPA, 2002a). “‘Good surface water status’ means the status achieved by a surface water body when both its ecological status and its chemical status are at least ‘good’” (EU, 2000, p. 7 § 18). The ecological status is supposed to correspond to natural status, whilst chemical status means that the concentration of substances is not allowed to exceed the set limit (SEPA, 2002a). “‘Good groundwater status’ means the status achieved by a groundwater body when both its quantitative status and its chemical status are at least ‘good’” (EU, 2000, p. 7 § 20).

5.3.2 The water planning cycle

To fulfil the overall aim of the WFD a fixed timetable, describing when different interim targets are to be completed and reported, is included in the Directive. Future water management can be divided into five main elements (Hägerhäll Aniansson & Vidarve, 2003), which can be seen in figure 7. The plan is an iterative process that will be repeated every sixth year (SOU, 2002:105:61).



The first step (1) involves descriptions of all watercourses and protected areas within the river basin. The risk of impact is to be evaluated and economical analysis concerning pricing of water shall be completed. In the following step (2) the status of all water are to be classified in comparison to what shall be achieved, while step three (3) includes establishment of an action plan in order to reach the environmental objectives within the river basin.

Figure 7. The Water Planning Cycle

Comment: Modified from Galaz (2005:20)

Next step (4) involves supervision of the water status in order to evaluate the effect of measures taken. In the final step (5) knowledge and results are to be summarised in a detailed management plan. The management plan is supposed to be the basis for decision making for the authorities, as well as a tool for communication with the citizens. The plan must also be reported to the European Commission (Hägerhäll Aniansson & Vidarve, 2003).

Since cooperation is meant to be part of the process from problem to measure (Svenskt Vatten, 2005a) the role of cooperation is essential in the water planning cycle and has to be included in all the steps. In order to succeed in the water planning cycle and carry out an accurate result it is important to involve actors at all levels, also locally. According to Svensson (2005) regional and central authorities have limited knowledge about the local conditions, why it is necessary to involve them in the whole process (I2). The conditions in the municipality of Laholm differ from other regions in Sweden, why an active communication and cooperation between the municipality and

regional and central authorities are necessary in order to describe the situation and find relevant measures in this certain area.

5.4 Driving forces in the WFD

The following section describes the main parts of the WFD and how it is supposed to function. Looking at the CLD (Figure 8) the central part is that the amount of cooperation and public participation determines the willingness to act and to take measures in order to achieve water of good status. Management within a river basin is a key concept in the Directive and the WFD requires that all parties within a river basin, nationally or internationally, manage their water in close cooperation (Hägerhäll Aniansson and Vidarve, 2003). According to the WFD “[t]he 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” (EU, 2000, p. 2, § 14). Illustrated in the CLD, cooperation results in a more transparent process and transparency is an essential element for making information available and to involve the public. The more transparency in target setting, decision making and determination of measures, the more willingness there will be to follow the Directive and reach the targets (Hägerhäll Aniansson and Vidarve, 2003).

Further, water of good status can be achieved both from enforcement from the Directive, but also from encouragement to act together as a consequence of the river basin approach. Worth to mention is that measures only have to be taken if the water does not reach the criteria of good status. Preventive measures in order to make sure that the water quality does not get worse are, however, needed. If the whole river basin is considered, a more holistic view of water is reached, which result in more willingness to act to fulfil the targets in the Directive. This because of that individual measures often are not that effective when it comes to water issues (Hägerhäll Aniansson and Vidarve, 2003).

Additionally, an important loop in the system is the balancing loop showing the connection between water price and water use. A sustainable water use, based on long-term water management is promoted in the WFD and it is essential with an accurate price for use of water in order to decrease the use of the resource (Hägerhäll Aniansson and Vidarve, 2003). A higher price consequently reduces the water use, which in the long run can result in decreased prices again if a sustainable water management is secured. The system of pricing is based on the PPP to ensure that polluters have to pay for their action or take compensative measures. Polluters are all users that in some way affect the water physically, chemically or ecologically (SOU 2002:105:197). The financial resources are used for improvements of the water, rather than for administrative tasks (SOU 2002:105:197; Galaz, 2005).

In the CLD this is illustrated by a balancing loop showing that the more the polluters have to pay for their pollutions the more measures they are willing to take to improve water of good status and reduce their costs for pollution. A further important aspect is that the money from the pollution will pay the measures to improve the water quality. If the polluter instead reduces the emissions fewer measures are needed to achieve water of good status.

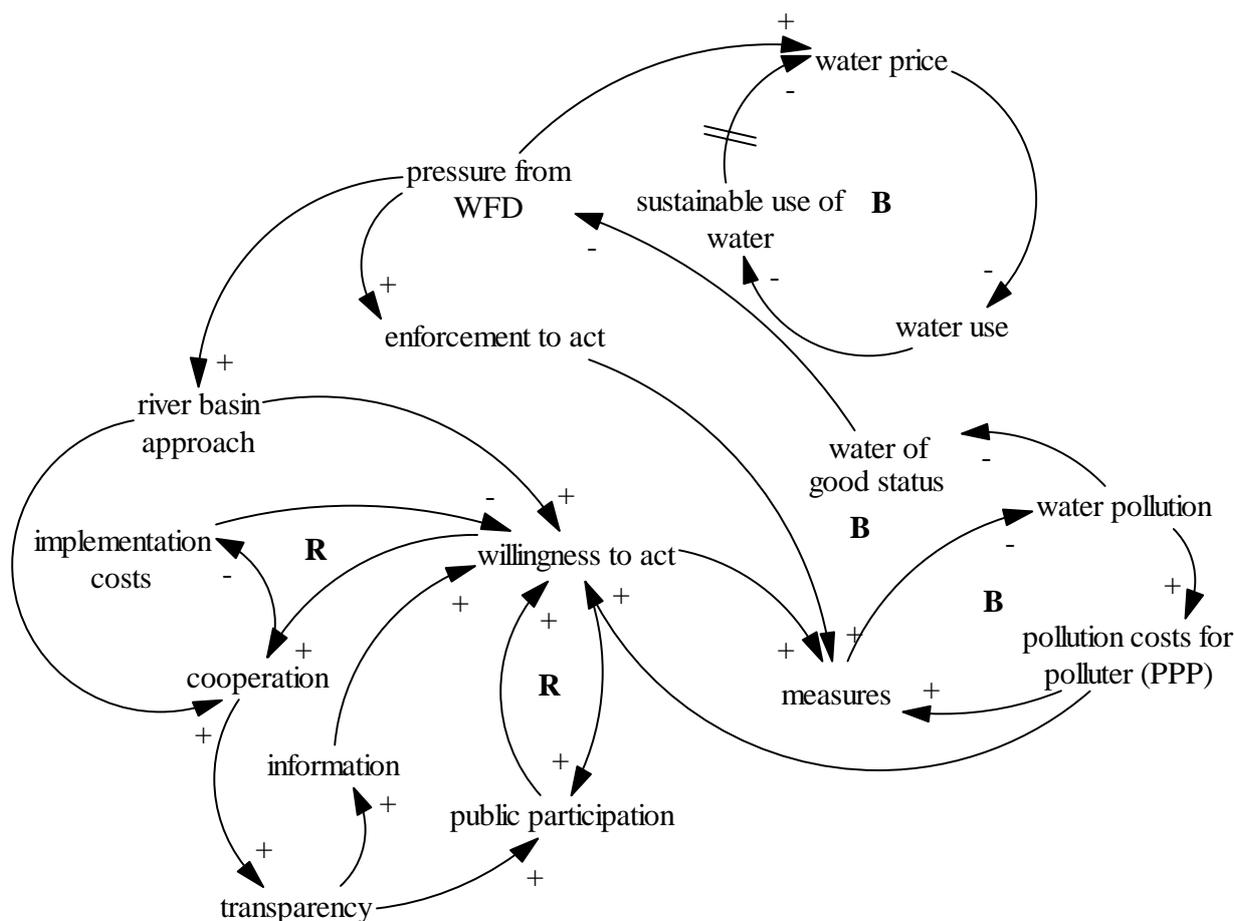


Figure 8. Simplified CLD of the driving forces in the WFD

In order to achieve sustainable water management, including both quality and quantity, new strategies and measures are established in the Directive. Instead of using individual measures as before, a combined approach is promoted. The targets consider point sources, as well as diffuse sources and both emission limits and environmental quality standards shall be used (Hägerhäll Aniansson and Vidarve, 2003).

5.5 The WFD in Sweden

As part of the European Union, Sweden is obliged to follow and implement the WFD. The existing Swedish environmental legislation is, however, not enough in order to reach the targets set in the Directive. Despite that Sweden is on the right track in the water management process the WFD will result in changes in the current water conservation work in Sweden (Hägerhäll Aniansson and Vidarve, 2003). According to SEPA (2002a) adjustments in the Swedish water planning is needed, not only to meet the target of the WFD, but also to make the current environmental work more efficient. River basins as a basis for decision making in the Directive requires a shared responsibility all the way from the watershed, through the river basin and out to the coast.

Apart from increased responsibility, the WFD also improves the opportunities to consider the water quality both upstream and downstream. The new system requires, however, more obligations towards the actors, municipalities and counties sharing the same water resource. In addition, it gives a more flexible process, which in turn makes it easier to take measures where it is needed (SEPA, 2002a).



As a consequence of the WFD, Sweden has been divided into five new water districts (see Figure 9), which is based on geographical areas. In each district a water authority is established. The purpose of these authorities is to make sure that the environmental objectives regarding water are met. Apart from achieving the objectives, further responsibilities are creation of action plans and administrative plans for the districts, as well as ensuring that all water are analysed and examined (Galaz, 2005). The water authorities also have to make sure that local cooperative bodies are established (Hägerhäll Aniansson and Vidarve, 2003).

These bodies shall be based on the main river basin areas in Sweden and include different water actors, such as municipalities, companies and water conservation associations. The main purpose of the bodies is to manage and maintain the water in the region, as well as taking part in activities concerning water protection (SOU 2002:105:104-105; Galaz, 2005).

Figure 9. The Swedish water districts

Comment: Extracted from Galaz (2005:20)

As can be seen in the illustration to the right (Figure 10) there is a clear hierarchy in the WFD. Since the Directive is binding (Hägerhäll Aniansson and Vidarve, 2003) the highest power can be found in the European Union, i.e. in the WFD. The Directive sets the target and it is after that up to the single Member State to decide how to fulfil the target. As just mentioned, the new water authorities in Sweden are the utmost responsible body and have to make sure that counties, municipalities and local actors are involved in the process to carry out a result as accurate as possible. It is, however, not only the decision process (black arrows) that is essential in the work of implementing the Directive, but also communication (grey arrows). In order to fulfil the targets and attain a relevant result local knowledge is essential (SOU:2002:105:157). Every river basin or watercourse is unique, which is important to keep in mind when looking at measures and solutions (Svenskt Vatten, 2005a).

Thus, it is crucial that authorities and other actors at the local level contribute regional and central authorities with correct and relevant input so they can take the most effective decisions. Cooperation at the local level is described in chapter 6, later in the paper. Next section explains the role of the WFD in the municipality of Laholm.

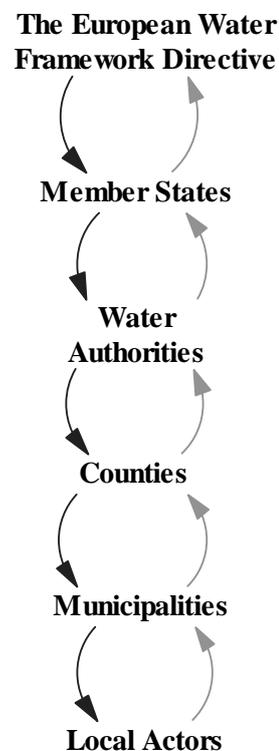


Figure 10. The hierarchy of the WFD

5.6 The impacts of the WFD in the municipality of Laholm

Despite that the water authorities are responsible for the cooperation process and the establishment of the bodies, initiatives have to come from others. To start the process, someone must take responsibility to encourage cooperation and the only conceivable actor to take this initiative is the municipality (Svenskt Vatten, 2005a). The success of the cooperation process in order to fulfil the aim of the WFD relies therefore a great deal of how willing the municipality of Laholm is to engage themselves.

Implementation of the WFD and improved cooperation with actors within the municipality, neighbouring municipalities and regional and central authorities can according to Svensson (2005) come to be beneficial in different ways for the municipality of Laholm. The Directive can be used as a tool in order to decide where measures will be most efficient, which can be difficult to determine today. As a consequence of the WFD, it will be possible to apply economical priority standards to decide where to concentrate the measures. The Directive can therefore be helpful in order to achieve as much environmental benefits as possible for as low costs as possible (I2). Harlén (2005) agrees with Svensson and claims that the comprehensive water view, as a result of the Directive, will make the measures more efficient (I5). Because of the Directive, data will be produced that can be beneficial for the planning procedure in the municipalities (I2). Further benefits with WFD for the municipality of Laholm is that the implementation requires knowledge about local water conditions, which probably will result in a 'market' for experienced in the field that can be helpful when solving water issues, but also in order to avoid and solve conflicts. The WFD creates the possibility of collective learning, which can result in a common understanding of the problem. This understanding requires, however, willingness to participate and cooperate at the local level (Galaz 2004b:132). The Directive also requires that data is communicated and stored in a different way than earlier, which gives a better basis for the description of the status of the water and where to take measures (I6).

As mentioned before the agriculture production is extensive in the municipality and also partly responsible for the reduced water quality. The focus on cooperation in the WFD encourages the municipality of Laholm to take collective measures and find solutions together with other actors in the municipality. Increased cooperation with the agriculture sector can increase that knowledge about the issues and also in improved trust between actors, why an improvement of the current situation is more likely in cooperation.

The following CLD (Figure 11), which is based on the CLD in Figure 3, illustrates the impacts of the WFD in the municipality of Laholm. The black arrows show the water situation in the municipality of Laholm, whilst the grey arrows illustrate the influence of the WFD.

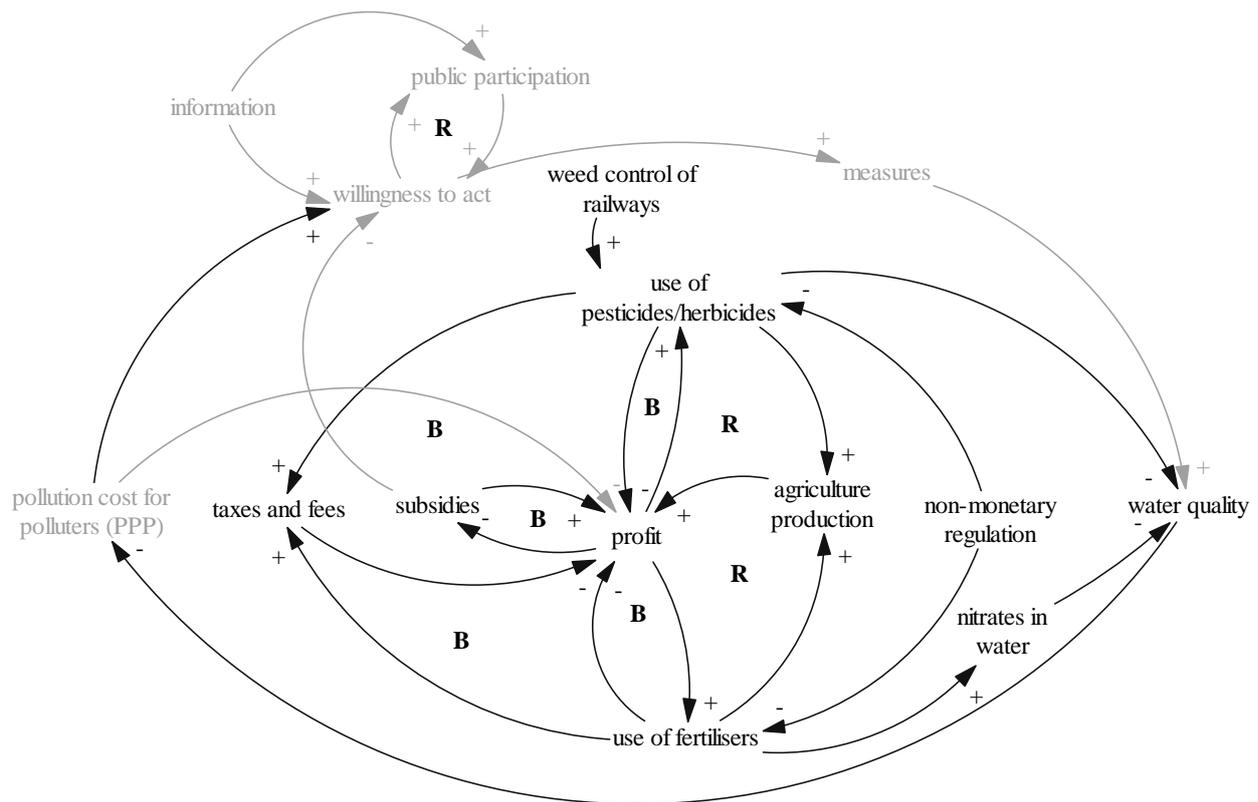


Figure 11. The impacts of the WFD in the municipality of Laholm

According to the WFD and the PPP the agriculture sector and weed control of railways in the municipality of Laholm are responsible to pay for their pollution caused by usage of fertilisers, herbicides and pesticides, meaning that the more they pollute the more they have to pay. The fact that they have to pay should encourage the actors to act and to cooperate in order to find a common and satisfying solution to the problem. How the PPP is supposed to be applied in Sweden is, however, not yet decided (I6).

The agriculture sector should be interested in fulfilling the WFD for another reason, namely the existing taxes on herbicides, pesticides and fertilisers. Using environmental taxes for emissions does, however, not automatically result in reduced emissions and environmental improvements. Thus, the Directive provides a different approach, meaning that the costs are decided in relation to the environmental harm rather than the emissions from a single user (I1), why a small agricultural production that does not harm the environment to a great extent are likely to pay less than with the current system. Additionally the WFD support the possibility to local solutions and in turn more accurate measures (Svenskt Vatten, 2002). The CLD explains this situation by showing that the more pollution costs for polluter, the more willing they are to act and take measures in order to increase water quality. On the other hand if subsidies are assumed to function in the same way in this CLD as in figure 3, it hinders the willingness to act. If the farmers attain subsidies for the loss of profit there is no purpose in act and take measures. Without subsidies the profit would be much lower that might encourage more willingness to act and take measures

The river basin approach in the WFD results in a more holistic view of water and according to Alkan Olsson (2005) this view is essential for the willingness to act and cooperate (I1). In the case of the municipality of Laholm cooperation within the river basin is essential to improve the water issues in the region. As can be seen in the map in figure 4 Laholm is the last municipality in the river basin of Lagan. Since Laholm is a downstream municipality action in other municipalities in

the region affects Laholm and therefore the problems can not be solved within the administrative borders of the municipality. If the municipalities in the river basin of Lagan get together and can agree on what kind of measures that is most relevant, rather than try to reach the target within the WFD individually, it will reduce the implementation costs and give a more effective and accurate result.

Thus, information is an important aspect. If the actors have an understanding about how everything is connected and that single actions can affect someone else in the flow it is more likely that they are willing to act, instead of if only small pieces at the time are considered (I1).

The CLD above illustrates how the WFD, cooperation and the PPP should work, but is it this easy in practise? Thus, the concept of cooperation is discussed in the next chapter (chapter 6) followed by an analysis of the case of the municipality of Laholm in relation to the possibilities and barriers of cooperation in order to reach the targets of WFD and attain sustainable water management in the region (Chapter 7).

6 Cooperation about water resources

The following chapter intends to give a background to the concept of cooperation, its possibilities and barriers and what is required to achieve successful cooperation. The role of cooperation in the WFD and the importance of local cooperation are also discussed in this chapter.

6.1 Forms of cooperation

Cooperation is a frequently used term when it comes to water resources. As highlighted in the introduction, increased cooperation between different water users is believed to result in a more efficient and ecologically sustainable water management (Galaz, 2003).

According to SEPA (2002a) cooperation is both a target and a tool in order to achieve set environmental objectives and environmental quality standards (SEPA, 2002a). Cooperation results in increased participation in water related issues, which in turn improves the decision making process and the access to local knowledge. In addition, cooperation gives attention to the issue and improves the awareness of environmental problems. The process also encourages local initiatives resulting in engagement to take action in order to improve the current situation (SEPA, 2002a).

Cooperation can take place in different forms. User based cooperation involves actors with similar interests regarding the water resource. An example might be farmers that cooperate within a river basin to create a common wetland. When cooperation is based on users with similar interests regarding a single resource it is a question of *private cooperation*. However, the situation is not always this easy but cooperation might also involve actors with different interests in the water resource. Farmers, fishery conservation association and environmental organisations can for example locally get together and improve a certain situation. The form of cooperation is still private, but concerns different interests, which makes the situation more complex.

So far, the cooperation has been voluntary without involved authorities, which indicates an *internal authorised solution of cooperation*. As soon as an authority is involved in the process, the power structure is changed and the cooperation is of *external authorised* character.

Further forms of cooperation are partnership, often between private actors and public authorities, who agree on how to utilise and maintain a certain water resource. An environmental agreement is another form of cooperation and a result of negotiations between private actors and responsible bodies. The purpose of an agreement is that measures that have to be taken are discussed and agreed rather than forced on the actors. Actors, which can be actors with both similar and competitive interests, cooperate in taking measures to protect and use the water resource, which is later discussed and approved by responsible authorities. In order to make environmental agreements possible two things are needed. Firstly, the authorities have to give the cooperative actors a service in return. Secondly, the agreement must be approved through a decision made by responsible authority (Lundqvist, 2004c:61-63).

6.2 Cooperation – a complicated necessity for sustainable water management

The importance of cooperation has been highlighted in this paper, but cooperation is also about giving up its own dependency. The degree of free decisions reduces and different actors must compromise or accept a majority decision. Hence, these factors have to be compensated in a way that makes the single actor willing to join a collective action. The most essential advantage of

cooperation is economic benefits. It is often more beneficial to take collective actions rather than single actors all doing the same thing individually (SOU:2002:105:162-164). Joelsson (2005) agrees with previous reasoning in saying that cooperation often results in benefits for the actors involved. If, for example, a new road from a number of houses is to be connected to the main road, everyone benefit from building it together rather than that every house constructs their own. Water is, however, a little bit different since it moves and the polluters get rid of their emissions, but still the actors can benefit from the collective good (I4).

Previous example obviously illustrates that cooperation is essential and a necessity for sustainable management, but despite that cooperation seems rational in many cases it does not automatically result in collective rational solutions. Individual actors will only encourage collective actions if they can benefit more from them compared to individual solutions. In all other situations, actors tend to find it beneficial to gain the benefits without engage themselves, i.e. free-ride on others efforts (Olson, 1965 in Lundqvist 2004b:21).

As mentioned earlier in the paper water resources often fall into a social dilemma. In these dilemmas it is for the single user, according Elinor Ostrom (1990), beneficial not to cooperate. If one actor decreases its share, someone else, automatically, will improve theirs (Lundqvist, 2004b:22-23). Despite this complicated situation there are solutions in order to solve the problem and achieve a more sustainable water use. In the book *Governing the commons: the evolution of institutions for collective action*, Ostrom (1990:90) presents eight factors for self governing of common pool resources:

- “*Clearly defined boundaries*”: both the common resource and the actors that have the right to use it shall be clearly defined.
- “*Congruence between appropriation and provision rules and local conditions*”: regulations regarding extraction of the resource are connected to local conditions and to maintenance regarding work, money and other resources to the commons.
- “*Collective – choice arrangements*”: the users that are affected by the regulation of use and maintenance of the resources have the right to take part of the decision making of modifying the regulation.
- “*Monitoring*”: those who monitor and control the condition of the common resource and the behaviour of the users are users themselves or are accountable to the users.
- “*Graduated sanctions*”: users that violate the common regulations are likely to asses graduated sanctions, based of the level of the crime and decided by other users, by officials responsible for the users or by both.
- “*Conflict – resolution solving mechanisms*”: all users have access to local arenas to together solve problems and conflicts both between different users and between users and the officials.
- “*Minimal recognition of rights to organize*”: political authorities at central, regional and local levels allow the users of the resource to create their own systems for regulation and the observance of it.

- “*Nested enterprises*”: for common resources that are part of a larger system abstraction of the resource, measures for improvements, maintenance, conflict solving and decision making are all organisationally integrated in different layers of nested enterprises.

According to Lundqvist (2004b:24) Ostrom’s solutions is, however, limited in the sense of being most applicable for small watercourses including few actors with similar interests (Lundqvist, 2004b:24). The cooperation based on river basins in the WFD involves much greater areas and plenty of actors with competitive interest, why the eight factors might be too simplistic for cooperation of this kind. Since the river basin of Lagan involves many actors with competing interests of water the situation is not as simple as Ostrom (1990) describes it. This issue was also highlighted in one of the interviews. According to Alkan Olsson (2005) cooperation based on river basins is a great idea, but the river basins are far too big in Sweden and involve many different water users. Thus, it is of importance to make sure that the tools that are in use results in actions improving the existing situation (I1). Galaz (2003) agrees with Alkan Olsson in saying that water policies requires input from different actors, but what complicates the process at the European level is that the amount of relevant stakeholders or actors are between two and three hundred (Galaz, 2003).

However, to achieve a successful water management cooperation between different actors is required (Galaz, 2004a:116) and according to SEPA (2005) cooperation involves different participants in a process of mutual give-and-take. Galaz (2003) does not agree with this, but argues that the role of cooperation from the Swedish Government’s point of view is far too simplistic. Voluntary action is not a guarantee for smooth and effective cooperation, but can, because of conflicts, be both time consuming and expensive. Lundqvist agrees with Galaz in saying that it is important to keep in mind that different water users have different and often competing interests regarding the outcome of water resources when finding successful solutions to water issues (Lundqvist, 2004b:24).

The fact that the WFD is based on the PPP (EU, 2000:4, § 38) might complicate the situation further. High polluting actors will probably promote as low level of ambition as possible in order to hold down their costs. The Directive is also a *minimum level directive* with a lowest level regarding water quality that the Member States can not be below (Hägerhäll Aniansson and Vidarve, 2003). This in combination with the PPP will most likely result in actors with different levels of ambition when it comes to measures in order to increase the water quality (Galaz, 2004a:118-125). A high polluting upstream municipality will probably promote a low level of ambition since their benefits from the measures will be low and the cost will be high. A low polluting municipality situated down streams, as the municipality of Laholm, is on the other hand most likely willing to take measures (Galaz, 2004a:121). The same pattern can also be seen among actors within a municipality. Industry and Farmer’s Organisations with high costs and low benefits from improvements of the resource are obviously not very interested in taking measures at a high level of ambitious, but rather strives to keep it down as much as possible. Actors, such as Fishing Organisations, NGO’s and citizens on the other hand, benefit from ambitious measures without paying and will therefore promote improvements of the water resource (Galaz, 2003).

What contradicts to previous reasoning is that the PPP should encourage the polluters to take action in order to prevent the pollutants to end up in the water, which improves the water quality and reduces the costs for the emissions.

In the case of Laholm previous situation described is very clear and according to the WFD and the PPP a significant share of the costs for the improvements of water in the region will fall on the farmers. According to Galaz’s statement above they will do their best to keep down the costs and therefore strive to put a minimum of efforts in improving the situation. On the other hand the PPP

can encourage other people to get engaged and willing to act to improve a situation (Margerum, 1999; Kapoor, 2001 in Lundqvist, 2004c:66). This fact was also mentioned in one of the interviews. According to Svensson (2005) real enthusiasts are very useful because they have a lot of knowledge and are willing to fight for their interests (I2).

Apart from engagement among the actors trust is fundamental in achieving satisfying cooperation and agreements (Leach and Pelkey 2001 in Lundqvist 2004c:66). As illustrated in the CLD the amount of conflicts are dependent on the amount of trust. If the degree of trust among the actors is high, conflicts are less likely to evolve. The trust is, however, deterrent of two things. Firstly, the amount of actors, the more participation, the more difficult it is to know who to trust. Secondly, earlier experiences, the more experienced the actors are regarding cooperation and negotiation, the more knowledge and trust is apparent among the actors (Lundqvist 2001b in Lundqvist 2004c:66).

Despite that a greater number of participants result in a more complex situation it is essential that all actors that are dependent on the water source are involved in the cooperation process. In case of a conflict it is important that accurate plans for decision making and how to solve the conflict are available (Leach and Pelkey 2001 in Lundqvist 2004c:67).

Cooperation based on voluntary action of this kind is not always efficient and free from problems. The main problem is the lack of instructions considering the actors that should and should not be involved. With unlimited numbers of participants free-riders can easily operate since measures made by a couple of actors also benefit actors not willing to participate. Voluntary action is, however, believed to be a necessity for efficient cooperation, but in addition there is a need of mandatory stable regulated associations to reduce the number of free-riders (SOU 2002:105:176). Alkan Olsson (2005) agrees with previous reasoning and claims that clear instructions from central authorities are crucial in order to achieve successful cooperation (I1). That regulation reduces free-riders and increases trust and engagement can be seen in the CLD, but another important factor is that regulation might also reduce the engagement. Forced measures, where involved actors are not taking part of the decision making, can decrease the willingness to engage themselves in order to take measures and improve the situation (SOU 2002:105:176). According to Svensson (2005) voluntary participation is essential and people like to be part of decisions and discuss the problem instead of being told exactly what to do without the opportunity to influence (I2). Thus, it is essential to find a good balance between voluntary and regulated action.

6.4 The role of cooperation in WFD

As a key concept in the WFD cooperation is a vital factor and without cooperation based on river basins the Directive is pointless (I1). Hägerhäll Aniansson and Vidarve (2003) agrees with this in saying that, since river basins are the base for water management in the Directive, cooperation between different actors within a certain area is a necessity (Hägerhäll Aniansson and Vidarve, 2003) and should take place at central and regional levels, as well as locally (SEPA, 2005). The core principles in the WFD, i.e. establishment of cooperation, participation engagement and a new 'water solidarity', should be involved in the whole planning cycle seen in figure 7 (Hägerhäll Aniansson and Vidarve, 2003). As mentioned before cooperation is a crucial factor for the success of the WFD (EU, 2000) and "Member States shall encourage the active involvement of all interested parties in the implementation of this Directive, in particular in the production, review and updating of the river basin management plans" (EU, 2000, p. 16, Article 14). The Directive requires close cooperation between actors within a certain river basin, nationally or internationally but does not include strict rules of how the cooperation shall be realised (Hägerhäll Aniansson and

Vidarve, 2003). According to Svenskt Vatten (2005a) the most important change in the new Directive is that directions from above are toned down and that future water management is based on mutual understanding and cooperation.

As explained earlier in the paper five water authorities were established in Sweden as a consequence of the WFD (Galaz, 2005). Since these authorities are responsible for that cooperation and participation are encouraged, it is important that the water authorities plan their work in the sense of making participation from involved actors possible. However, it is crucial that information from the local level reaches central authorities and organisations. Further responsibilities for the water authorities are to inform the public about the cooperation process and what it resulted in. Reporting is believed to improve the cooperation between different actors in the continuous water management process (SEPA, 2005). Cooperation does not, however, only involve authorities, organisations and municipalities, but also the public that is described in the next section.

6.4.1 Public participation

Public participation (PP) is a high priority in the European Union regarding water management (EC, 2003) and since all of us use water in the daily life it is important that everyone is engaged in the process of achieving the targets of the Directive. Therefore, the WFD encourages all citizens to engage themselves and protect and maintain their water (SEPA, 2005). PP can be defined as “[...] allowing people to influence the outcome of plans and working processes” (EC, 2003:1). It is, however, important to determine the degree of participation and agree on if the opinions from the citizens should influence the decision making or if participation basically involves increased information to the public (Jonsson, 2004:87). Participation needed to achieve legitimate political decisions has increased (Creighton, 1998 in Jonsson, 2004:87), which indicates that not only more participants, but more intense and active participation is needed (Jonsson, 2004:87).

Despite that PP is of high concern in the EU, it is difficult to decide how to use participation in practise and how it should be implemented. According to EC (2003) participation sometimes can result in empowerment of local communities and increased democracy, while in other cases it is basically used as a market tool in a traditional top-down decision making process.

PP can, however, result in well informed and more creative decision making. It also improves the transparency in the process that in turn leads to more democratic attitudes among the people. On the other hand, public participation can be both complicated and risky. If the decision makers do not include the public enough in the process it might end up in disappointment and less support from the public. According to the EC (2003) “[...] PP is necessary but it has to be organized in order to make it work, especially in term of level of PP and type of public to involve” (EC, 2003:2).

6.5 The importance of local cooperation

Municipality borders are not respected by emissions from neither point sources nor diffuse sources, but affect all the municipalities within a river basin. Borders made by human beings are seldom adapted to the nature’s territory, ecosystems or landscapes, why local cooperation is an essential factor (Lundqvist, 1997). In the official government report *Klart som vatten* (SOU:2002:105) the local knowledge and experiences are argued to be of great importance regarding a successful water management. People living close to the water are also the first to pay attention to changes, why it is important to incorporate local actors in the action plans and make them feel involved in the process. Local knowledge also improves the accuracy of the action plan and its establishment

(SOU:2002:105). Thus, it is important that solutions are formed locally i.e. that decisions are taken at the lowest level as possible, which is believed to result in both lower expenses and improved water quality. In order to achieve sustainable water management it is essential to consider social, economic and democratic aspects and it is therefore necessary to organise the work in a way that make all actors dependent on water involved in the decision making process (Svenskt Vatten, 2005a).

According to Lundqvist (1997) the primary reason for cooperation is the opportunity to manage issues which requires wider knowledge than from the single municipality. Crossing administrative borders result in higher economical efficiency and at the same time democracy is encouraged (Lundqvist, 1997). The municipalities in Sweden play an important role in the success of the cooperation process to achieve sustainable water management and development (Svenskt Vatten, 2005a). Central authorities often lack in resources, regarding financing, administration and knowledge, to alone take a decision. Local actors have a better understanding and knowledge about the resource, why central solutions without cooperation with local actors might give an incorrect picture of the regional area (Galaz, 2004a:117). Svensson (2005) agrees with Galaz in saying that there are a lot of knowledge at the local level that authorities don't are aware of and in order to take relevant measures at regional and central levels the local knowledge is essential (I2).

It is also at this level the communication with citizens, companies and organisation takes place (Svenskt Vatten, 2005a).

In order to achieve satisfying cooperation at the local level engagement, resources and organisation are, however, crucial factors (I5). Svenskt Vatten (2005a) also highlights the role of engagement and claims that the engagement of the municipalities is an essential tool for future water management. Engagement also improves the knowledge about water and contributes to a new and wider view of sustainable development (Svenskt Vatten, 2005a). According to Alkan Olsson (2005) local cooperation is important for the outcome of the implementation of the WFD. Interviews made by Alkan Olsson involving farmers and employees at the municipality and counties shows that cooperation at the local level improves the knowledge and the overall perspective of the water resource and create an 'aha-experience'. Through cooperation solutions become more efficient and the overall perspective encourages people to work together rather than taking individual measures (I1). Svenskt Vatten (2002) agrees on that cooperation improves the understanding for water, which also results in increasing trust among the water users. In total, collective measures will result in lower costs and more efficient protection for the water resources (Svenskt Vatten, 2002).

Galaz (2004a:117) also points out the importance of cooperation at the local level and the need of cooperation can clearly be seen in a river basin. Since the downstream water user are affected by the water quality upstream it is no use for a single municipality to alone work with water quality improvements if no other municipality is doing it (Galaz, 2004a:117). To attain a powerful cooperation bodies both economic and personnel resources are essential. There seems to be a shortage in resources in the municipalities and the WFD must put a pressure on the municipalities to prioritise water resources more (SOU:2002:105:162-164).

The lack of resources in order to fulfil the requirements of the WFD was highlighted in almost all the interviews. Cooperation will cost a lot of money and there is also a need of personnel resources, who exclusively works with the implementation and maintenance of the Directive (I1). The implementation of the Directive and the cooperation process will, however, be costly. According to Svensson (2005) the first step, characterisation, in the water planning cycle alone will cost between 100-200 millions of Euros and that there is a severe lack of money (I2).

The economic aspect or lack of resources can be a determinate factor regarding the willingness from the municipality to get involve in the process of improving the water quality and achieve sustainable water management (I4).

What supports cooperation at the local level is that there is a long tradition in cooperation processes in Sweden. Cooperation improves the opportunity to own initiatives, which result in better control over the actors' activities. Instead of waiting for the authority's requirements the initiatives can be taken by the actors. A single actor also increases its power as a consequence of that the knowledge of the group often is greater than the sum of the participants (SOU:2002:105:173). According to Alkan Olsson, municipalities have started to work more positive together and cooperation is something that is in progress and improves all the time (I1).

7 Discussion

In the next chapter the possibilities and barriers regarding cooperation in connection to the case of the municipality of Laholm to achieve sustainable water management in the region is analysed.

Most of us can agree on that cooperation in order to solve water issues is necessary and that individual measures without considering the whole water flow, in most cases, do not solve the problem. The implementation of the WFD and the focus on river basins instead of administrative borders open up possibilities for the municipality of Laholm. The river basin approach results in a holistic view of water and if the watercourses within the municipality is seen in an overall perspective the possibilities to take accurate measures and solve the water problems, both within the municipality and in the river basin as a whole, significantly improves. Thus, the role of cooperation is essential in order to solve the problems concerning water quality in the municipality of Laholm but previous discussion in the paper shows that cooperation not always is a smooth process but rather complicated and time consuming.

As a result of the literature review and the interviews, five main barriers that might hinder the improvements of the situation through cooperation in the municipality of Laholm and the achievement of the targets of the WFD have been identified. The barriers are the following:

- *Resources:* To play a key role in the implementation of the WFD, resources, including both financial and personnel resources have to be available for the municipalities. Despite the importance of resources they seem to be quite limited. Apart from money generating from the PPP, intended to finance costs for measures, the Swedish Government are responsible for the administrative costs, such as control, supervision and reporting, of the WFD (Svenskt Vatten, 2005b). According to the Directive the money generating from the PPP are not supposed to cover administrative costs (SOU 2002:115:197). Who is going to pay for other procedures, such as monitoring are, however, not yet decided, but the Government are likely to be responsible for that too (I5). Direct measures in order to improve the water quality are however the water users economically responsible for (Svenskt Vatten, 2005b).
- *Competence:* In order to achieve satisfying cooperation resulting in that the targets of the WFD are met, it is essential that people with relevant competence are involved in the process. The people involved must have the right knowledge in order to take decisions and determine where measures are most effective and needed. Additionally, competence regarding water management and protection is necessary. Competence only considering natural science is, however, not enough, but in order to improve the water situation multidisciplinary science is required. Competence regarding policy, system thinking and economy is as important as natural science in order to solve issues covering social, economic and environmental aspects.
- *Engagement:* Engagement often depends on what to get in return. Thus, it is crucial that the actors that should be involved in the cooperation process in Laholm in order to improve the water situation feel that they can benefit from it. 'Real enthusiasts' are essential in the cooperation process since they have a lot of knowledge and can motivate other actors to act.
- *Site specific information and basic data:* Competence and engagement alone is, still, not enough to solve the water issues in the municipality of Laholm, but site specific information

and basic data, such as land use, point sources and environmental status is needed. In order to achieve effective solutions there is a need of basic information about the region. There are, however, existing information about the watercourses in general in Sweden, but the WFD requires that all water is classified according to criteria determining if the water is of good status or not (Hägerhäll Aniansson and Vidarve, 2003). The first step in the water planning cycle (Figure 7), characterisation, gives the basis for this information.

- *Conflicts*: cooperation is not only about smooth agreements but can result in tough negotiations between actors with different interests considering the water resource. Cooperation evolving into conflicts is both time consuming and expensive instead of cost effective that often is the target of cooperation.

In the following simplified CLD, possibilities and barriers regarding cooperation to solve the problems in the municipality of Laholm is illustrated. The five factors explained above can be seen in the CLD and how they impact each other and the water situation in the municipality is also shown.

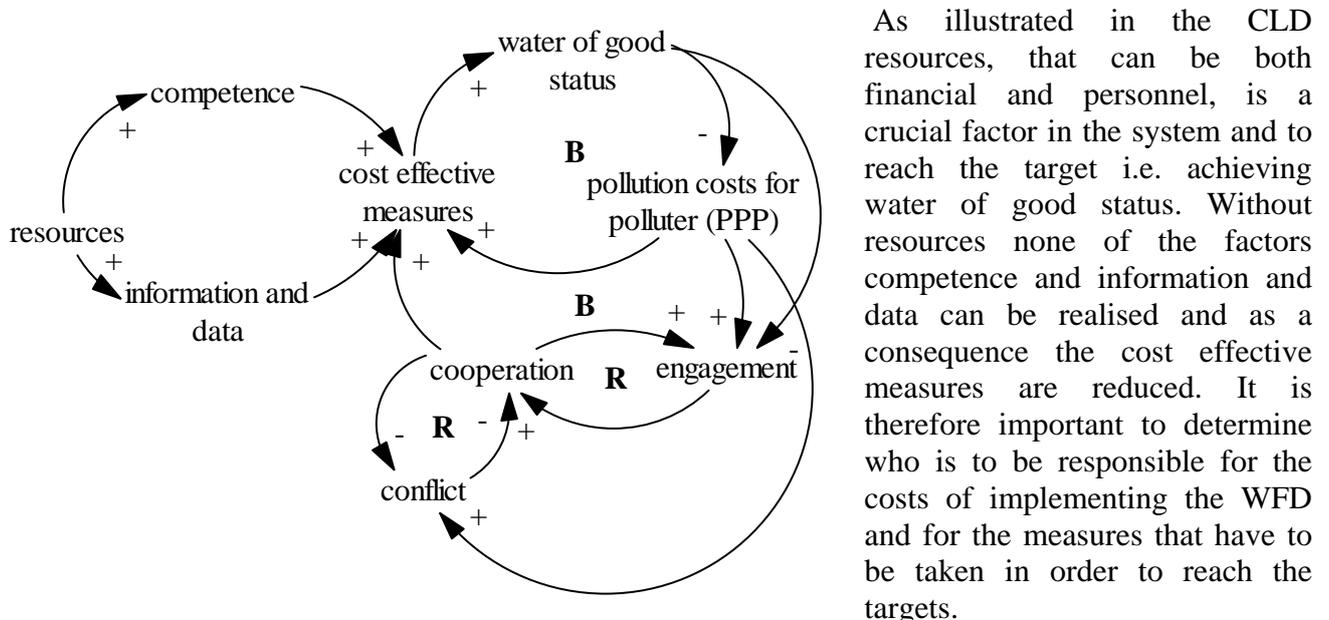


Figure 13. Simplified CLD of possibilities and barriers of cooperation in the municipality of Laholm

Despite the fact that resources are the core of the system, limited resources are the reality in many municipalities (SOC 2002:105:166) and it seems to be a concern also in the municipality of Laholm. According to Persson (2005) personnel resources have to be allocated in the municipalities of Laholm since the existing employees have no time over for the implementation of the Directive (I3).

However, it seems to be a conflict existing between the local and central level when it comes to responsibilities and the implementation of the WFD. It is argued at the central level that the municipalities must prioritise and take more measures to improve the water situation (SOC 2002:105:166) while the municipalities claim that they need more resources to be able to implement the Directive. The increasing costs arising from the Directive is something that is supposed to be debated between the Government and the municipality (SOC 2002:105:157) How much the

municipalities are willing to pay to follow the directive is, however, an open question and will definitely decide the level of ambition in the municipality.

Another aspect worth attention is the PPP, shown as 'costs for polluter' in the CLD above that has a central part in the WFD. Since the herbicides caused by weed control of railways mainly occur from pollutants emitted a long time ago and some of them are banned today, the agriculture sector is the main cause of reduced water quality in the case of the municipality of Laholm. Two problems regarding the PPP can be identified in this case. Firstly, is the agriculture sector capable to pay for their emissions? According to the SBOA (2003) the development of the Swedish agriculture sector is decreasing by in average 1.5 percentage point a year compared to the rest of the EU's Member States (SBOA, 2003) and according to a study made by Nordström Källström (2002) a central reason to why farmers chose to shut down the production is deficiency in profit.

Secondly, how is it supposed to function? The emissions from agriculture coming from diffuse sources are not easy to track as for example an industry, why it will be problematic to determine who is paying for what. According to SOU (2002:105:327-328) huge efforts are required in order to determine the load from every single farmer and the situation gets even more complex when considering that most of the nitrogen ending up in Sweden comes from transboundary air pollution. Alkan Olsson (2005) agrees in this in claiming that there are problems considering the PPP. Since the polluter is supposed to pay the principle is based on individual emissions, which is difficult to determine when it comes to water issues. However, the pollution emitted does not stay in one place and it can therefore be difficult to decide who is responsible for what (I1). This situation is likely to evolve conflicts, which is illustrated in the CLD as the more pollution costs for polluter, the more conflicts.

As discussed before in the paper, further problems are that a PPP approach probably will limit the level of ambition. Looking at Laholm and the agriculture sector, they are likely to strive for as low ambition as possible and not encourage cooperation, on the other hand costs for use of herbicides, pesticides and fertilisers should encourage the farmers in Laholm to engage themselves and cooperate in order to together find measures that prevents the substances to end up in the water. In this way the cost for pollution reduces and in turn the water quality in the region increases. This can be seen in the CLD as the more costs for pollution, the more engagement. The more engagement, the more cooperation and in turn more effective measures resulting in water of good status. How the PPP will function in Sweden is, as mentioned earlier, not yet decided why the impacts of the principle at this stage only can be estimated.

The next barrier that the municipality of Laholm has to overcome in order to benefit from cooperation is competence. As illustrated in the CLD above, competence is essential in order to take cost effective measures. However, as a result of the interviews several respondents mentioned that there is a lack of knowledge in the municipalities in order to implement the WFD in Sweden (I3, I5, I6). Since personnel resources seem to be lacking in the municipality of Laholm and no new people are employed in order to work with the WFD, the right competence might be a limitation in the municipality. Without the right competence and knowledge about where to take measures it can turn out to be a repetitive and expensive process. The municipality is, however, not alone in this process, but work in close cooperation with the regional county and since the Swedish environmental quality objectives have to be achieved there must be people working with these issues in the municipality today. According to Joelsson (2005) the municipalities are used to work with the issues dealt with in the WFD already (I4). If the work required achieving the objectives are coordinated with the implementation of the WFD the existing competence and personnel resources can be used also here, as well as that knowledge from other municipalities can be beneficial. As

defined previous in this chapter it is, however, important that multidisciplinary competence is available in the municipality.

A further crucial factor is engagement. In the CLD engagement is necessary to realise cooperation between actors that in turn leads to cost effective measures and increased water of good status. As can be seen in the CLD, engagement does not generate from costs for polluter alone. Actors not responsible for pollution costs, but benefit from a water of good status are willing to engage themselves and cooperate to improve the situation as much as possible. In the CLD this is illustrated by the less water of good status, the more engagement.

To engage the actors to cooperate in the municipality of Laholm it is essential to inform the involved parties about the benefits of cooperation. The actors benefiting from a water of good status without having to pay are the ones that have to take the initiative and encourage other actors to take part of the process. In the CLD there are two main ways to take cost effective measures. Either through engagement, that increases the cooperation and consequently the measures and water of good status, or through that the costs for polluter cover the costs for measures that lead to increased water of good status. If the actors that must pay for the pollutions choose to just pay and not get engaged and cooperate the solution is not really satisfying. The whole idea with the WFD is in this way not achieved and it is most likely that the lowest level of ambition is promoted by the polluters in order to keep down their costs. Thus, it is important that the polluters are convinced that the way of engagement and cooperation is more beneficial and will result in more cost effective measures in the end. Despite that the polluters engage themselves to take measures in order to prevent fertilisers and pesticides etc. to leach to the water they still have to pay for the pollution. The pollution costs will, however, reduce compared to if no measures are taken. The latter solution, encouraged in the WFD, will also result in a more sustainable water management in the municipality of Laholm.

Worth to mention is that even though 'real enthusiasts' are important for the cooperation process the authorities can not be dependent on them. Engagement from actors makes the cooperation process much easier, but the authorities must make sure that the cooperation process is functioning despite that engagement is lacking.

The fourth barrier involves the importance of relevant information and data. According to SOU (2002:105:162) the first step in the water planning cycle characterisation is demanding and requires huge local efforts. The local knowledge is essential in order to communicate with regional and central authorities to be able to receive cost effective measures. The characterisation is the basis for site information and as illustrated in the CLD (Figure 14), basic data about the region necessary to take accurate and cost effective decisions. Despite that the municipality of Laholm has extensive descriptions of their water catchments, water protection areas and pollution sources (Laholms Kommun, 2005) this process will be laborious, which requires resources.

The last barrier that can hinder successful cooperation is conflicts. As discussed earlier, the Swedish Government sees cooperation as a smooth give-and-take process, which results in cost effective measures. It has, however, been argued that cooperation is not always this simple and can be both time consuming and inefficient (Galaz, 2003). In this paper the agriculture sector is the main polluter in the municipality of Laholm and it is therefore here conflicts are most likely to develop. Thus, it is essential to highlight the benefits of cooperation that encourage different actors to find an agreement rather than refuse to cooperate. In case of conflicts it is, as discussed previous in the paper, important that a plan including how to solve conflicts is available. The more actors that are involved the greater risk for conflicts, why it is important to determine who to involve in the process. There has to be a good balance of actors, meaning that actors contributing with necessary

data must be included in the process, but it is important not to exclude actors that want to take part since exclusion of actors might result in dissatisfaction and conflicts.

In the case of Laholm it is essential to involve representatives from the agriculture sector and agree on measures to improve the water situation in the municipality. Since the WFD is based on the PPP the agriculture sector in Laholm should be willing to cooperate in this issue. In the municipality of Laholm there is a domination of small farmers with less than 100 hectares (I3). As the situation is today the farmers pay according to how much fertilisers, herbicides and pesticides they use instead of how much they pollute. Small scale agriculture might not cause that much of environmental harm, why the farmers in the municipality of Laholm should benefit from the PPP approach.

How smooth the cooperation will turn out to be are dependent on the information and communication between the involved actors, but also on how many actors that are involved in the decision making. Many small farmers in the municipality of Laholm can complicate the process of cooperation and it might be difficult to make a decision that every actor can agree on. On the other hand, the effect is not as significant if one actor oppose to the decision in comparison to if a big scale farmer refuses to cooperate. Once again it is essential to emphasize the benefits of collective action rather than individual solutions, but also local cooperation instead of decisions taken at the central level. To make all actors agree on that local action and cooperation is beneficial and cost effective the alternative; central control must be seen as a threat (Lundqvist et al., 2004:205).

8 Conclusion

As hypothesised in the paper cooperation is necessary in order to improve the water situation in the municipality of Laholm, to achieve the targets of the Water Framework Directive and to reach sustainable water management. Since water is a movable resource and actions from a single actor affects everyone dependent on the same water, collective measures rather than individual are required.

Water users have different interests in the resource, why cooperation and agreements are essential in order to find a satisfying solution for involved actors. The implementation of the WFD in Europe, which emphasises on the importance of considering water as a whole rather than loose parts, creates new possibilities to cooperation between water users. The river basin approach in the Directive encourages all municipalities connected to Lagan to cooperate and take collective measures, which is crucial to improve the water situation in the municipality of Laholm. For a downstream municipality, measures within the administrative borders are not enough if upstream actors continue to pollute the water.

As a result of the literature review and the interviews it can, however, be concluded that cooperation is a complex and time consuming process. Five essential barriers that hinder cooperation in the municipality of Laholm have been identified, namely; *resources*, both financial and personnel, *competence*, to be able to take accurate and cost effective measures, *engagement*, 'real enthusiasts' are important since they have a lot of knowledge and can motivate others to participate, *Site specific information and basic data*, in order to achieve solutions where they are most needed and finally, *conflicts*, that are both time consuming and expensive and hinders the cooperation process and the improvements.

A further factor that complicates the cooperation process to achieve the targets in the WFD and improve the situation in the municipality of Laholm is the PPP. It was hypothesised that the PPP should encourage the polluters to take action in order to reduce emission costs. This might be true, but only to a certain extent. It is, however, more likely that conflicts will evolve when deciding who is going to pay. According to the PPP, the agriculture sector is responsible for the majority of the pollution costs in the municipality of Laholm and the question is how beneficial they will consider cooperation to be the day they have to open their wallet. Agriculture is a diffuse pollution source, which makes it difficult, if not impossible to determine who is paying for what, which probably creates even worse conflicts. Since cooperation is supposed to be based on voluntary action, it is more likely that the farmers will oppose rather than cooperate.

The way cooperation is supposed to work in the WFD will result in lengthy and inefficient processes and as a consequence, conflicts about who is responsible for the cost of pollution will evolve. In order to achieve successful cooperation and attain sustainable water management in the municipality of Laholm all participants have to benefit from the collective action, not only in the long run, but they also have to experience the improvements. How it is supposed to function is, however, not within the scope of this paper.

The WFD is an attractive directive with new and unique approaches that in theory works fine. The real world is more complex than that, why the path to achieved targets will not be as smooth as in theory.

9 List of references

- Bergström, S. (1993). *Sveriges Hydrologi – grundläggande hydrologiska förhållanden*. Norrköping: SMHI/Svenska Hydrologiska Rådet.
- Clarke, R. (1991). *Water – The International Crisis*. Great Britain: Biddles Ltd, Guildford and King's Lynn.
- EC. (2002a). *Ramdirektiv för vatten- Slå upp det!* Luxemburg: Byrån för Europeiska gemenskapernas officiella publikationer.
- EC. (2002b). *Vatten är liv – Ramdirektivet för vatten*. Luxemburg: Byrån för Europeiska gemenskapernas officiella publikationer.
- EC. (2003). *Public Participation and the European Water Framework Directive – Role of information and communication tools*. European Commission. WorkPackage 3 report of the HarmoniCOP project –Harmonising COLlaborative Planning.
- EU. (2000). *European Union Water Framework Directive*. Official Journal of the European Communities. L 327/1.
- Galaz, V. (2005). *Does the EC Water Framework Directive Build Resilience? Harnessing Socio-Ecological Complexity in European Water Management*. Policy Paper 1 by The Resilience and Freshwater Initiative, Swedish Water House.
- Galaz, V. (2003). *Bargaining And Cooperation – Why Swedish Catchment Based is Likely to Be Costly and Inefficient*. Göteborg: Göteborg University, Department of Political Science, Working paper.
- Galaz, V. (2004a). Spelet om övergödningen – en konfliktanalys av samverkan kring vattenresurser. In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. VASTRA Rapport 5. (pp. 115-125). Västervik: AB C O Ekblad & co.
- Galaz, V. (2004b). Spelet om övergödningen – en tillämpning och möjliga utvägar. In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. VASTRA Rapport 5. (pp. 126-133). Västervik: AB C O Ekblad & co.
- Gierow, E.; Nilén, C.; Altner, A. (2001). *På Grön Kvist – Boken om miljö och miljöarbete*. (3rd ed.). Lund: Lund University, Stiftelsen Tem.
- Haraldsson, H. (2004). *Introduction to System Thinking and Causal Loop Diagrams*. Lund: Lund University, Department of Chemical Engineering.
- Haraldsson, H. and Sverdrup, H. (2004). Finding simplicity in complexity in biogeochemical modelling. In: J Wainwright and M. Mulligan, *Environmental Modelling: Finding simplicity in complexity*. (pp. 211-223). New York: Wiley.
- Haraldsson, H. (2005). *Developing methods for modelling procedures in System Analysis and System Dynamics*. Doctoral Thesis. Lund: Lund University, Department of Chemical Engineering.
- Hardin, G. (1968). The Tragedy of the Commons. *Science* 162 (December 13, 1968):1243-1248. In Conca, Ken & Dabelko, Geoffrey D. (Editors), *Green Planet Blues, Environmental Politics from Stockholm to Johannesburg*. (3rd ed.). (pp. 37-44). Boulder & Oxford: Westview Press
- Hartman, J. (1998). *Vetenskapligt tänkande: från kunskapsteori till metodteori*. Lund: Studentlitteratur.
- Hägerhäll Aniansson, B. and Vidarve, M. (2003). *En basbok om Ramdirektivet för vatten*. Stockholm: Naturvårdsverket. Report 5307.

- Jonsson, A. (2004). Metoder för ökat deltagande. In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. VASTRA Rapport 5. (pp. 87-103). Västervik: AB C O Ekblad & co.
- Knutsson, G. and Morfeldt C-O. (2002). *Grundvatten – teori och tillämpning*. (3rd ed.). Stockholm.
- Kvale, S. (1997). *Den kvalitativa forskningsintervjun*. Lund: Studentlitteratur.
- Lagans Vattenvårdsförening. (2005). (2005-09-22). URL: www.lagansvattenvardsforening.com.
- Laholms Kommun. (2005). *Beskrivning över dricksvattenförsörjningen i Laholms kommun*. The municipalataty of Laholm. Laholm: Laholms kommun, Teknik – och servicekontoret.
- Lundqvist, L. J. (1997). *Institutionalized Cooperation for Water Management. Sweden, The West Coast, and the Lagan and Nissan Catchment Areas*. Göteborg: Göteborg University, VASTRA Cooperative Learning Process.
- Lundquist, L. J. (2004a). Det nya ”VattenSverige” och ramarna för lokal vattenförvaltning. In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. (pp. 46-60). VASTRA Rapport 5. Västervik: AB C O Ekblad & co.
- Lundquist, L. J. (2004b). Vatten – en omstridd allmännyhetsresurs. In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. (pp. 17-24). VASTRA Rapport 5. Västervik: AB C O Ekblad & co.
- Lundquist, L. J. (2004c). Miljööverenskommelser som metod för lokal vattenförvaltning. In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. (pp. 61-69). VASTRA Rapport 5. Västervik: AB C O Ekblad & co.
- Lundquist, L. J.; Jonsson, A.; Galaz, V.; Löwgren M.; Alkan Olsson, J. (2004). För vattnet i tiden? In Lundqvist et al. *Hållbar vattenförvaltning – organisering, deltagande, inflytande, ekonomi*. (pp. 199-209). VASTRA Rapport 5. Västervik: AB C O Ekblad & co.
- Miller, G. T. (2000). *Living in the environment: principles, connections, and solutions*. (11th ed.). California: Brooks/Cole-Thompson Learning, inc.
- Nixon, S. C.; Lack, J. T.; Hunt, E. T. D.; Water Research Centre; Lallana, C.; CEDEX; Boschet, F. A.; Agences de l’Eau (2000). *Sustainable use of Europe’s water? State, prospects and issues*. Environmental assessment series No 7. Copenhagen: EEA – European Environment Agency.
- Nixon, S. C.; Trent, Z.; Marcuello, C.; Lallana, C. (2003). *Europe’s water: An indicator-based assessment*. Topic report 1/2003. Copenhagen: EEA – European Environment Agency.
- Nordström Källström, H. (2002). *Att vara lantbrukare eller inte - En studie av förutsättningar för livskraftigt lantbruk i tre nedläggningsdrabbade områden i Sverige*. Rapport 2002:10. Jordbruksverket, Naturvårdsverket, Riksantikvarieämbetet.
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Patel, R., Davidsson, B. (1994). *Forskningsmetodikens grunder – att planera, genomföra och rapportera en undersökning*. Lund: Studentlitteratur.
- SBOA. (2003). Hur går det för svenskt jordbruk – en jämförelse med några konkurrentländer. Rapport 2003:7. Swedish Board of Agriculture, Jönköping.
- Schwedt, G. (2001). *The Essential Guide to Environmental Chemistry*. Florence: Conti Tipicolor Arti Grafiche.
- SEOC. (2004a). *Sweden’s Environmental Objectives – a shared responsibility*. Secretariat for the Environmental Objectives Council, Swedish Environmental Protection Agency. Falköping.
- SEOC. (2004b). *Sweden’s Environmental Objectives – are we getting there?* Secretariat for the Environmental Objectives Council, Swedish Environmental Protection Agency. Falköping.

- SEPA. (2000). *Miljööverenskommelser – en möjlighet i miljöarbetet?* Swedish Environmental Protection Agency. Rapport 5064. Stockholm: Naturvårdsverkets Förlag.
- SEPA. (2002a). *Helhetssyn i vattenvården*. Swedish Environmental Protection Agency. Stockholm.
- SEPA. (2002b). *Miljö kvalitetsnorm för nitrat i grundvatten*. Swedish Environmental Protection Agency and SGU. Stockholm: Naturvårdsverkets Förlag.
- SEPA. (2005). *Samverkan. Handbok för Vatten*. Swedish Environmental Protection Agency. Working material.
- SOU. (2002:105). *Klart som vatten – Betänkande av Utredningen svensk Vattenadministration*. Ministry of Environment/Fritzes, Sweden. [Statens offentliga utredningar, Final Report from Government Inquiry Commission, in Swedish].
- Svenskt Vatten. (2002). *Ramdirektivet för vatten – en kommunal utmaning*. Meddelande M126, Svenskt Vatten, Stockholm.
- Svenskt Vatten. (2005a). *Samverkan i avrinningsområden – en demokratiprocess*. Meddelande M131, Svenskt Vatten, Stockholm.
- Svenskt Vatten. (2005b). *Samverkan i avrinningsområden – Organisation, arbetssätt, finansiering*. Meddelande M130, Svenskt Vatten, Stockholm.
- Wivstad, M. (2005). *Kemiska bekämpningsmedel i Svenskt jordbruk – användning och risker för miljö och hälsa*. CUL – Centrum för uthålligt lantbruk, SLU, Uppsala.

Interviews

Code	Name	Position/Authority	Date
I1	Johanna Alkan Olsson	Researcher, Lund University	2005-09-16
I2	Jonas Svensson	Water planner, County Administration, Halland	2005-09-23
I3	Jan-Eric Persson	Municipality of Laholm	2005-09-23
I4	Arne Joelsson	County Administration, Halland	2005-09-30
I5	Anneli Harlén	Västerhavets Water Authority	2005-10-03
I6	Håkan Marklund	Swedish Environmental Protection Agency	2005-09-29

10 Appendix

Appendix 1: Interview questions Laholm

1. What kind of problems regarding water quality exists in the municipality of Laholm?
2. Why did these problems occur?
3. Have measures been taken? If yes, what kind of measures?
4. Have the problems been fully solved? If not, what is the reason?
5. Do conflicts that complicate the measure process and the situation, between different actors exist?
6. If yes, why did these conflicts evolve?
7. If conflicts evolve, how can they be solved in order to improve the water situation in Laholm and to sustain a sustainable water management in the region?
8. How will the Water Framework Directive influence the municipality of Laholm? Will it result in an improved water situation in the municipality?

Appendix 2: Interview questions WFD

1. What are your expectations for the WFD?
2. What is the difference between the Directive and Swedish environmental law?
3. How important is the role of cooperation in the WFD?
4. Which are the advantages with cooperation?
5. Which are the disadvantages with cooperation?
6. Can cooperation increase conflicts between different actors?
7. Can cooperation put a pressure on the actors to take action?
8. How will the WFD influence the municipalities in Sweden? Will it result in an improved water situation? If yes, in what way?
9. What is required at the local level in order to reach the target of the WFD?
10. Is there enough competence in the municipalities to be able to implement the WFD?

Appendix 3: Interview summary

The following table presents a summary of the answers regarding the WFD. Since the case of the municipality of Laholm is described in chapter 3 questions about the municipality is not included in the table.

Question	I1	I2	I3	I4	I5	I6
1	I am doubtful to its possibilities. It relies on if the regional authorities and municipalities can cooperate and clear directions from the central level are required. It will, however, take time.	Since it is binding the water status must be achieved. Reaching half the way can be a target in it self.	I think it will succeed but the time is short. In the first round the quality might be suffering.	I think it will get more power and influence that people believe today. It will take some time, but if it is implemented in a good way it will result in environmental improvements.	That engagement about water questions increases and thereby the knowledge at all levels. More measures and preventive action. For example include the WFD in the municipalities' comprehensive plans.	More cooperation and a holistic water view that doesn't consider administrative borders. The WFD have the potential for improvements and heavy directives like the WFD is good since environmental issues are not a priority in Sweden.
2	The river basin approach. Swedish legislation focuses on the single polluter instead of the harm on nature in total.	The WFD is incorporated in the Swedish legislation and strict and binding regulation, much stricter than Swedish environmental quality standards, will be required.		The WFD includes binding environmental quality standards compared to the non-binding Swedish environmental quality objectives. The Directive also includes a non-decreasing water quality policy.	The WFD gives water management higher legal status including binding targets and requirements of action plans.	Most of the WFD is incorporated in the Swedish environmental law. How to deal with the PPP in Sweden is not yet decided.
3	It is everything and the whole point with the WFD. The river basin approach equals to cooperation and without it the Directive is meaningless.	It is essential and the only way to go. If actors are involved in the whole process it is more likely to succeed. People like to be involved in the decision making process. No one prefers forced measures.		Cooperation is highlighted as an important part in water management and it is essential to collect the actors opinions.	Crucial to achieve water of good status	The cooperation process is very important and it is dependent on the required efforts.

4	Shared knowledge and it gives a comprehensive view to water issues and results in more efficient measures.	The positive is that cooperation is the only way for achieved water of good status.	It can encourage more actors to take action.	Without cooperation, no improvements! Cooperation can also reduce sabotage and actors opposing decisions and measures taken.	The legitimacy of the decision process is strengthen, which make it easier to carry through decisions. Increased local knowledge, which gives a better basis for decisions and creative solutions.	Reduction of sabotage, comprehensive view of water issues resulting in a better understanding for where to take measures. Creates possibilities for win-win situations and voluntary action.
5	It will evolve into conflicts, especially when deciding who is going to pay for what. The PPP will create conflicts since it is based on what the actor pollute, which in many cases are difficult to decide.	Long decision process.	It takes time, conflicts that might evolve takes time to solve.	Too much information and cooperation without any clear results can result in stakeholder burnout.	Time consuming and requires resources.	
6	Yes! In the first stage the actors tend to have an aha-experience, but when deciding about who is paying it will result in conflicts!	Yes! Both between different interests in the water resource among the users, but also between old and new legislation.	Yes, and it will mainly concern the role of the agriculture regarding water issues.	The risk for conflicts is higher without cooperation.	The conflicts will not increase, but be identified at an earlier stage and can therefore hopefully be solved faster and easier.	Possible, but not likely. There can be differences in opinions and interest, but conflicts will probably be reduced if cooperation is done in a good way.
7	Municipalities work well together and it is getting better all the time. If they have a good contact they can see what others do and do the same thing.	Yes because you don't want to be worse than your neighbour.	Information about wetlands in Laholm created a demand. The fact that a neighbour had a wetland increased the willingness to create one for others.	If the actors understand that they can benefit from cooperation they are more likely to take collective actions.	Cooperation can make actors inspired to take measures.	Cooperation is not about pressure, but voluntary action. Group pressure is possible.

8		The WFD can be used as a tool to decide where to put measures and to get as much environmental benefits as possible as inexpensive as possible. It can also be beneficial for the planning process in the municipalities .			A comprehensive view about water resulting in more efficient measures. Increased cooperation through more participation and local initiatives. Incorporation of the WFD in the comprehensive plans in the municipalities are required to achieve water of good status.	The municipalities must store and communicate data in a different way than earlier. This gives a better basis for the status of the water, which in turn can result in improvements.
9	At the local lever there is a lot to do and it is essential that the land owners, farmers and other actors participate. It is crucial to achieve successful cooperation and make everyone involved in the process.	The municipalities are already working in the right direction so it is just to continue. It will, however, be expensive and a lot of resources are needed.	All actors have to be part of the process and to be able to do this resources are required.	More cooperation between upstream and downstream actors. The municipalities also have to give up the thought considering administrative borders. Economy and resources will determine the level of ambition in the municipalities.		
10			No, it is not enough. But there is a lot of interest in these questions.	Yes, the municipalities are used to work like this.	No, not in all municipalities.	It is different in different municipalities, but generally no.