

## **Towards improved actor collaboration for better stormwater management**

Vers une meilleure collaboration entre les acteurs en charge de la gestion des eaux pluviales

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### **RÉSUMÉ**

La valeur économique, sociale et écologique de l'utilisation d'infrastructures vertes pour la gestion des eaux pluviales suscite une attention croissante. Cependant, la transition pour passer de systèmes de drainage par canalisation vers des infrastructures vertes est lente, ce qui est dû en partie à des obstacles institutionnels et organisationnels entre les diverses parties prenantes impliquées dans la planification et la mise en œuvre des systèmes d'assainissement urbain. L'objet de cette étude est d'étudier comment le processus de planification de la gestion des eaux pluviales peut être amélioré grâce à une implication précoce des acteurs et à une collaboration transcendant les limites organisationnelles. Cette étude a été réalisée comme une étude de cas multiple, avec la participation de cinq communes suédoises. Des ateliers ont été organisés dans chaque commune et ont fourni de nombreux commentaires des participants. Plusieurs moyens d'impliquer davantage les acteurs, d'améliorer la communication et la collaboration ont été identifiés. En outre, il a été constaté que les villes ayant des entreprises de services publics rencontrent davantage de difficultés pour parvenir à une collaboration plus harmonieuse.

### **ABSTRACT**

The economic, social and ecologic value of utilizing green infrastructure for stormwater management is gaining more attention. However, the pace of transition from piped drainage systems to green infrastructure is slow and this is partly due to institutional and organisational barriers between various stakeholders involved in the planning and implementation of urban drainage systems. The purpose of this study was to explore how the stormwater planning process can be improved in terms of early involvement of actors and collaboration across organisational boundaries. This study was conducted as a multiple-case study, with five Swedish municipalities participating and workshops were held in each municipality, providing extensive feed-back from participants. Several means for improved actor involvement, communication and collaboration were identified. Moreover, it was found that cities with public utility companies encounter more challenges in reaching an enhanced collaboration.

### **KEYWORDS**

Actor collaboration, stormwater management, urban planning, organisation, planning process

## 1 INTRODUCTION

The economic, social and ecologic value of utilizing green infrastructure to keep stormwater in urban landscapes is gaining more attention (Foster, Lowe, & Winkelman, 2011; Vandermeulen, Verspecht, Vermeire, Van Huylenbroeck, & Gellynck, 2011). Incentives for keeping stormwater in the urban landscape, instead of draining it out of cities, include to, prevent flooding; provide pollution control; use as resource; and create green and blue areas enhancing urban comfort (Brown, Keath, & Wong, 2009; Ferguson, Brown, Frantzeskaki, de Haan, & Deletic, 2013; Fletcher et al., 2015).

However, although the increasing value of sustainable drainage solutions is beginning to be better recognized, the pace of transition from piped drainage systems to green infrastructure is still surprisingly slow in Europe and other parts of the world (Ashley, Nowell, Gersonius, & Walker, 2011). The transition from a traditional urban drainage system towards a sustainable drainage concept is a long process, partly because of the institutional barriers between the various stakeholders involved in the planning and implementation of drainage solutions (Cettner, Ashley, Hedström, & Viklander, 2014b; Stahre, 2008). Cettner et al. (2013) found that water professionals' limited impact on the planning process and socio-technological path-dependencies often result in pipes being installed as the default stormwater solution. Hence, to improve the pace of transition towards sustainable stormwater management, there is a need to involve all key stakeholders early in the planning process, and to improve their collaboration (Cettner, Ashley, Viklander, & Nilsson, 2013; Stahre & Geldof, 2003). Several studies can be found that address institutional and organisational prerequisites for sustainable urban water management (Brown, Farrelly, & Loorbach, 2013; Ferguson et al., 2013; Fratini, Geldof, Kluck, & Mikkelsen, 2012; Storbjörk & Söderberg, 2003). However, no study has been found that investigates how to achieve early collaboration on stormwater planning between key stakeholders in municipalities. Accordingly, the purpose of this paper is to explore how the stormwater planning process can be improved in terms of 1) involvement of key stakeholders early in the planning process, and 2) enhanced collaboration across organisational boundaries. The work presented here is part of on-going research to understand these processes, to help facilitate the uptake of green infrastructure.

## 2 BACKGROUND

In Sweden, municipalities are the main responsible actors for urban planning and stormwater management (The Swedish Code of Statutes, 1987). That is, the strong autonomy and "local planning monopoly" of Swedish municipalities give them power to act and allow them the sole right to develop and adopt local land-use plans (Hrelja, Hjerpe, & Storbjörk, 2015; Lundqvist & von Borgstede, 2008). The term municipality in Swedish refer to both the geographical and legal bounded area and the elected decision making body that govern it. In municipalities, planning occurs on different levels and many different strategies guide planning. Most Swedish municipalities (if not all) have an overarching strategic plan, including a budget, for the next coming years, which is revised every year. They also develop strategies for some of the municipality's different operations and so far, around a third of Swedish municipalities have developed a stormwater strategy (Cettner, Ashley, Hedström, & Viklander, 2014a). Land-use planning is structured around the municipal comprehensive plan and detailed development plans, the former specifying long-term land-use goals. Comprehensive plans are not legally binding. Detailed development plans perform a regulatory function and therefore influence change (Boverket, 2010). According to the Planning and Building Act, Swedish municipalities need to consider climate change and its effects in planning and take climate change into account when planning new built-up areas (Boverket, 2009; 2010).

## 3 THEORETICAL FOUNDATION

The classical questions for strategic and change management planning were used as a starting point for this research, i.e. 1) where are we now? 2) where do we want to go? and 3) how are we going to get there? Focus in this study has been on exploring issues pertaining to the second question. By including all relevant actors early in the planning process, and having those working together, cross-functional cooperation will occur. In this study, two constructs related to collaboration were empirically investigated – goals and communication – as these have been identified by previous research as important predictors of collaboration and its outcomes (Bryson, Crosby, & Stone, 2015; Patrashkova-Volzdoska, McComb, Green, & Compton, 2003; Pinto, Pinto, & Prescott, 1993).

## 4 RESEARCH DESIGN AND METHOD

An action research approach was followed (Herr & Anderson, 2014; Robson, 2011), where researchers together with municipal officials collaborated in finding answers to challenges. Researchers and officials were brought together by a shared interest of wanting a change in existing practice. Researchers took the position of outsiders, collaborating with insiders. Municipal officials identified and formulated research needs, whereas researchers formulated the research questions; and contact persons, from the water and waste water organisations, at the municipality validated them as relevant. To allow for replication logic and comparisons across cases, a multiple case study approach was adopted (Yin, 2013; Eisenhardt & Graebner, 2007; Eisenhardt, 1989).

Focus in this study has been on the major city in each municipality and henceforth, the term city is used when speaking more generally. The participating municipalities (cities) have different characteristics in terms of geographical location, population size (ranging from around 20 000 to almost 500 000), organisation of water and wastewater operations (public utility company or municipal department), and to what extent strategic work, in the form of policies, strategies, plans or guiding principles have been undertaken with regards to stormwater management, as summed up in Table 1. Strategic plan refers to plans such as a stormwater plan, stormwater strategy or water and wastewater plan incorporating stormwater in an explicit way.

One full-day workshop where conducted in each participating municipality, in total five, during the period of January to November 2015. Invited were all municipal officials that management thought either would be interested in sustainable stormwater planning, and/or should be involved in such planning, at both strategic and operational level. This resulted in between 8-40 participants from a broad range of organisational units within each municipality.

Table 1. Municipality characteristics

City	Organisation of water and wastewater operations	Municipal comprehensive plan	Strategic stormwater plan
A	Public utility company	2009	Yes (2001, 2010)
B	Municipal department	2014	Under development
C	Public utility company	2014	Under development
D	Municipal department	2013	Under development
E	Public utility company	2014	Yes (2011)

Open-ended questions were posed to the participants, accompanied by follow-up questions depending on the participants' own dialogues, while at the same time allowing for small variations of questions between workshops. To ensure the relevance of workshop questions, contact persons at the water and waste water organisations in each municipality validated questions beforehand of the actual workshops taking place. Participants were asked to ponder each question individually for five minutes and write down their thoughts on post-it notes before discussing each question in small groups for about 15 - 20 minutes. During the small group discussion we requested participants to add their individual post-it notes to a large sheet of paper, one for each small group and to continue to add post-it notes generated by their joint discussion. Each group then presented their discussion in plenary. The key questions discussed during the workshops centred on, goals and guiding principles for stormwater management; actors to involve; and communication. The workshop leaders took extensive notes during the discussions and these, together with the post-it notes form the empirical material from the workshops.

## 5 FINDINGS

All municipalities participated because they proactively wanted a change in practice. They wished for a situation where all relevant actors, with regards to stormwater management, get involved and cooperate already in the early stages of the planning process.

### 5.1 Involvement of key stakeholders early in the process

A prerequisite for involving all relevant actors early in the planning process is a common understanding of when the planning process starts; which actors to involve and when; and who should be responsible for raising the stormwater issue early in the planning process. Accordingly, the municipalities were asked to reflect on these issues.

### **5.1.1 When does the planning process start?**

In all cases, participants identified several starting points for the planning process, e.g., development of strategic plans, comprehensive plans, local development plans, land purchases and building phase. Participants in three of the cities identified an idea to do something, e.g., start a planning/exploitation/building process, or an identification of a problem in already developed areas, as the real starting point of the process – before any formal decisions have been made. The cities in the process of developing a stormwater strategy especially highlighted the stormwater strategy as their starting point.

### **5.1.2 Who to involve and when?**

The start-up phase of each of the above mentioned processes was seen as the desirable time to involve relevant actors from all organisational units, e.g., environment and health; planning; water and waste water; operation and maintenance; roads and parks; and land development. External actors such as, land and property owners; developers and building companies; consultants and insurance companies, were identified as important to involve in some of the processes by four of the cities. Three of these cities also brought up state or regional actors such as the Swedish Transportation Agency, the Swedish Agency for Marine and Water Management and county administrative boards. Three cities mentioned the importance of involving politicians in the dialogues, to get political support and make politicians aware of the consequences of different decisions. Two of these cities further emphasized the importance of including citizens in the dialogues.

All cities expressed an ideal of having many people and competencies involved in the beginning, and to later on reduce the number of people involved, depending of the nature of the project.

### **5.1.3 Who should be responsible?**

Little will change unless someone actually is responsible for raising the stormwater issue early in the planning process. Therefore, participants were asked who they thought should be responsible for this. Respondents in one of the cities suggested the need for a stormwater strategist as responsible for raising the stormwater issue. Three of the cities, all in the process of developing a stormwater strategy, suggested that the stormwater strategy would perform such a function when finalized. Respondents from two cities suggested that the responsibility should reside with an organisational unit – one city suggested the planning unit, whereas the other suggested the water unit. Finally, one city suggested a system or procedure that captures the stormwater issue in each planning process for example through check-lists, to make sure that it is addressed in all processes. All participants agreed that irrespective of system, each individual still has responsibility for addressing the stormwater issue in each process and project they are involved in.

All units, in all cities stated that the main issue to solve is who is responsible for what and when, when it comes to managing stormwater. This involves dividing responsibility within the municipality, but also between the municipality and other actors. The concerns raised by the participants reflect different aspects of responsibility related to law, governance and organisation, the other three cities expressed similar statements:

*“Dividing responsibility within the municipality is not always easy. We have to start looking at stormwater as the city’s challenge, not just as a challenge for the water unit. City B and D”*

## **5.2 Goals as a means for enhanced collaboration**

A goal is the future position that an organisation wishes to attain (Schmidt & Kochan, 1972). However, when individuals from multiple functional areas work together on projects, divergent goals and values are inevitable (e.g., Ford & Randolph, 1992). This was found also in this study. All cities stated that roles and mandates differ between organisational units and they consequently have diverging goals and this can sometimes impede collaboration. Apart from different roles and mandates, other causes for goal-conflicts were mentioned. One cause was the apparent goal-conflict between different sustainability goals, e.g., dense city versus green city. This was a concern in all participating cities, and similar statements as the one below were expressed by all cities.

*“One challenge is the conflict between stormwaters’ need for e.g., green spaces and pervious areas and expressed wishes for a dense city structure. City C”*

Two cities raised another apparent goal-conflict between aesthetics and technical function of sustainable stormwater systems. Three cities raised conflicts of prioritisation as a concern, like the perceived conflict between need for increased building of housings and need to preserve green spaces.

Previous research has shown that superordinate goals improve cooperation in cross-functional teams and also have a strong direct impact on project outcomes (Pinto et al., 1993). Accordingly, participants were asked to discuss what goals should be guiding their city's stormwater management. A set of existing goals and guiding principles, developed by Sundsvall city (Sundsvall, 2011), were used as a starting point for the discussion. Participants were asked to discuss whether these goals and guiding principles were relevant for their city, whether they needed to be adjusted, and whether some were missing.

### **5.2.1 Goals for stormwater management**

All municipalities expressed that the goal for stormwater management, i.e. *being able to manage an increased rain intensity and extreme precipitation in a way that doesn't affect people's health, property or the environment* (Sundsvall, 2011) were relevant also in their city. Four cities expressed support for Sundsvall's goal on *being able to manage groundwater levels higher than those of today* (Sundsvall, 2011) as relevant in their city. In addition to this four of the cities wished to include a goal on reducing pollution loads on receiving waters.

### **5.2.2 Goals on design of stormwater systems**

Goals regarding how to design the stormwater system i.e., *design robust stormwater systems that take into account climate change and reduce the risk for damages during severe flooding; design stormwater systems that doesn't contribute to increase the risk of natural disasters; design stormwater systems to contribute as a resource in urban planning; and design stormwater systems to as much as possible mimic nature* (Sundsvall, 2011), were also discussed. Three cities desired goals on robust design; four of the cities emphasized goals regarding stormwater systems being adaptable to climate change. Four of the cities wanted to include the goal of using stormwater as a resource in city planning. In addition, three of the cities situated in Northern Sweden expressed the importance of including a goal of using snow (frozen stormwater) as a resource in city planning. One city stressed a need to add a goal on striving for multi-functional stormwater systems.

All cities expressed support for the goal to design stormwater systems to as much as possible mimic nature, as a worthy but unrealistic goal. Two cities stated it as a desirable goal, but one was struggling to find ways to implement it in denser, already built areas, such as the city centre and the other emphasised that nature mimicking stormwater systems is an ideal. Three cities expressed the goal of being adaptive to surrounding conditions and letting water's need direct the stormwater system design. Moreover, four cities stressed the importance of having a goal on stormwater systems being adaptive to both land conditions and existing structures, i.e. using green infrastructure where appropriate and using pipes where those are more appropriate. One city translated this goal into a list of order, firstly to allow/follow natural waterways wherever possible and not hinder natural flows and build around natural ponds; secondly to use nature mimicking/nature inspired solutions; and thirdly to use constructed solutions (e.g., pipes).

## **5.3 Communication as a means for enhanced collaboration**

As already stated, cross-functional teams must meld many different goals and values. In order to do so, they must find ways to effective communication (Bryson et al., 2015; Patrashkova-Volzdoska et al., 2003). Participants were therefore asked questions related to how communication on stormwater in the early stages of the planning process should take place.

The three cities with a public utility company brought up that by dividing a local authority into a public utility company and one or more departments, these units find it harder to collaborate. That is, they expressed a situation where the relationship between the municipal departments and the public utility company resemble the relationship with any external business partner, i.e. the relationship of a customer and a supplier. This led to a situation where the municipal departments got what they ordered from the public utility company, but nothing more, even when the public utility company probably knew that additional information would have been beneficial. They wished to clarify service orders in writing, but they wanted that the order should be expressed as the solving of a problem, and that the public utility company then delivers what is necessary to solve the problem.

Participants also identified other sets of formal communication structures needed. Two of the cities with public utility company wanted shared platforms/intra networks to ease sharing of documents and data, for example early drawings and GIS-data. Three cities wanted to establish exchange procedures for comments on plans and strategies to ensure that all actors have been heard. Two cities mentioned the need to create a feedback system on both processes and projects, to be better able to learn from

mistakes and good examples. Lastly, two cities wanted to develop better tools for planning (e.g., maps) that all key actors can access. Participants also identified informal structures needed, knowledge about each other's practices and processes; essential daily dialogue and informal collaboration and networking.

Three cities recognise the importance of having early joint meetings across boundaries of organisational units and with a range of competences represented, before the formal planning process start to sound out problems and difficulties that can arise, as expressed in City C:

*"Large surveys are not always needed, sometimes it is enough just to talk to each other to identify problems. City C"*

Participants further suggested a couple of new arenas for joint collaboration. One city wants to create an arena where long-term planning (5-10 years) can be discussed. Three cities suggested meeting across boundaries in a stormwater network. Almost all, four cities, want to establish regular meetings between units at e.g., local development planning start-up meetings; and start-up meetings for building permits and development agreements. Two cities especially mentioned doing a round of internal consultation before inviting external actors for a consultation on plans. Two reasons for this was mentioned, i.e. this procedure was seen as necessary to be able to issue unified requirements on developers and building companies, and from e.g., the water departments perspective it was seen as impossible to voice a disagreement when a plan has been made public.

## 6 DISCUSSION AND CONCLUSION

There is a need to involve all key stakeholders early in the planning process, and improve their collaboration, in order to improve the pace of transition towards sustainable stormwater management (Cettner et al., 2013; Stahre & Geldof, 2003). Accordingly, one purpose of this study was to explore how the stormwater planning process can be improved in terms of involvement of key stakeholders early in the planning process.

As the findings of this study show, raising the issue of stormwater early in the planning process requires acknowledging that the process begins before any formal decisions has been made to start, e.g., a new detailed development plan process. When the formal decision to start a process is made, the process has actually already been running for a time. Accordingly, initial cross-functional meetings should preferably occur already before the formal decision to start has been taken. The municipalities wished that quite many people and competencies should be involved in the beginning, so that all relevant perspectives on stormwater planning would be taken into account. Depending on the nature of the project, the number of people involved should later on be reduced. However, this approach would require more resources, in terms of time and personnel. As Cettner et al., (2014a) found, municipalities stated that an increase of such resources would be very effective for the improved implementation of sustainable stormwater solutions. Accordingly, decisions makers would probably have to be willing to increase the costs for the needed resources in the beginning of the planning process for the realisation of such an approach. Nevertheless, the increase of resources would probably be well-invested money, as the costs for flooding etc. can be disastrous (e.g., Gerdes, 2012).

Regarding who should be responsible for raising the stormwater issue early in the planning process, three solutions performing the same function can be identified from the findings, i.e. *designated person*, *strategic document* or *organisational unit*. That is, the need for a stormwater strategist as responsible for raising the stormwater issue was expressed. The cities without a stormwater strategy, identified the stormwater strategy as the solution, i.e. the strategy when finalized would perform the function of e.g., raising the stormwater issue early in the planning process. This result could be one explanation to the findings of Cettner et al., (2014a) who found that municipalities thought that a stormwater strategy would be very effective for the increased implementation of alternatives. The cities that suggested that the responsibility should reside within an organisational unit identified two different units, i.e. the planning unit versus the water unit. Although the cities recognised different ways to solve the responsibility of raising the stormwater issue early in the planning process, they all agreed that the division of responsibility is more complex than just appointing one person/document/organisational unit as responsible. Each individual has the responsibility for addressing the stormwater issue in each process and project they are involved in. All cities indicated that the main remaining matter to solve is who is responsible for what and when, when it comes to managing stormwater. This involves dividing responsibility both within the municipality, but also between the municipality and other actors.

The second purpose of this study was to explore how the stormwater planning process can be improved in terms of enhanced collaboration across organisational boundaries. The first construct that

was investigated with regards to collaboration was goals. Divergent goals and values are inevitable when persons from different functional areas are working together on projects (e.g., Ford & Randolph, 1992). That diverging goals between organisational units sometimes impede collaboration was expressed also by the cities in this study. A difficulty brought up was built-in goal conflicts within the sustainability concept, such as dense city structure versus green city. The manner in which increased building is prioritised before the need to preserve green spaces for stormwater purposes, reflect findings from studies focusing on climate change mitigation and adaptation in the urban planning process, i.e. how climate change adaptation is deprioritised in favour of economic growth and political interests (Storbjörk & Ugglå, 2015; Storbjörk & Hjerpe, 2014; Hrelja, 2011).

Superordinate goals can be used to improve cooperation in cross-functional teams, and they also have a strong direct impact on project results (e.g., Pinto et al, 1993). However, although superordinate goals with regards to *goals for stormwater management*, and *goals on design of stormwater systems* were expressed by the participants, political support is needed for these to be effective in the stormwater planning. Nevertheless, a shared understanding between all actors in a collaboration of the nature of a problem addressed is needed for a successful collaboration (Bryson et al., 2015; Clarke & Fuller, 2010). Just by identifying the superordinate goals, participants in this study have almost certainly achieved an improved shared understanding across organisational units on their different functional priorities.

The second construct with regards to collaboration included in this study was communication. It's clear that the participants wished for more communication in the early stages of the stormwater planning process. Some of the results can be referred to tools and/or structures to facilitate communication, e.g., intra networks/shared platforms, whereas other findings can be related to ensuring that all relevant actors have been involved and heard in the planning process. Regarding the latter, there is a need to create a feedback system, to be able to learn from both processes and projects. Moreover, there is a need to create procedures for internal consultation across organisational units before inviting external actors for consultation. Meetings across organisational boundaries have been raised by participants as necessary for involving relevant actors and improve collaboration. Here, it is important to note the importance of face-to-face meetings across boundaries as arenas not only for communication, but also as arenas for creating relationships; participation; and conflict and problem solving as shown in other research on collaboration in the urban water context (e.g., Storbjörk & Söderberg, 2003).

In this study, it was found that some adverse effects arise for stormwater planning when municipalities organise their water and wastewater operations into a public utility company, instead of keeping it in-house. The public utility company more or less operates as a private company, which affect the collaboration with municipal departments; often resulting increased physical and mental distance. For instance, joint problem solving suffers when actors have to make formal orders of services from each other to address even the smallest enquires. It is therefore vital for these municipalities to establish both formal and informal arenas for collaboration and joint problem solving, to help alleviate the mental and physical gaps.

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