Can Social Learning Help Facilitate Stormwater Management?

Stephan Larsson
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Supervisor: Yoshiko Asano
Evaluator: Jasper de Vries
# Content

1. **Introduction** ................................................................. 1
   1.1 Thesis structure and focus ............................................. 1
   1.2 Overview .................................................................... 1
2. **Background** ................................................................. 3
   2.1 What is stormwater? .................................................... 4
   2.2 What is the ReSolve process? ....................................... 4
   2.3 What is the innovation competition? ............................ 6
   2.4 Similar water-related sustainability competitions .......... 6
   2.5 What is the competition case study? ............................ 7
   2.5.1 The competition research question ......................... 7
   2.6 How can social learning help? ..................................... 8
   2.7 Criticisms to social learning? ...................................... 8
3. **Theoretical background** ............................................... 9
   3.1 Social learning theory ............................................... 9
   3.1.1 History of social learning theory .............................. 9
   3.2 The authors’ definition of social learning .................... 10
   3.2.1 Cross boundary knowledge .................................... 10
   3.2.2 Context specific learning and innovation ............... 11
   3.2.3 Framing & re-framing ............................................ 11
   3.3 Summary .................................................................... 12
4. **Method** ........................................................................ 12
   4.1 Research design ....................................................... 12
   4.2 What is action research? ............................................ 13
   4.3 Data collection .......................................................... 14
   4.3.1 Limitations ........................................................... 15
5. **Theoretical framework** ................................................ 15
   5.1 Sustainable development ........................................... 15
   5.2 Ecosystem services .................................................... 16
   5.3 Section conclusion .................................................... 16
6. **Results/Discussion** ....................................................... 16
   6.1 Section contents ....................................................... 16
   6.2 Stakeholders ............................................................. 17
   6.2.1 Role of the author .................................................. 17
   6.3 Observations from meetings ...................................... 18
   6.3.1 Initial competition workshop (29/01/2015) ............... 18
   6.3.2 Follow-up competition workshop (05/02/2015) .......... 19
   6.3.3 Meeting with Vinnova (10/02/2015) ....................... 20
   6.3.4 Email notification (16/02/2015) .............................. 24
   6.4 Further discussions ................................................... 24
   6.4.1 Did social learning take place? ............................... 24
   6.4.2 Post-study social learning ..................................... 25
7. **Conclusions** ............................................................... 25
8. **Acknowledgements** .................................................... 27
9. **Abbreviations & Key Terms** ........................................ 27
10. **References** ............................................................... 28
11. **Appendix** ................................................................. 33
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STEPHAN LARSSON


Abstract: Scientific summary.

This thesis shows the effect social learning has on various stakeholders involved in a project aimed at tackling a stormwater challenge in the city of Uppsala in Sweden and if social learning is a useful tool to address such an issue. Due to the onset of climate change societies are having to deal with increasingly complex issues. Finding sustainable answers to these challenges is proving difficult so alternative methods such innovation competitions much like the one studied in this paper are becoming attractive alternatives to conventional climate change mitigations approaches. By using an active participation method, this thesis attempts to study whether or not social learning is taking place in the innovation competition and if it is having an impact on the innovation competition. The study found that social learning is in fact taking place during the meetings which were attended but whether or not the resulting knowledge created as a result of the social learning was being used to the advantage of the stakeholders was compounded by communication issues outside of the project meetings.

Keywords: Social Learning, Stormwater Management, Uppsala, Sweden, Sustainable Development

Stephan Larsson, Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden
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1 Introduction

1.1 Thesis structure and focus

This thesis will use the following structure. Firstly an introduction to stormwater and the specific context of stormwater in Uppsala will be presented. This is accompanied by a summary of the case study that will be the focus of this thesis. Following that, social learning will be introduced, and it’s benefits and drawback will be highlighted. Having presented the background of the thesis, a more in-depth look at social learning will be undertaken. This will include topics such as the emergence of social learning as a theory, the authors’ definition of social learning, which includes a presentation of cross boundary knowledge, context specific learning and innovation as well as the processes of framing & re-framing. These topics are important to the analysis of the thesis. This section will be followed up by Methods, which will present how the data was collected and the difficulties faces during this process. After presenting the methods the thesis is placed in the context of sustainable development and ecosystem services which form the core reason why conducting a study such as this is important. Finally, the results of the data collection are presented, discussed and conclusions are drawn.

The work will focus on the effect social learning has on efforts undertaken to mitigate the negative impacts of stormwater in a medium sized city such as Uppsala. This study will look at the outcome of a series of meetings held during the process of running an innovation completion with the desired outcome of solving the stormwater issue on a particular stretch of road in Uppsala.

1.2 Overview

“Climate change is destroying our path to sustainability. Ours is a world of looming challenges and increasingly limited resources. Sustainable development offers the best chance to adjust our course.”

– Ban Ki Moon (2012)

This is how Mr Ban addressed the UN General Assembly in 2012 where he also stated that; “environmental, economic and social indicators tell us that our current model of progress is unsustainable” (Ban, 2012). The world is currently undergoing a change so dramatic that science and understanding is struggling to keep up. This is why Ban Ki Moon (2012) said that Sustainable Development is the best chance humankind has of staving off destruction. Destruction, that is how serious climate change is and that is why every action we take must be reflective and responsible. The world’s population is collectively walking along the edge of a razor. Whether we choose to believe in climate change is a separate issue altogether, although there have been numerous academic papers presenting that the scientific community agrees (75% to 97% consensus) that climate change is caused by anthropogenic activities (Oreskes, 2004; Tol, 2014). The Secretary General of the United Nations has therefore placed “the Challenge of Sustainable Development” at the top of the list of most important things we need to achieve in the near future.

Depending on where you are in the world, the effects of climate change can take different forms. It is generally accepted that we will be experiencing more extreme weather events and
dry places will become drier, wet places will become wetter along with rising sea levels due to ice melt from glaciers and inland ice such as the Greenland ice sheet (IPCC, 2014). These large-scale impacts can have knock-on effects that alter the seasonality of wet/dry seasons and will affect the water quality (IPCC, 2014). This impact on water quality can come as an effect of a number of different reasons, some of which include; “storm water drainage operation and sewage disposal disturbances in coastal areas due to sea-level rise” (Haines et al., 2000; in IPCC, 2015); “increasing water withdrawals from low-quality sources” (IPCC, 2015); “greater pollutant loads due to increased infiltration rates to aquifers or higher runoff to surface waters (as result of high precipitation)” (IPCC, 2015); and “increased amounts of polluted storm water” (IPCC, 2015).

Naturally the changing seasonality of weather systems, geophysical and ecological changes will come to impact most species of animals and plants; their habitats will change and this will force them to migrate or find ways to adapt. All of these aforementioned changes will have serious impacts on crop yields, which in turn will impact the geopolitical landscape. An example of such an event is the Arab Spring in the Middle East where the price of grain increased to such an extent, due to crop failures, that it acted as a so called “threat multiplier” and decreased the political stability in the region (Perez, 2013; Banusiewicz, 2014). In short climate change will induce more extreme weather events, poorer water quality and supply, ecosystems along with their flora and fauna will be affected, crop yields can decrease which cause geopolitical instabilities and vulnerabilities (Banusiewicz, 2014).

Taking the aforementioned IPCC predictions into account it could be assumed that governments across the world are doing as much as they can to combat this serious issue. However, since the effects of climate change are incremental, but also unpredictable, this means that it may be hard to know which event is natural or caused by climate change. This makes it difficult for some to take climate change seriously and as such public concern remains relatively low. Governments are therefore not taking the drastic steps, suggested especially by the scientific community, to mitigate or even prevent climate change. Consequently, other groups in society together with, academia have become the spokesmen and women of the environment and are doing all they can to raise awareness and make an impact on their local and regional environment. An example of this is the ReSolve Innovation project that will be studied in this thesis.

As a result of climate change it is expected that Uppsala municipality will see an increase in the amount of stormwater it must deal with (MSB, 2011). Indeed the pressure on the system is already very high and the municipality has to deal with poor water quality and high volumes (ReSolve, 2015). Currently the stormwater is dealt with by a series of pipelines, which feed into the Fyris River without any prior treatment (ReSolve, 2015). Due to the density of buildings in the centre of Uppsala, there is little possibility of treating the water using conventional sedimentation treatment. It is therefore important to find alternative solutions to dealing with this issue. This will most likely require a combination of several different solutions. The ReSolve Innovation Competition is a cooperative-project, which is being held in Uppsala Municipality with the goal of finding these alternative and innovative solutions to help solve the issue of stormwater in Uppsala.

The research in this thesis will focus on 1) studying the social learning process taking place in the ReSolve Innovation Competition and 2) will formulate practical insights for facilitators working with social learning in the field of sustainable development. The thesis will attempt to answer the following questions:
1. In the process of planning and running an innovation competition aimed at tackling the problem of stormwater in Uppsala, is social learning taking place?

2. Furthermore, if social learning is indeed taking place, is social learning a useful tool in tackling a sustainability issue such as stormwater management?

2 Background

The Fyris River flows through the city of Uppsala and its catchment area covers a large portion of the province of Uppland (See appendix 1) (ReSolve, 2015). The river is severely overburdened (ReSolve, 2015) and the city of Uppsala sees it as an important task to find solutions to purify the city’s stormwater before it reaches the already struggling river (ReSolve, 2015). There are high concentrations of pollutants in the stormwater and these predominantly originate from road surfaces (ReSolve, 2015). As a rule of thumb, the more congested the road, the higher the pollution (ReSolve, 2015). This is important to consider since the focus of the Innovation Competition will lie upon one of Uppsala’s most congested roads.

The topography in and around Uppsala creates severe problems out of a water management perspective and Uppsala is in fact one of the 18 most prone areas in Sweden to experience problems resulting from flooding due to excessive precipitation (Uppsala County Administrative Board, 2015). To compound problems further Uppsala’s stormwater drainage network is under-dimensional for this predicted increased flow and work is currently underway to remedy this (Uppsala Vatten, 2014).

Beneath the impermeable surfaces there are two main types of substrate and the boundary between these is very distinct. Running through the centre of Uppsala is the Uppsala Esker, which was left behind when the ice sheet that once covered Scandinavia and Europe retreated. The esker is used as a natural water filtration system and Uppsala Vatten regularly pumps water from the Fyris River into it to keep the levels of water in the esker relatively constant (Uppsala Vatten, 2015a). After six months, the water from the river has filtered down through the esker and reaches the same quality as the natural groundwater (Uppsala Vatten, 2015a). Since a large part of the esker runs through the centre of Uppsala it is extremely important to keep harmful substances from seeping into the ground since this would severely damage the freshwater supply to Uppsala. The estimated value of the Uppsala Esker is around 1,2 billion SEK (Svenskt Vatten, 2013). The other type of substrate is clay. Generally it can be said that clay primarily consists of fine-grained minerals which has a plasticity at appropriate water concentrations and consists of particles no more than $4\mu m$ (Guggenheim et al., 1995). The flocculative properties of clay cause the particles to stick tightly together meaning that water has difficulty penetrating the material (NRCS, 2008). Clay is estimated to have an infiltration rate of 0.1 to 0.5 cm/hour (Hillel, 1982; in NRCS, 2008). This, along with the fact that apart from the Uppsala Esker which runs straight through Uppsala in a north/south direction cutting a ridge through the otherwise quite flat landscape presents Uppsala Kommun and Uppsala Vatten with considerable problems since keeping the drinking water clean and controlling stormwater are inherently linked issues.

Therefore, as a case study and pilot project, Uppsala Kommun, Uppsala Vatten and ReSolve have joined forces and are trying a new method to combat the stormwater dilemma. The innovation competition they are running will combine the innovative power of students together with the experienced private sector to try to come up with new solutions to the question of stormwater. More detailed information on the Innovation Competition will be presented in the following chapters.
2.1 What is stormwater?

Stormwater is the rain- and melt-water than runs along the surface of the ground (Uppsala Vatten, 2015b) and is a natural bi-product of urban areas where naturally porous surfaces such as soil, grass and other substrates are covered with impervious surfaces such as tarmac, concrete, roofs, and similar man-made structures. By definition, stormwater consists of the water that does not infiltrate into the ground. This creates large quantities of water that can quickly reach peak flow. As is shown by figure 1, stormwater often reaches a higher rate of flow because it is not absorbed by the substrate and reaches its peak much earlier than in rural environments. This can lead to problems in the urban environment with rapid onset of flooding with high quantities of water. In urban situations it is therefore desirable to mimic the rural environment as much as possible and create buffer zones where infiltration can take place and effects of flooding are much less pronounced.

<table>
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<tr>
<th>Effects of urbanization on volume and rates of surface water runoff</th>
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<tr>
<td>Urban</td>
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<td>Rate of flow</td>
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It is widely accepted that urban stormwater runoff affects quality of the water (USEPA, 2006). Car traffic and other human activities produce waste and spillage which get swept away during rainy periods. Depending on the topography the stormwater flows into different bodies of water through the help of gravity and evapotranspiration (USGS, 2014). This system is called the hydrological cycle and covers the whole planet linking every water body to each other and, in doing so, also links ecosystems and their chemistry. In the specific case of Uppsala, the stormwater from the city flows into the Fyris River which runs through the city and then flows into Lake Mälaren (A large freshwater lake which supplies Stockholm municipality with its drinking water) and then on into the Baltic Sea. This makes the stormwater issue in Uppsala into an excellent example of a small problem. This problem, which is linked to a larger system, highlights the fact that small inputs such as these can amount to increased problems on a larger scale when being allowed to continue for a prolonged period or when several sources of pollution flow from individual locations into a large body of water such as the Baltic Sea. In summary, to solve the problems in the Baltic you must first find the source of the pollutants. The stormwater in Uppsala is a good example of such source.

2.2 What is the ReSolve process?

ReSolve started as a project run by three organisations under the umbrella of Uppsala University (ReSolve, 2014) and was funded by Vinnova (2015) (Sweden’s innovation agency). The Uppsala Centre for Sustainable Development (CSD Uppsala), The Entrepreneurship Lab, and Uppsala University Innovation, in collaboration with 30 politicians, environmental strategists, practitioners and leaders from Uppsala, Knivsta and Heby municipalities set out to “explore and identify challenges in the field of environment and sustainable development” (ReSolve, 2014: p.7) in the region. The project also looked into...
“the underlying causes of the identified challenges and investigates why well-functioning solutions have not been implemented” (ReSolve, 2014: p.7). In the end, the project proposed collaboration opportunities to be set in motion between the municipalities in Uppsala County together with local stakeholders and universities (ReSolve, 2014).

ReSolve has embraced the very nature of sustainability problems in its name, which hints at the fact that there may not be “simple or long-term solutions” to sustainable development. Therefore the name ReSolve indicates that solutions that work today may have to be re-solved in the future, for the sake of sustainability (ReSolve, 2014).

The original ReSolve report (ReSolve, 2014) presented the findings of their study and they showed that there are a number of sustainability issues currently (2014) faced by the participating municipalities. These are (in no particular order); City Planning; Energy; Food; Transportation; Waste; and Water (ReSolve, 2014). Each of these categories have a number of different sub-categories with more detailed explanations of the problems experienced in each. These will not be presented here, although the “Water-Category” discovered the following problems in Uppsala Municipality:

1. Flooding – “A problem of imminent severity” due to a lack of buffers to absorb stormwater. “New systems for city planning are required and new technology” is sought-after (ReSolve, 2014: p. 29).

2. Sludge – “Hazardous chemicals and chemicals which are difficult to handle enter the water system and end up at the water treatment facility” (ReSolve, 2014: p. 29). “The main challenge is to find an easy, sustainable solution for the sludge problem on a broader level” (ReSolve, 2014: p. 29).

3. Snow – An annual problem, which presents logistical, temporal and economical challenges for the municipality. Alternative solutions for handling the issue are sought after (ReSolve, 2014: p. 29).

The earlier ReSolve project (ReSolve, 2014) laid the base for an in-depth study/solution oriented approach to each particular issue by mapping them out in their exploratory study. This is what is being built upon in the current iteration of the ReSolve project, the Stormwater Innovation Competition. This makes the ReSolve Innovation Competition a particularly good case to study social learning since it has a solid base and will probably expand in the future to cover other sustainability issues in the region, which it mapped out in its initial study. This thesis is therefore a window into how the theoretical and exploratory overlying study is being operationalized and might give insights into how possible future studies may look.
ReSolve itself relies upon a method developed in collaboration between the Uppsala Centre for Sustainable Development and the Entrepreneurship Lab. This process, called the ReSolve Process, consists of seven steps (See fig 2) aimed at ‘identifying and analysing key problems, creating visions and possible solutions, deciding and implementing solutions and finally assessing the results together’ (ReSolve, 2014).

2.3 What is the innovation competition?

The innovation competition, which is run by the ReSolve team, has devised a competition based on the first four steps of the ReSolve Process. Together with Uppsala Municipality and Uppsala Vatten, the ReSolve team has identified a particular challenge with regards to stormwater within the City of Uppsala. In order to win the competition, students need to come up with concrete solutions to the problem. The competition allows and encourages the team of two to four students to connect with private sector companies in order to better find innovative and viable solutions to the posed stormwater related problem. The winners are offered the chance to help in the implementation stage of the solution. As an added incentive, two students will travel to Sardinia, Italy to present their solution at a conference on stormwater, which is being held there.

2.4 Similar water-related sustainability competitions

What makes a competition a particularly interesting approach to solving natural resource management and sustainability questions at a municipal level is the change to involve stakeholders who might otherwise not be consulted. Firstly, when municipal leaders and policymakers realise that the best results might not come out of an in-house development project they start looking for alternatives. The obvious choice might not be a competition since there are a number of other steps more often than not chosen for such a task. One of these options is turning to a number of external contractors and asking them to present their ideas for solutions. This is expensive and time consuming but will of course get the job done. An attractive alternative is the general competition where the public and other interested parties may submit their ideas for solutions. Companies may of course also submit their solutions but they do not get paid for their efforts. So other than saving costs, the competition offers the added bonus of being more inclusive to other stakeholders and may lead to a more sustainable and organic solution (Plein et al., 1998).

An example of such an approach is the one initiated by the City of Boston Municipality (Massachusetts, USA). The problem they are facing is due to the rising sea levels caused by global warming and they are looking for solutions to help prepare the city to cope with the rising water levels. The organisers are offering people to “envision a future Boston that is more resilient, more sustainable, and more beautiful” (Boston Living with Water, 2015). Similarly to the ReSolve Competition the organisers of the Boston Competition have chosen to focus on three specific locations offering the contestants a chance to focus on the site of their choice and for the opportunity to influence development in that area (Boston Living with Water, 2015). However whereas the ReSolve Innovation Competition is open to Students and Private Sector companies alike, the Boston Competition is only open to “leading planners, designers, and thinkers” (Boston Living with Water, 2015). While this may exclude the citizens of Boston having a direct input in how their city is developed it does show that city-planners and decision-makers are trying new and different ways to help solve their problems. This is what makes it so interesting to study a similar attempt in Uppsala.
2.5 What is the competition case study?

Seeing as the majority of the pollutants flowing into the Fyris River originate from road surfaces, the municipality have chosen the area around a stretch of road they are currently looking to develop. In doing so the students can have more freedom to propose new solutions since the project-planning phase of the development is in its infancy and it is still possible to make alterations to the plan.

The road that has been chosen is called Tycho Hydëns Väg and is a dual carriageway lined with park areas and wide ditches. This arrangement is designed to handle the storm water from the subsequent traffic but is not currently connected to the existing stormwater drainage network (See fig 3) (Uppsala Vatten, 2015b). Adding insult to injury, the runoff from Tycho Hydëns Väg lies ahead of a sensitive drainage recipient (Uppsala Kommun, 2015). This means that once construction in the area commences measures to delay and purify the water must be established (Uppsala Kommun, 2015).

Since the area around the road is earmarked for extensive development/urbanisation the area will look considerably different after the development has taken place. This leaves the competing teams more space to find creative ideas for their solutions. They have been given an *artists impression* of what the municipality thinks the area might look like in the future so as to give the students some idea of what is expected of them (see fig. 4) (Uppsala Kommun, 2015).

2.5.1 The competition research question

The question presented to the teams hoping to come up with the winning innovative solution reads as follows:

“In the case of Tycho Hydëns Väg, how can we decrease the environmental impact on the Fyris River by delaying and purifying the water from trafficked surfaces? In relation to the relevant strategies in Uppsala Municipality’s stormwater programme, how should methods of purifying water be created along Tycho Hydëns Väg in order to decrease the environmental impact on the Fyris River? A stormwater assessment was undertaken within the framework of the structural analysis. The investigation suggests a number of possible measures and solutions for the management of stormwater on streets. Can you identify alternative solutions?” (Uppsala Kommun, 2015: p. 1)
2.6 How can social learning help?

The link between social learning and sustainable development was first noted by Milbrath (1989). He used the term “self-educating community” to describe the process when people learn from one another and from nature (Muro and Jeffrey, 2008). Since sustainable development is considered to be a “wicked problem” (Rittel and Webber, 1973) it is theorised that its realisation will be the result of the varying degrees of ability of “actors and groups to communicate, negotiate and reach collective decisions” (Pahl-Wostl, 2002; Schusler et al., 2003; in Muro and Jeffrey, 2008: p. 3). A number of authors (e.g. Röling and Maarleveld, 1999) have argued that traditional approaches to bring about social change (using market forces & technology) have failed and that now an alternative method is required, such as learning (Muro and Jeffrey, 2008).

In response to the growing attention to learning, several theories of learning are developed. Two important ones are “communicative learning” and “transformative learning” (van der Veen, 2000). In communicative learning people construct an “inter-subjective” (collective agreement) understanding of a situation with others, which is important when dealing with wicked problems (Muro and Jeffrey, 2008), such as those found when dealing with sustainable development, which are difficult at the best of times. Transformative learning on the other hand is a process where peoples understanding (of the world and themselves) gradually change over time (Muro and Jeffrey, 2008).

In the debate and the development of social learning theories, tools have found their way in; some examples of these are adaptive management and soft systems thinking (Leeuwis and Pyburn, 2002) making it a truly interdisciplinary method. The outcomes of adaptive management in terms of social learning “feed back into the adaptation of governance structures and influence intervention mechanisms and ambitions” (Muro and Jeffrey, 2008: p. 4) which indicates that social learning can indeed have a beneficial impact on questions such as stormwater management.

In summary it can be stated that through the process of social learning, the generation of new knowledge, gaining new technical and social skills and the creation of new bonds of trust (important when different stakeholders are working together) form a basis for a common understanding of the problem at hand (Muro and Jeffrey, 2008).

2.7 Criticisms to social learning?

The theory of social learning states that individuals imitate or copy behaviour based upon observations of other peoples behaviour, from their environment or from mass media (Drumwright, 2015). This has drawn critique from the advocates of biological theory who argue that this stance ignores the biological state of individuals. Furthermore they argue that social learning theory ignores the fact that individuals present differences in genetics, brain function and differences in learning capacity (Jeffery, 1985) This may have a degree of importance when considering the what the outcome of the interactions between the individuals may be, but since this lies outside the possibilities of the researcher to study, it will only be noted here in the critique chapter.

A separate critique of social learning came from Lave and Wenger (1991; in Lotz-Sisitka, 2012) which was based on a practical study on peripheral participation. They state that neglect of political, economic and institutional structuring can have an effect on participation in group activities (Lave and Wenger, 1991; in Lotz-Sisitka, 2012). Furthermore Lave (2008)
comments that in their earlier work, not enough emphasis was placed on “the way in which the political and economic environment can influence the participation of the learner” (in Lotz-Sisitka, 2012: p. 73). This indicates that the political and economic environment of their background and in which the participants are currently situated can have an impact on each participant’s level of influence in the discussion. Even though it may be difficult to gauge this in the data collection phase, it is important to keep in mind when analysing the data and when placing value on what might be deemed as important elements of their arguments.

3 Theoretical background

In this chapter the underlying theories used in this thesis will be presented and explained. This section will cover a background of social learning theory, including its history and a summary of what the author understands social learning to be. That section (4.2) will cover cross-boundary knowledge transfer, “Context specific learning and innovation” as well as framing and re-framing.

3.1 Social learning theory

3.1.1 History of social learning theory

The basis of social learning theory stems from the mid to late twentieth century (until the late 70’s) “command and control” approaches to natural resource management (Cundill and Rodela, 2012; Holling and Meffe, 1996). The approach was mostly applied to conservation projects in Africa after centuries of “Victorian” notions of human domination over wildlife (Cundill and Rodela, 2012) and led to the creation of wildlife reserves, intended for hunters, and later national parks intended to “maintain the wildlife in pristine condition” (Cundill and Rodela, 2012: p. 17). In these conservation practices, learning did take place among the park wardens and later also among scientists, although this was not actively referred to at the time (Walters and Holling, 1990; in Cundill & Rodela, 2012).

Having set out to find alternative measures to management, a “systems orientation gained prominence” (Cundill and Rodela, 2012: p. 17), and this linked social-ecological systems, adaptation, learning and resilience (Lee, 1993). This became embodied in “adaptive management” (Holling, 1978; in Cundill & Rodela, 2012), which although gave no direct definition of learning, did describe it as “…an iterative process based on the scientific model of carefully planned experiments that involved scientists and decision makers…” (Walters, 1986; in Cundill & Rodela, 2012: p. 18). This learning was however highly directed towards scientists and policy makers (Cundill and Rodela, 2012) and did not permeate a wider audience.

The first mentioning of social learning in the context of adaptive management came from Lee (1993), where he defined it as a combination of adaptive management and bounded conflict. Later in the 1980’s and 90’s the development of collaborative management began to influence the understanding of who, what and how people learn in relationship to natural resource management (Cundill and Rodela, 2012). A more inclusive perspective on natural resource management was taking form where the importance of social learning was finding its place. This gained traction on the global arena from the early 1980’s up until 1992 during the Rio Earth Summit which supported “community-based approaches to resource management and sustainable development more generally” (Cundill and Rodela, 2012: p.18-19).
3.2 The authors’ definition of social learning.

From the subject background (2) and theoretical background (3) one is able to see that social learning does indeed have a place in natural resource management and in group-work related to this. So what does the author define as social learning in the context of this study?

Social learning is when a group of people, in this case the organisers, stakeholders and competition participators, interact with one another to create a new knowledge/understanding or simply grapple with existing understandings from each persons perspective, work together to align their knowledge and use this to produce new knowledge. In a way, it must be said that such knowledge is the embodiment of interdisciplinary cross boundary knowledge transfer. This is one of the cornerstones of sustainable development.

3.2.1 Cross boundary knowledge

The term boundary spanning has been around since the 1950’s and was first coined and used in relation to information exchange between an organization and external sources (Tushman, 1977). Studies have shown that the ability to access knowledge from across boundaries enhances the innovative performance of a unit such as an organization, business, team or individual (Tortoriello and Krackhardt, 2010).

Though boundary spanning can be beneficial it is not always easily achieved when “transferring, integrating, and leveraging the heterogeneous inputs and diverging perspectives available across organizational boundaries (Argote, 1999; Carlile 2004; Dougherty, 1992; in Tortoriello and Krackhardt, 2010: p. 167). Furthermore, Tortoriello and Krackhardt (2010) argue that the structures in place in organizations can in their own right present boundaries that separate “heterogeneous types of knowledge” (Tortoriello and Krackhardt, 2010: p. 167) causing difficulties for individuals involved in cross-boundary interactions to find “a common ground to facilitate knowledge integration” (Tortoriello and Krackhardt 2010: p. 168). Adding insult to injury, “differences in languages, perspectives, lack of common understandings and shared meanings (Bechky, 2003; in Tortoriello and Krackhardt, 2010: p. 170), and coordination problems (Mors, 2010; in Tortoriello and Krackhardt, 2010: p. 170)” can further compound the interactions between individuals engaging in cross-boundary interactions.

Whereas this may seem difficult to endure, due to the many difficulties that can potentially be faced in cross-boundary interactions, several researchers describe that absorbing diverse knowledge and generating new ideas can be made easier when the “source-person” and the “recipient” share some “common (not diverse) knowledge base” (Ahuja, 2000; Reagans & McEvily, 2003; in Tortoriello and Krackhardt, 2010: p. 167).

In summary, the transfer of diverse information and knowledge across boundaries has been shown to be conducive to innovation while it simultaneously “raises obstacles” to this knowledge sharing (Tushman, 1977; in Tortoriello and Krackhardt, 2010). Related to this, Tortoriello and Krackhardt (2010) state that not all ties formed when undertaking knowledge sharing can be regarded as equal and which ties are the most beneficial to the creation of innovative ideas will depend on the “microstructural context in which they are embedded” (Tortoriello and Krackhardt, 2010: p. 168).
3.2.2 Context specific learning and innovation

The author has identified two major locations, where learning is deemed to take place. These are, in the planning meetings and workshops where the organisers of the innovation competition take place. In addition to this, the interactions between the team members (and their cooperating companies), between competing teams, between teams and the organisers and any other time a diverse group of stakeholders and participants takes place.

It is of course very difficult to gain a proper overview of the situation and yet more difficult to form a conclusive idea or result from it. Yet it is in these spaces and temporal locations that social learning and the formation of innovations will take place.

Reed et al. (2010) highlighted that in order for a process of study to truly be considered as social learning it must firstly “demonstrate that a change in understanding has taken place in the individuals involved” (Reed et al., 2010: p. 5), and secondly that it “demonstrates that this change goes beyond the individual and becomes situated within wider social units or communities of practice” (Reed et al., 2010: p. 5-6). Finally Reed et al., (2010) also state that social learning needs to “occur through social interactions and processes between actors within a social network” (Reed et al., 2010: p. 5-6).

This is something which, although difficult to accurately demonstrate in a short study such as this, it would likely require follow up studies to note that the change did in fact become ingrained in the participants and that it has affected their actions and motivations since the time of learning. However the fact that social learning would take place “between actors of a social network” (Reed et al., 2010: p. 6) is more of a prerequisite for social learning to take place and not evidence of such learning.

3.2.3 Framing & re-framing

3.2.3.1 Framing

Framing is a concept in Social Sciences, which refers to an individuals’ or groups’ “cognitive shortcuts” which enable them to make sense of complex information (Kaufman et al., 2013). Framing helps people categorize and order complex phenomena and give meaning or discount certain aspects of a phenomena depending on the relevance or intuitiveness (Kaufman et al., 2013). Simply put, frames help people interpret their surroundings and understandings; and are often used to help represent this information to others. This means that framings represent how different people look at the world and therefore problems and relations can be framed in a variety of ways (Dewulf et al., 2009).

3.2.3.2 Re-framings

The process of re-framing takes place constantly in everyday life. Several examples of the variety of different contexts where frames are adjusted or re-confirmed take place during reconciliation, negotiation, or joint problem solving (Kaufman et al., 2013). Furthermore the process of re-framing may cause alterations to the frames themselves as well as their “impact on the conflict dynamics” (Dewulf et al., 2009; Kaufman et al., 2013).

There are two differing paradigms of understanding when referring to framing and re-framing; the cognitive paradigm and the interactional paradigm (Dewulf et al., 2009). Dewulf (et al., 2009) explain these paradigm from the context of a conflict. In a cognitive approach: “A conflict frame is a cognitive representation that guides expectations about the conflict situation” (Dewulf et al., 2009: p. 163) whereas conflict taking place in an interactional
approach is a: “process in which the meaning of the conflict situation is co-constructed through the meta-communicational aspects of discourse” (Dewulf et al., 2009: p. 163).

In addition to this, Dewulf (et al., 2009) go on to explain the details of frame-change in the different paradigms. In the cognitive approach “The criterion for frame change lies in the cognitions” (Dewulf et al., 2009: p. 163) and can stay quite stable for extended a considerable length of time. However, the criterion for re-framing in the interactional paradigm stem from the interaction itself (Dewulf et al., 2009). These frames change over the course of the interaction as the participants “react to each others’ framings” (Dewulf et al., 2009: p. 163).

According to Kaufman et al. (2013) the process of re-framing has the following goals:

- to clarify the perception of the questions being disputed. This is done so that more productive information exchange can take place and the participants can listen to ideas they did not previously entertain. This enables the participants to “expand the framework of discussion and explore means of action or solutions not yet attempted” (Kaufman et al., 2013).
- to “sharpen the parties’ understanding of their interests” and how their chosen modes of action serve those interests. This takes place so that it is possible to examine potential processes for a more productive conflict management and so that patterns of relationships between stakeholders can be reconsidered. (Kaufman et al., 2013).
- to identify the topics where the participants views differ. This should take place even when there is a better understanding of the foundations of the divergent frames so that “opportunities for trade-offs based on clearly understood differences” can be identified. (Kaufman et al., 2013).
- to identify irreconcilable differences so it is easier to appreciate the conflict dynamics and to determine the possibility of a conflict minimisation process that does not transgress these balking differences. It is important also to ascertain the level of importance assigned to these frames of differences, and to find a means to address them. (Kaufman et al., 2013).

3.3 Summary

This chapter has given an insight into the concepts and processes that take place during social interactions. It is these concepts and processes that the results and discussions rely upon when drawing conclusions. The key things that have been analysed in the data is the evidence of cross boundary knowledge transfer as well as framings and re-framings.

4 Method

This section will cover an overview of the research design followed a detailed explanation of the chosen data collection method, action research. Finally a summary of the data collection will be presented along with the limitations experienced during this process.

4.1 Research design

The research question addressed in this thesis are two-fold, focussing 1) on studying the social learning process and 2) formulating practical insights for facilitators working with social learning in the field of sustainable development:
1. In the process of planning and running an innovation competition aimed at tackling the problem of stormwater in Uppsala, is social learning taking place?

2. Furthermore, if social learning is indeed taking place, is social learning a useful tool in tackling a sustainability issue such as stormwater management?

Little work prior to this appears to have been focussing on social learning in the context of an innovation competition regarding stormwater management. It was deemed that an exploratory approach to research is most applicable since this offers a good entrance to a new topic (Brown, 2006). Also, since the project that is being studied will continue after the completion of this thesis, the choice of exploratory research makes even more sense because it “forms the basis of more conclusive research” (Singh, 2007: p. 64) which can be conducted once the ReSolve innovation competition comes to an end.

A qualitative approach to data collection was selected as the preferable method since this was deemed to be the most natural way of collecting the data owing to the character of the topic. Qualitative data allows for the research to be “descriptive rather than predictive” (QRCA, 2015) which is suitable since Gay and Airasian (2000) state that qualitative research allows for a deep understanding of a problem or phenomenon to be formed as well as allowing for the process to be studied rather than the outcome.

More specifically the data to help answer the research question will be gathered by taking part in a number of planning workshops run together with CSD Uppsala, Uppsala Kommun and Uppsala Vatten which were organised to help create the innovation competition aimed at tackling the issue of stormwater management in Uppsala. This was done using “action research” and is presented more thoroughly below.

4.2 What is action research?

Action research is a form of participatory research, which is a form of research where the researcher is deliberately taking part in, and influencing the object of study. Action research focuses on analyzing and formulating advice and recommendations for and in cooperation with the involved stakeholders. Since the author of this thesis is/was an active member of the CSD ReSolve team and was helping to organise the innovation competition a participatory approach appeared to be the perfect way to combine the data collection phase of the thesis while at the same time helping to run the competition.

Gilmore (et. al., 1986) have a very descriptive explanation of action research whereby the method “aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously” (Gilmore et. al., 1986: p. 161). In this case the practical concerns were the questions and problems faced with planning and running a multi-stakeholder innovation competition and the furthering of social science was the collection of data of social learning. Gilmore (et. al., 1986) go on to state that the very nature of action research emphasises the dual commitment of studying a system while at the same time collaborating with its members and helping to change it towards what is deemed as a desirable direction. In doing this, it is necessary for the researcher and client to actively collaborate (Gilmore et al., 1986), and this is what took place. The use of this method already “stresses the importance of co-learning as a primary aspect of the research process.” (Gilmore et al.,, 1986: p. 161).
Stephen Kemmis (in Hopkins, 1985) presents a nice graphical example of how action research takes place (see Fig. 5). The image has been adapted from the original but the process is cyclical and continues onward as long as the reflective process provides grounds for doing so.

“Social learning is an iterative and on-going process that comprises several loops and enhances the flexibility of the socio-ecological system and its ability to respond to change” (Pahl-Wostl and Hare, 2004: p. 195)

John Elliott (in Hopkins, 1993) explains the fundamental process of action research design and this is reflected in the graphical representation of action research. There are four stages of action research design. Initially a general plan is developed (1) for the research where an understanding of the problem is developed (Elliott, in Hopkins, 1993). After this, the so-called intervention is carried out (2) (Elliott, in Hopkins, 1993). This is where the action part of action research takes place. While the intervention is taking place observations are collected (3) “in various forms” (Elliott, in Hopkins, 1993). This is referred to as the observation phase. Following these stages, reflection of the process and data collection takes place and further “intervention strategies” are carried out and the whole process repeats (4) until a sufficient grasp of the problem has been reached (Elliott, in Hopkins, 1993). This is referred to as the reflection and revision stage.

This methodological structure has been adapted to suit this study and this is what has been followed throughout the research process and due to time constraints it has not been possible to complete more than one cycle of the process and so the whole structure of the research closely resembles that of figure 5.

What is important to note in action research is when a researcher becomes part of the organisation or community which they are studying, and gain a collaborative and democratic partnership with other practitioners, researchers are able to provide feedback and experience gained from the research process to the practitioners so this can be used to improve their environment (Kim, 2014: p. 16).

4.3 Data collection

The data, for use in this thesis, was collected in the following fashion: The researcher took part in planning events and internal workshops acting as a team member and as an observer. Most of these events were recorded. While these events were taking place, a theoretical framework was constructed to help support the observations/data which were collected. This theoretical framework was then used to order and analyse the observations to help study whether the participants had experienced learning or had changed perceptions during the course of the project. The data stemmed from four meetings or other key events that influenced the project in a significant way. There were other meetings and events that took place during the planning process, but it is these four meeting that this thesis has focussed on. These meetings covered organisational aspects of the project and include an insight into the thinking behind the project from the perspective of the different stakeholders. The data from
these meetings were analysed using the contents of the theoretical background chapter (4) and the results from these discoveries has been discussed in (6.3 and 6.4).

4.3.1 Limitations
The data collected for the use in this project came from observations during internal workshops. While the time span of this thesis runs from mid-January to May 2015, the project will run until the official ReSolve report has been published in September 2015. These workshops are still on-going so the observations collected from the workshops only represent a snapshot in the learning process. Due to time constraints and the fact that the project is running longer than the time allotted to write this thesis, only the early to middle workshops have been observed. For obvious reasons it would have been beneficial to collect observations from the workshops in the latter stages of this project. Unfortunately this is not possible and this should be kept in mind when analysing the outcomes of research.

Since the author of this thesis is bilingual in Swedish/English, the languages spoken in the workshops presented no barriers. However, since some of the members in the workshops had varying language backgrounds and varying proficiencies of English and Swedish (the languages spoken in the workshops) certain misunderstandings may have taken place. This is impossible to judge from an outside perspective, so the contents of the observations should perhaps not be taken at face value.

Finally, it must also be noted that all the stakeholders present at the different workshops have varying educational and cultural backgrounds. This may have influenced the outcome and understanding of the points each stakeholder was trying to make to the others. What one stakeholder might think is self-evident another stakeholder might not understand at all or may have a different interpretation based upon their background. An example of this is the use of technical terms by the public sector stakeholders, which did cause some confusion/difficulties in understanding.

5 Theoretical framework
5.1 Sustainable development
This thesis lies within the realm of sustainable development. Sustainable development has a large number of definitions and each person dealing with the concept of sustainable development will have their own personal understanding depending on their education, social status, political inclination and many other factors. Having understood this, the World Commission on Environment and Development (WCED), headed by Gro Harlem Brundtland produced a report in 1987 where they attempted to define sustainable development. This report is called “Our Common Future” or is more commonly referred to as the “Brundtland Report”. The key phrase from the report defining sustainable development has become somewhat over-used and reads as follows: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987). This implies that present generations need to use their resources wisely so as to allow the future, as yet unborn, generations to survive with an adequate amount of resources to allow them to sustain themselves, and so on. The only problem is, how do we define or even begin to understand what the needs of the coming generations are, let alone the generations after them, if we over consume and overstretched the earth’s capacity today. It can be said that sustainable development advocates a measure of “common sense”, we need to look after our planet so it can keep looking after us.
5.2 Ecosystem services

Why do we want to look after the environment? Society receives a number of benefits from the natural world which include things such as provisioning of food, clean water, regulation of climate and disease as well as recreational, cultural and spiritual benefits. All of the aforementioned points are all called Ecosystem Services (Cole, et al., 2012). TEEB (2010) has categorised a number of different services provided by ecosystems such as; supporting services, provisioning services, regulating services, and cultural services. A foundation to all these services lies upon the concept of Biodiversity, which is defined as the existence of variation within species, variation between species and a variation of ecosystems (Cole, et al., 2012). It is widely accepted that the planets biodiversity has been in a steady state of decline over the past decades (WWF, 2014) and Rockström (et al., 2009 in Cole, et al., 2012) have highlighted that if this decline continues at its current rate it could have serious consequences for the Ecosystem Services. Furthermore, if key tipping points are crossed, this could lead to individual ecosystems collapsing entirely (BISE, 2014). The theoretical concept of ecosystem services is used in this thesis to provide a background to why it is important to address the dilemma of stormwater in Uppsala municipality and the repercussions that could take place if no action is taken. Fortunately action is being taken, and an example of this is the focus of this thesis (the innovation competition).

5.3 Section conclusion

Sustainable development is inherently linked to the management of our resources and management of stormwater is therefore also linked to sustainable development and ecosystem services. The management of stormwater in Uppsala is crucial since it is one of the worst affected municipalities when it comes to stormwater quality and quality (Uppsala County Administrative Board, 2015). The state of stormwater in uppsala therefore also has a negative effect on ecosystem services and sustainability of Uppsala Municipality and the region it is situated in. Uppsala therefore needs to find a sustainable solution to its stormwater management and the innovation competition presents itself as an ideal platform to come up with such a solution. The link between social learning and sustainable development is a close one and is thoroughly described in section 2.6. In short, sustainable development is a wicked problem and conventional methods to tackle climate change and sustainable development are therefore not adequately addressing the problem. Social learning offers an alternative approach and this thesis looks at the implementation of social learning in the context of stormwater management.

6 Results/Discussion

6.1 Section contents

In part of the Thesis the results of the conducted research will be presented. As is previously mentioned, the data stems from the notes, recordings and active participation in numerous workshops and meetings with stakeholders. The section will present what role the stakeholders have, but will aim to keep their identity private as best as possible. Therefore names will be replaced with letters or be given other appropriate designations. The section includes examples of when social learning takes place and will present the different types of framings, which were observed, and if re-framing took place. The author will also address the
role in which he took part in the data collection and in doing so affected the data that was collected.

6.2 Stakeholders

The Uppsala Centre for Sustainable Development (CSD) + Myself.

Academia. Affiliated with the Department of Earth Sciences at Uppsala University (UU) as well as the Swedish Agricultural University (SLU). It is the aim of CSD to facilitate research and education within sustainable development for UU and SLU. This group is responsible for the running and planning of the project. It was their application to Vinnova, which initiated the ReSolve innovation competition.

Uppsala Kommun

Public Sector. Recipients of the innovative solutions and co-hosts of the competition.

Uppsala Vatten

Public Sector. Recipients of the innovative solutions and co-hosts of the competition.

The Private Sector Companies

Private Sector/Competitors. Co-producers of the innovative solutions and competitors in the ReSolve Competition

Vinnova

Public Sector. Main source of funding for the project. Interested in promoting innovation in society, in this case, through the competition. Seriously interested in the successful completion of the project since it represents an investment.

Students

Academia/Competitors. Co-producers of the innovative solutions of and competitors in the ReSolve Competition. Interested in producing a good solution capable of winning the competition.

6.2.1 Role of the author

Placing oneself in the centre of the data and data collection process is somewhat of an uncomfortable and unusual prospect for any researcher. Yet this is the situation that the author found himself in when deciding to approach the data collection with the action research method.

This method has enabled the author to get a closer insight into the processes and realities of social learning in a project planning stage yet at the same time being able to affect the outcomes and results of the same process. This is something which has been brought up by those who have studied the method and they have come to regard it as normative and acceptable since such a method is conducive to bringing about change. Changing or affecting a process or organisation needs to be regarded as something, which is desirable; otherwise another method would need to be selected. As Kim (2014) highlights, when a researcher becomes involved in an organisation they form a partnership and allow the researcher to “provide knowledge and experiences to help resolve or improve their system”.

-- 17 --
At the same time taking an active role in the goings-on of the research, the author must be able to “stand back from the action and be able to reflect on it, in order to contribute to scientific knowledge” (Kim, 2014: p. 16). Whereas in traditional research, the study is conducted from a third person perspective, the action researcher takes the first, second and third person perspective at the same time (Kim, 2014). This allows for greater insight into the interaction between participants and the individual subjects and this is crucial for gaining an in-depth understanding of the context specific social learning (Kim, 2014).

6.3 Observations from meetings.

Throughout the project it has been clear that there have been a number of interest groups involved in the planning of the competition. However, during the workshops this has been less transparent since many of the decisions crucial to the development of the project did not take place during the meetings, rather during times when each interest group could converse internally in their own environments. The following section will present the authors observations from these meetings as well as those instances where social learning took place.

6.3.1 Initial competition workshop (29/01/2015)

This was the first organised meeting between the organising stakeholders of the innovation competition. The stakeholders present were the author, CSD, Uppsala Kommun and Uppsala Vatten and the Designer. This was a very general workshop where the boundaries and the fundamental topics of stormwater were brought up in a number of presentations held by each stakeholder group. This was followed up by a group exercise (See appendix 2 for an example in Swedish) to try to whittle down to the key questions that were going to be presented to the competitors as the main questions to be answered by them. It was decided that the contestant teams were to collectively come up with 3 proposals for solutions to solve the stormwater issue. At this stage of the planning process it seemed pretty clear that everyone was working towards the same conclusion.

From the discussions it is clear that all the involved participants are looking to find the key questions for the students. More specifically the participants are looking at what the main challenges are in relation to quality and quantity of the stormwater in the inner core of Uppsala. The participants from ReSolve are particularly looking at the economic, social and environmental aspects to try and find out why the stormwater is an issue in Uppsala.

Uppsala Kommun explains why they are working with stormwater and this is because they have to follow the Water Framework Directive in order to achieve a good water status (the environmental aspect of sustainable development). They mention that one of the ways to achieve good status in the Fyris River is to work with stormwater and in this work they are looking to “enrich the urban landscape” as they put it (the social aspect of sustainable development).

In this workshop Uppsala Kommun state that: “stormwater features in nearly every plan that Uppsala municipality is working with, so it’s a really relevant theme in daily work at the municipality”. However, they explain that they find it difficult to create solutions in the existing urban environment. They want to know if this Vinnova project can give alternative inputs to what they are already doing to address the stormwater problem in the inner city.

Uppsala Vatten explains that the primary source of pollution comes from the road surfaces.
A small discussion arises, between a representative of Uppsala Vatten and an unidentified workshop participant henceforth “UP”, around water handled from ground surface parking as opposed to parking garages. From Uppsala Vatten's perspective, they think that polluted water collected in parking garages is better since it can be contained in a drainage network, rather than running along the ground surface. “UP” however, suggests that if this contaminated water is led to the sewage treatment facility it is a worse option because sewage sludge is later used in agriculture. However, all parties agreed that this was a difficult question since there are pro’s and con’s with both aspects of this particular case of stormwater management.

A few minutes later another discussion arises over the management of stormwater sludge, which is collected in a dam where the stormwater filters through and flows out in a cleaner state than when it entered the dam. A question was raised by “UP” as to what happens with the contaminated sludge later when the dam needs emptying. The answer from the Uppsala Vatten representative was that this has not yet needed to be dealt with and it still needs to be solved. “UP” suggests that one needs to be wary with such a method of stormwater management since this sludge “may very well also be used for agricultural use” and that (quote) “either way we handle the water through the stormwater drainage network or through surface run-off into dams, the outcome is similar, the mountain of sludge is growing, and you can’t really use it as a building material can you?”. This indicates that “UP” has an incredulous opinion as to the way the stormwater is currently being handled in the wider system and that a degree of forethought is required when designing the system. The reply to this from the Uppsala Vatten representative was that this is a continuous struggle, (quote) “this is the problem we have to deal with, with our way of life”. A member of the ReSolve team (henceforth “N”) entered the conversation by stating that this had been a very good discussion, but that it might be saved for the group-work part of the workshop. “N” clearly had noted the importance of the on-going dialogue and was keen to get the workshop on to the second part where such matters could be explored in depth and could hopefully lead to these discussions turning into the main questions to be answered by the competition participants.

A little later “N” also mentioned that is seemed from the discussions that the areas outside Uppsala also must have an inflow of water into the city and that this is not just an isolated problem in the city centre. This did not seem to wake much attention with the participants, and nothing came from this.

At the end of the workshop no key questions were presented. However, a number of main topics had emerged from each group and it was evident that another workshop with fewer people was needed in order to have all the representative opinions heard and fully addressed.

### 6.3.2 Follow-up competition workshop (05/02/2015)

This was the follow-up workshop designed to once and for all decide the key questions for the competition. After a lengthy discussion it was achieved and four locations were selected for the teams to choose between.

A good example of framing took place here where the stakeholders from academia wanted to choose locations which could encompass the three main pillars of sustainability (Social, Environmental and Economic problems) whereas the representatives of the public sector (Uppsala Kommun and Uppsala Vatten) primarily wanted to reach a classical “engineered” solution which only addressed the problem of water from the eyes of the city planner. The public sector stakeholders were therefore less incentivised to include social aspects of the solution in the selection process but naturally wanted to include economic aspects out of a
budgetary point of view. This appeared to be a step back in the process of the competition planning since a member of Uppsala Kommun had already mentioned that they continuously sought to “enrich the urban landscape” when dealing with issues regarding stormwater.

This may have been an example of re-framing due to changing values or perspectives since the first meeting on the 29th January. This may also be an example of the difficulties of boundary spanning which was mentioned by Tortoriello and Krackhardt (2010) when participants do not share common knowledge base and therefore have difficulties finding common ground. It is also important to take into account a further point raised by Tortoriello and Krackhardt (2010), which is that these difficulties are highly context specific, and may have other possible explanations.

Also, with regards to committing to implementing the winning solution and contributing with funding to this part of the project, the representatives of Uppsala Kommun and Uppsala Vatten were unwilling to make any promises and therefore suggested that this be taken up with politicians higher up within their organisations.

6.3.3 Meeting with Vinnova (10/02/2015)

After the previous workshop there was some email communication between the ReSolve team at CSD and the representative responsible for the funding from Vinnova to meet up and discuss the details of the competition planning.

Since it is in the interest of the Vinnova representative (henceforth referred to as “SA”) to ensure the funding is well spent and that this funding results in a successful project, he was keen to suggest alterations to the existing structure of the competition in order to achieve the objectives of Vinnova.

From the start it had been assumed by the ReSolve team that there should be three prizes (One for the winner and two runner-up prizes). The Vinnova representative questioned this and there was no clear argument why this had been chosen.

M: “We are discussing with the municipality now. We are considering to have the winner team get about 50,000sek, because I understood we cannot finance the prize at all with the money from Vinnova?”

SA: “It’s possible but then we have to, it’s, it’s, it’s a problem with our rules to give money to companies”

M: “Mhm, but student is ok, or?”

SA: “No, it’s... it’s... well if you really want to give our money as prize money we can arrange that, but then they might have to sign a contract or something, but I’m not sure.”

M: “But it is possible to give a prize as a trip to a conference [referring to the trip to Sardinia]?”

SA: “Erm...I think it’s possible, a trip is ok.”
The ReSolve representatives explain more about their thoughts about prizes for the competition, and then:

SA: “Why do you think you need 3 prizes?”

M: “…[silence…] Because we are going to, do you think we should only have winner team prize…aha? We thought that maybe we could have 3 team prizes”

SA: “Everything can be motivated. You could have one prize, you could have 10 prizes, I don’t know how you think about having three prizes, I don’t know?”

M: “Because when we first approached this, we were thinking about having three good solutions in Uppsala municipality.”

SA: “Three solutions?”

M: “Yes, three winner teams. I don’t know, maybe it’s good to only have one winner team. But that’s how we thought”

Me (The Author): “The council wants as many solutions as it can get, but we don’t necessarily have to give them [the teams] all prizes.”

SA: “I think the council wants a good solution….with quality”

M: “Mmm”

SA: “I think that’s more worth [more valuable] than many”

M: “Ok, we can consider that [having only one winner team]”.

Following this discussion, it was decided that the three prizes would be scrapped in favour of a One-prize solution. This was a key turning point in the planning of the competition, and is a good example of re-framing taking place. The re-framing has clarified the perception of the questions being disputed, “sharpened the parties’ understanding of their interests”, identified the topics where the participants’ views differ (Kaufman et al., 2013) and this has lead to the alteration of one party’s opinion.

The last workshop with the public sector stakeholders ended with the selection of four locations. The Vinnova representative “SA” suggested that the problem formulation needs to be a highly defined “small scale” problem and that the students should be able to find an innovative solution to this within the given deadline. This would mean that one aspect of one location would be chosen as the competition focus. This was something, which was previously not considered before and introduced the ReResolve team to a new frame of thought.

This is how the discussion started off. Note that here the discussion is about one street rather than one aspect of a certain streets’ stormwater problem.

M: “You said it would be better if we focussed on one street rather than 4 streets”

SA: “yeah, that’s right”

M: “We communicated this to Uppsala Municipality but we haven’t heard back from them yet”

SA: “I see”
Later the topic shifted to discuss more in depth, the specific problems and existing solutions in place for stormwater management in the streets of Uppsala.

SA: “The prize statement here [points to paper] will be ‘clean the stormwater’, from a particular street then?”

M: “yes”

SA: “Do you know what kind of solutions there is today to clean stormwater?”

M: “Possible solutions for this street?”

SA: “Yes, exactly. There are filters and stuff you buy on the market today, what is the problem that can’t be solved with the technology available today?”

[general] “mhm”

Me: “I think the problem is that, err, It’s not… because I think the problem is that you can clean the water at the source or the emission point into the river right? And I don’t think they have anything for cleaning the water at the street level, so they’re talking about these... I don’t know what they’re called in English but skeletonjordar\(^1\), to help infiltrate it into the ground, but they have nothing at the moment, it’s just a hard surface where the water runs into the river straightaway”

Finally “SA” reaches the point he is trying to make. He is worried that a general question might not lead to a sufficiently innovative solution and that the municipality will not be satisfied with.

SA: "You need to have a more defined problem question, because now you have several different roads with different characteristics. If you define it better you will get better contestants and better solutions. The municipality will be more pleased with the solution if you tell them we want to solve this problem. It needs to be a problem where they don’t already have a solution. You can describe it in one or two sentences”

M: “Oh, we are only thinking more along the lines of one paragraph”

SA: “You should really only focus on one aspect of the streets’ problems, just one problem. Then you will get the best solution. You could focus on the pollutants, the lights [referring to an insecure area at night], you should pick one limited problem, from that report that they [Uppsala Kommun] will write for you”

“M” was worried that focussing on one aspect might detract from finding a solution that fits into the sustainability aspect of the problem since sustainability problems take into account, economic, social and environmental aspects.

SA: “You need to create a question formulation that is easy to formulate and communicate and where the competitors know what it is they should be solving, so that they don’t come up with a solution for something that the municipality isn’t asking for.”

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\(^1\) English definition: a type of soil composition used in the urban landscape with cavities for air, water and roots
“But the municipality is looking for a solution that solves many problems in their streets”

“[laughs] But it’s impossible!”

“It’s impossible you think?”

“It’s impossible to create a competition that solves all those problems! You can’t communicate all those things, to the participants. If they want to solve something like that they have to go to a consultancy company or something. You have to define a problem within the stormwater issue.”

“SA” does not reveal that he himself might be worried on behalf of Vinnova; he indicated that he does not believe that it would be possible to conduct an innovation competition with a competition question that encompasses all the sustainability aspects.

Entering a separate topic, “SA” suggested an alteration to the proposed 50 000sek + Trip to Sardinia (Italy) prize since this would not provide any incentive for the participating companies in the teams. He suggested that the 50 000sek be used towards implementing the winning solution and giving the students the chance to get working experience from this.

“You need to think of what you are giving as the prize. For a student, 50 000sek and a trip to Italy is very nice, but a company won’t sit down and develop a new thing [product] if you get 50 000sek. They will maybe send in a paper with a product that they already sell today, but they will not develop anything new. So it’s good to have a competition where the students get to develop their ideas.”

Other topics are covered and then the topic of monetary allocation arises again.

Coming back to the question of whether or not Vinnova can help fund the prize, “SA” said that the money could in fact be allocated for the development of the solution.

“We’ve already allocated [X-amount of money] for prototyping the solution. I think it’s good that they can get funding to help develop their solution”

“Exactly, that’s a good prize.”

“Maybe we can get the municipality to chip in so the prize is bigger”

“Also, if you can get the Municipality to guarantee to implement the prize, that is better than a cash prize.”

Again this is an example of social learning taking place. Both parties have presented their ideas, discussed their standpoints (they were already established before entering the meeting) and one party has come out of the discussion with a new perspective. Re-framing has taken place and demonstrates that change in framing has followed the Interactional paradigm as described by (Dewulf et al., 2009).
6.3.4 Email notification (16/02/2015)
The contents of the meeting with the Vinnova representative were communicated by one of the ReSolve team members via email to Uppsala Kommun. The author is not certain exactly how detailed this message was and what information it actually contained. However, on the 16/02/2015 a reply was sent to the ReSolve team explaining that a completely new location, that had not been discussed in the prior meetings, had been selected by the municipality as the study site. This came as quite a shock to the ReSolve team since this was a decision taken completely without their knowledge and did not take into account the new knowledge that had been created in the Vinnova meeting regarding the size and scope of the problem formulation.

This miscommunication issue was not communicated back to the municipality, perhaps because in this way it may have been possible to incorporate the three sustainability aspects that the Vinnova representative previously had deemed impossible. This is however only speculation and can therefore not be treated as anything but the authors own views. The decision made by the municipality was accepted without any question and it was decided that the city planner in charge of the area in question would draft a briefing report which would be used to inform the students of the physical aspects of the location. This report would present the specific questions that the teams would have to answer.

6.4 Further discussions
6.4.1 Did social learning take place?
Coming back to the research question;

“In the process of planning and running an innovation competition aimed at tackling the problem of stormwater in Uppsala, is social learning taking place?”

The results of the action research have shown that social learning has indeed taken place during the meetings and workshops that the author has participated in. There are a number of occasions where the different stakeholders have interacted with one another, presented their points of view, found gaps in each others’ thinking and acted to bring each other to a common level of understanding. Even though “literature suggests that social learning involves internal changes which are generally hard to qualify and measure” (Muro and Jeffrey, 2008: p. 340) there have been instances where the framings and processes of re-framing have been clear to see.

This positive finding makes it possible to address the second research question;

“Furthermore, if social learning is indeed taking place, is social learning a useful tool in tackling a sustainability issue such as stormwater management?”

This is a more complex question to answer. The initial answer would be yes. There has been a positive outcome from the meetings tasked with finding the main question for the innovation competition. The participants have understood each others’ points of view and engaged in boundary spanning even though they did not have a common knowledge base of points of reference. This has led to a number of re-framings among the participants. Having said that, the lack of understanding or communication failure that occurred on the 16/02/2015 is enough cause for concern for the author to doubt these findings. There must be a premise of total communication if social learning is to have enough of a positive effect on the issue of stormwater management. This means that the actors and stakeholders should agree, prior to the beginning of discussions, that decisions taken outside of official meetings should be
communicated to the other parties before binding decisions are taken. This has been discussed in Muro and Jeffrey (2008) as to whether social learning can contribute to or help facilitate a natural resource management, such as stormwater management. Muro and Jeffrey (2008: p. 340) state that “encouraging social learning through participatory platforms can be time-consuming and costly”, and “careful consideration should be given to whether social learning is likely to contribute to a successful process outcome” (Muro and Jeffrey, 2008: p. 340). Therefore the possible contributions to be gained from social learning may be limited (Muro and Jeffrey, 2008) and that this could be caused by an overly ridged institutional framework. The author is unsure whether this has been evidenced in the meeting proceedings but the decision taking in the background may suggest this. Muro and Jeffrey (2008) go on to state that this may however be dependent on the specific problem being faced and the usefulness of social learning must be judged on a case by case basis (Muro and Jeffrey, 2008).

It is clear from the conversations that a number of stand points (framings) exist among the stakeholders. The two public sector stakeholders seemed to have a similar point of view and acted as the customers of the innovation competition. Within their group they swayed a little as to whether they wished to include multiple aspects of sustainability. The Vinnova representative had a more clear-cut framing regarding this issue. Innovation competitions that have a wider focus, involving several aspects (such as the sustainability aspects) are in general less successful than those with more specified objectives. This is something that the ReSolve representatives clearly did not agree with even though they did undergo some re-framing as a result of their interaction with the Vinnova representative.

6.4.2 Post-study social learning

Learning is a constantly on-going process that begins at birth and ends at death; this is true for individuals as well as projects, organisations and other similar structures. It is therefore highly likely that social learning among all participants and stakeholders, from the organisers down to the student participants, will experience and partake in social learning up until after the winning team has been selected and the final report for Vinnova has been published.

This is something which is natural but of course presents itself as an annoyance to the author who would have preferred to be able to document the social learning process from the start of the project to the end. Having said that, it is acceptable to join and leave the learning process at any given time. This is the nature of research project and this will allow others to reflect on the outcomes and shortcomings of this piece of work and find something which needs further study. Learning is a continuum that researchers only gain access to for a limited period of time.

7 Conclusions

This study has shown that social learning has indeed taken place during the planning meetings of the ReSolve innovation competition and this has influenced the results of these meetings. However since part of the framings and re-framings which were the result of the meetings to have to some extent been ignored, it is difficult to claim outright that social learning is a useful tool for stormwater management. Having said that, if there is sufficient communication between the stakeholders outside of the workshops there should be no reason why social learning could not have a positive and beneficial influence on the management of stormwater. This is an interesting discovery since literature has found that there can be significant difficulties experienced by participants who do not share a common knowledge.
base (Ahuja, 2000; Reagans & McEvily, 2003; in Tortoriello and Krackhardt, 2010). This may be due to a similarity of the structural underpinnings of the participants’ own organisations enabling them to cooperate without significant difficulties. The author is keen to point out that the data for this thesis has only been collected during a short time in the beginning of the project and that it will be interesting to see how the results of the innovation competition are received by Uppsala Municipality and Uppsala Vatten. Their reception of the “Innovative Solutions” could indicate the success or failure of the communication between the stakeholders during the management and planning phase of the competition.
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9 Abbreviations & Key Terms

BISE – Biodiversity Information System for Europe
CSD – Uppsala University Centre for Sustainable Development
IPCC – The Intergovernmental Panel on Climate Change
MSB – The Swedish Civil Contingencies Agency
NRCS – The United States Natural Resources Conservation Service
QRCA - Qualitative Research Consultants Association
SLU – The Swedish University of Agriculture
UN – The United Nations
Uppsala Kommun – Uppsala Municipality
Uppsala Vatten – Uppsala Water Board
USEPA – the United States Environmental Protection Agency
USGS – The United States Geological Survey
UU – Uppsala University
WCED – World Commission on Environment and Development
WWF – The World Wildlife Fund for Nature
10 References


ReSolve, 2015. *The ReSolve Innovation Competition (Guidelines)*. ReSolve, Uppsala


11 Appendix


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