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# Collaborative learning for policy innovations: sustainable urban drainage systems in Leicester, England

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## ABSTRACT

Collaboration among multiple stakeholders is crucial in decentralised governance settings. The success of such collaboration hinges upon *collaborative learning* – the acquiring, translating, and disseminating of policy-relevant knowledge. However, despite much research, a knowledge gap persists in the public policy literature on the relationship between learning and policy change. It is debated whether learning is necessary and sufficient for policy change, and if so, under what conditions. To contribute to this debate, this paper examined whether *collaborative learning* has had any impact on the emergence and implementation of sustainable urban drainage systems (SuDS) in Leicester, England. We first examined implementation of SuDS in Leicester, and then study collaborative learning focused on SuDS. We found that implementation of SuDS in Leicester is marginal despite active collaborative learning that has resulted in the change in beliefs and attitudes towards SuDS among all policy actors in the setting. Social dynamics factors and leadership of two SuDS champions proved crucial for collaborative learning. We conclude that collaborative learning, while essential for legitimacy of a policy innovation, is not sufficient for policy change and a national legal and institutional framework is required to incentivise broader SuDS practices in Leicester and England.

## ARTICLE HISTORY


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Decentralisation;  
collaborative learning; policy  
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## 1. Introduction

Collaborative approaches to governance of natural resources have gained prominence in the past few decades with such concepts as ‘co-management’ (Baird, Plummer, & Bodin, 2016; Koontz & Thomas, 2006), ‘adaptive governance’ (Huiteima et al., 2009), ‘public sector knowledge networks’ (Dawes, Cresswell, & Pardo, 2009), ‘multi-stakeholder governance’ (Bäckstrand, 2006) and ‘collaborative governance’ (Weber & Khademian, 2008). Heikkila and Gerlak (2013, p. 583) define collaborative governance as ‘a group of diverse stakeholders, including resource users and government agencies, working together to resolve shared dilemmas’. The rise of attention to collaborative governance coincided with the growing popularity of decentralisation and de-regulation around the world (Wilder & Lankao, 2006). Collaborative governance aspires to produce shared understanding among various parties and smooth key disagreements, although some discrepancies in the views will inevitably remain (Brugnach & Ingram, 2012; Driessen, Glasbergen, & Verdaas, 2001; Ingram, Schneider, & DeLeon, 2007). Since the emergence of the collaborative governance concept in the 1990s, several initiatives have been put in practice to test it, such as the Chesapeake Bay Program (Lubell, 2004; Sabatier et al., 2005), the Florida Everglades Restoration Program (Gerlak & Heikkila, 2006, p. 2011), and flood risk governance

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programmes in England (e.g. Alexander et al., 2016; Benson, Lorenzoni, & Cook, 2016), and the Netherlands (van Popering-Verkerk & van Buuren, 2017).

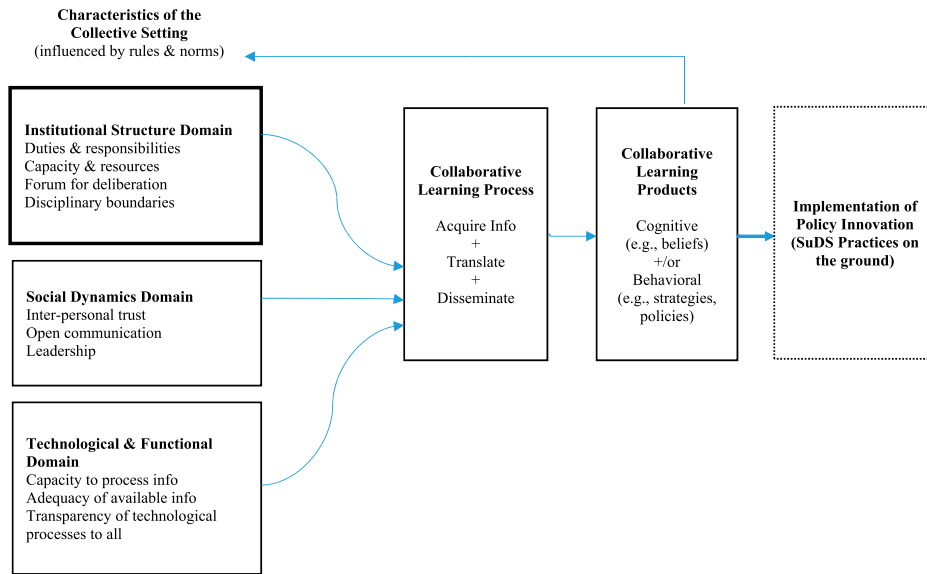
One branch of collaborative governance literature focuses on *learning* to fosters policy innovations in various governance settings (Driessen et al., 2001; Huitema et al., 2009; Pahl-Wostl, 2009). A policy innovation is defined here as a 'program, idea or practice that is new to the government adopting it' (Walker, 1969, p. 881). One key debate in the literature concerns whether and how collaborative learning relates to the emergence and implementation of policy innovations. Various empirical studies examine collaborative learning in different contexts. Berardo, Heikkila, and Gerlak (2014) claimed that knowledge provision, the levels of scientific certainty, and technical capacity of actors are key to secure collaborative learning. Leach, Weible, Vince, Siddiki, and Calanni (2013), in a similar line, found that new knowledge can change beliefs of actors. Newig, Kochs-kämper, Challies and Jager (2016), demonstrated how policy-makers rarely learn in a systematic fashion from other jurisdictions in Germany, being more open to learning from those with whom they interact regularly. Collaborative learning is thus an elusive subject and more theoretical guidance and empirical evidence are needed to explore the relationship between particular governance factors and collaborative learning in specific policy contexts. Parallel efforts are needed to explore the relationship between collaborative learning and policy innovations (e.g. Ansell & Gash, 2008; Gerlak & Heikkila, *in press*; Healey, 2006). The aim of this paper is to examine these two relationships by studying collaborative learning with an in-depth case of urban flood risk governance in Leicester, and whether such learning influenced the application of sustainable urban drainage systems (SuDS) in practice. An in-depth case study approach allowed for an extensive use of qualitative methods, such as semi-structured interviews with a diverse set of stakeholders, ethnographic observations, including participant observations, and shadowing key policy actors. In Section 2, we introduce our conceptual framework, which is based on Gerlak and Heikkila (2011), and Heikkila and Gerlak (2013). Section 3 gives an overview of the context of flood risk management in England and Leicester, Section 4 discusses our methodology, and Section 5 presents the research findings. Section 6 then provides a discussion and Section 7 concludes the paper and offers avenues for the future research.

## 2. Collaborative learning and policy innovations: A conceptual framework

There are various approaches to learning in the literature, including abundant literature on 'social learning' (Benson et al., 2016; Newig et al., 2016; Pahl-Wostl, 2009). Such learning often starts with cognitive and behavioural changes in an individual (Muro & Jeffrey, 2012, p. 3) and can lead to 'social or institutional transformation at the group level' (Gerlak & Heikkila, 2011, p. 3). Rodwin and Schön (1994) have further suggested that social learning may be the major pre-requisite of bottom-up policy innovations through collaborative improvisation and finding creative solutions to pressing problems. We acknowledge the complexity of the debate on learning and policy change and choose to build on the collaborative learning framework of Gerlak and Heikkila (2011) and Heikkila and Gerlak (2013), as in Figure 1, due to its comprehensive and clear structure and attention to the learning processes, products, and policy change as well as contextual factors that enable or inhibit such change.

Gerlak and Heikkila (2011) and Heikkila and Gerlak (2013), building on policy and social learning literature, proposed a research framework to study the products and processes of learning (Argyris & Schon, 1996; Crossan, Henry, & White, 1999; Dekker & Hansen, 2004). By focusing on 'what' has been learned by individuals in a collaborative setting and 'how', and on the 'impact' of such learning in terms of the 'products of learning', the framework allows the connection of collaborative learning with policy outcomes.

Gerlak and Heikkila (2011, p. 5) define collaborative learning process 'as acquiring information through diverse actions (e.g. trial and error), assessing or translating information, and disseminating knowledge or opportunities across individuals in a collective'. They define collaborative learning products as 'new shared ideas, strategies, rules, or policies' that emerge from the collaborative learning process (2011, p. 5). These may be 'cognitive' covering changes in beliefs and attitudes, and 'behavioural' covering changes in the way actors behave, and in more structural changes in implementing new policy innovations on the ground. There is a special emphasis in the framework on contextual factors that enable or constrain collaborative learning, such as structural, social, and technological features of collaboration.



**Figure 1.** Conceptual framework for understanding the emergence and implementation of policy innovations in collaborative learning settings (based on Heikkila & Gerlak, 2013).

Figure 1 presents a modified version of the framework by Heikkila and Gerlak (2013) that guided our data collection and analysis. We maintained the original framework apart from adding a box on the right to emphasise our interest in ‘implementation of SuDS practices’ in Leicester and distinguish it from changes in beliefs and attitudes or changes in policy documents, strategies and ways of operating of policy actors in the policy setting. We understand implementation of ‘SuDS practices’ as putting material SuDS infrastructure in place, such as green roofs, retention ponds, swales, or artificial wetlands – practices that must be also enabled at the policy level through ‘cognitive’ and ‘behavioural’ learning products mentioned in Figure 1. We thus assume that collaborative learning products have a logical relationship with implementation of policy innovations. Indeed, the nature of this relationship has been contested with claims that policy change may happen without learning, whereas much learning may lead to little or no policy change. We thus do not claim that learning is a sufficient or a necessary condition for policy change but insist that there is a meaningful relationship between the two constructs and set out to empirically study it.

Furthermore, we have elaborated on indicators within each of the three boxes on the left that originally have not been presented by Heikkila and Gerlak (2013) in the figure. We omitted from Figure 1 ‘exogenous factors’, such as political, social, and economic changes suggested by Heikkila and Gerlak (2013) but discussed these as part of the broader ‘institutional structure’ of governing surface water flooding and SuDS in Leicester in Section 4.3.

### 3. Flood risk management and sustainable urban drainage systems in England

Floods cause great financial and health impacts in England and UK. Adjusted for inflation, the average damages from floods in the UK in the last 23 years are approximately £250 million per year (Penning-Rowsell, 2015). As a response, flood risk management policy in England has seen two major shifts. First, there has been an increasing emphasis on ‘soft’ measures of flood prevention through nature-based solutions and citizen preparedness (Defra, 2004). Secondly, the leading tasks of surface water management have been devolved to local authorities (UK Government, 2011; Begg, Walker, & Kuhlicke, 2015; Penning-Rowsell & Pardoe, 2014), although decentralisation remains constrained by the legacy of centralised approaches to flood management in England since the 1930s, especially pronounced in still centralised patterns of funding (Alexander et al., 2016; Penning-Rowsell & Johnson, 2015). These two trends have been encoded in the Flood and Water Management Act (2010) – a major legislation reforming the flood policy in the UK (e.g. Wiering et al. 2017).

Sustainable Drainage Systems (SuDS) is one of the key policy innovations for managing surface water and is a subset of 'Natural Flood Management' (NFM). It puts an emphasis on integration of urban drainage design and management with land use planning, urban biodiversity management, and water quality provision. The Leicester City Council (LCC) SuDS Guide described SuDS as follows:

A SuDS (sustainable drainage systems) mimics natural drainage, having some storage capacity, slowing the movement of water and achieving a reduction in volume leaving the site during a storm. The key difference between this and conventional piped drainage is that there is no one standard technique to be used universally. SuDS may take more time in the initial design but if thought through at the outset then there can be savings both in construction and longer-term maintenance. The term SuDS is a general term made up of the use of a variety of techniques – either independently or as a collection of differing and complementary measures. (LCC, 2015a, p. 4)

The earlier drafts of The Flood and Water Management Act (2010) proposed that local authorities responsible for surface water flooding establish SuDS Approving Bodies (SAB) to ensure that developers comply with the national level requirements. SABs were also proposed as responsible actors for long-term maintenance of SuDS (Alexander et al., 2016). However, these provisions were withdrawn from the Act making SuDS an 'additional planning consideration' within the existing national planning system (Alexander et al., 2016; Defra/DCLG, 2014). In a recent survey of 541 experts affiliated with the Chartered Institute of Water and Environmental Management (CIWEM), Melville-Shreeve et al. (2018) reported that SuDS implementation in the UK lags behind some other countries. Melville-Shreeve et al. (2018) also stressed the lack of data on prevalence of SuDS in the UK and called on professional bodies to produce surveys of existing SuDS schemes (Melville-Shreeve et al., 2018, p. 10). We are interested to understand whether the current lack of an effective institutional framework for SuDS in England prevents the emergence of bottom-up initiatives through collaborative efforts of local authorities, water companies, real estate developers and other actors. We proceed with the methodology of the study and presentation of the findings in sections below.

#### 4. Methodology

We have chosen Leicester as a case study as it has one of the highest risks of surface water flooding in the UK (in top ten cities) but by contrast, a remarkably low awareness about flood risks among its citizens (Ozawa-Meida et al., 2016).

The Leicester case study is based on 18 semi-structured interviews with diverse stakeholders in the field of flood risk management in Leicester, such as employees of various departments of the Leicester City Council, Environment Agency, the private water company Severn Trent Water (STW), flood risk management consultants, members of the Flood Resilience Council, academics, non-governmental organisations and citizens. Interviews and ethnographic observations have been conducted in the period of five weeks in May and June 2017. We focused on how these partners coordinate flood risk management measures with regard to SuDS in Leicester under the leadership of LCC. The interview protocol has been designed in accordance with Figure 1 and included process-tracing (Bennett & Elman, 2006). More specifically, interviewees were asked to identify examples of changes in attitudes and behavioural strategies with regard to SuDS, followed up with questions about the processes and factors that have led to such changes. Ultimately, interviewees were asked to identify external or policy-related issues that either facilitated or hindered collaborative learning. Ethnographic observations at LCC included everyday interactions of staff with regard to planning applications, approving flood protection schemes and calculating cost-benefit ratios for flood protection schemes. These observations, compiled in a field journal, comprised input for the NVivo analysis. We present the standard interview protocol in Annex 1.

We have applied NVivo, a software programme for qualitative data analysis, to code and memo the 18 interview transcripts, field journal and a few key policy documents. The initial codes included such terms as 'products of learning', 'processes of learning', 'social factors', 'structural factors', 'technological factors'. These were further sub-coded according to indicators provided in Figure 1. The central code for the analysis was 'SuDS'. The first author of the article conducted interviews, compiled the dataset, conducted coding and memo-ing and prepared the first draft of the analysis that has been later discussed and

improved upon together with other co-authors. We present the findings of our research in Section 5 below.

## 5. Findings: collaborative learning and SuDS in Leicester

In accordance with Figure 1, we first present findings on learning products (Section 4.1) followed by an extensive discussion of learning processes that lead to such products (4.2), and contextual factors that may explain the process and products of collaborative learning in Leicester, such as the structural, social and, technological factors (Sections 4.3–4.5). Section 4.6 briefly summarises findings on collaborative learning and implementation of SuDS.

### 5.1. Learning products for SuDS: cognitive and behavioural changes

Remarkably, all actors including Leicester City Council's (LCC) various teams, the Severn Trent Water, policy consultants, and the Environment Agency, reported a change in the *attitudes* towards SuDS from an unrealistically expensive and an unreliable drainage strategy to a serious alternative to conventional drainage. A number of interviewees mentioned that SuDS is an innovation on the brink of breaking into the mainstream in Leicester and the UK (Interviewee 01, Local Councillor; Interviewee 15, Water Company; Interviewee 02, LCC Planning Team; Interviewee 03, LCC Planning Team). A local councillor in Leicester emphasised the increasing political support to SuDS and noted that LCC is 'looking at these what we call multiple benefits, where we can get some biodiversity on the back of it' (Interviewee 01, Local Councillor). Collaboration between various actors involved in flood protection has been mandated by The Water and Flood Management Act adopted in 2010 that required a partnership approach between national and local stakeholders, such as private water companies and citizens (UK Government, 2010). The local lead flood authorities (LLFA), in bigger cities these are city councils, became a statutory consultee on surface water management in the planning process. LCC thus is responsible for promotion of SuDS locally by suggesting SuDS to property developers with the National Planning Policy Framework, although the provisions for SuDS are non-statutory. Interviewees mention that LCC lacks sufficient power and resources to ensure that SuDS are implemented through monitoring and enforcement of SuDS promised by property developers (Interviewees 06, 07, LCC). Furthermore, LCC is not obliged to take over SuDS schemes and infrastructure and maintain these as happens with roads and highways. There is also uncertainty with regard to the long-term performance of SuDS, compounded by the absence of a framework for maintenance of SuDS to ensure optimal performance. This institutional vacuum makes collaborative learning central in any efforts to build support for and implement SuDS practices. As a result of such learning, a gradual acceptance of SuDS could be observed in Leicester as captured by an urban planner at LCC as follows (Interviewee 02, LCC Planning Team):

Firstly, it (SuDS) has gone from being a nice idea to being a procedure, it's gone from "we would like you to do something like this if you're an innovative developer", to "we have a policy and you will comply with it" and then going from that to, "how best will you comply with it?"

This change in attitudes and beliefs of LCC officials and partner organisations has gradually translated into some *behavioural changes*, such as the publication of the Leicester City Council's 'SuDS Guidelines' (LCC, 2015a) and the 'Leicester Green Infrastructure Strategy 2015–2025' (LCC, 2015b), documents that Interviewee 02 (LCC) referred to as a 'policy' to comply with. The green infrastructure strategy has over 150 pages of text with policy recommendations to various bodies in Leicester to implement better green areas management, including a section on SuDS (LCC, 2015a, p. 80). Green Infrastructure can be defined as 'the networks of multi-functional green space which sit within, and contribute to, the type of high quality natural and built environment required to deliver sustainable communities' (UK Government, 2018, p. 67). Such green infrastructure is maintained through the creation of new river corridors, waterways, woodlands, nature reserves, urban green space and historical sites (LCC, 2015c).



The LCC SuDS Guide, in turn, is much shorter – about 22 pages and has a function of awareness raising about the goals of SuDS, the various types of SuDS, and some ‘best practices’ involved. The Leicester SuDS Guidance document plays an important role as a ‘go-to’ place for examples of SuDS written in a simple and accessible language with attractive illustrations for property developers. There are also internal Leicester SuDS guidelines and a set of best practices maintained by one of the SuDS champions. Council employees, thus, believe that the change is taking place, but see it as slow and gradual, consisting of many small-scale changes:

I’m also a very strong believer in small scale cumulative change so we get a scheme like Asda<sup>1</sup>, which was a brilliant scheme but it hasn’t changed the attitudes and it’s only one particular area but if everybody does a little bit and easy wins, you know, don’t kill yourself trying to get something that’s never going to change ... So building on small wins is important (Interviewee 03, LCC Planning Team).

Apart from changes in attitudes and behaviour towards applying SuDS in daily work of the council, the most important area of learning occurred in exploring new ways of building support for SuDS within the council. This took place under leadership of two LCC employees whom we refer to hereafter as ‘SuDS champions’. These two SuDS champions worked side to side to build greater acceptance for SuDS by various communication and persuasion strategies – an example of learning that both emerged from collaboration and supported further collaboration (Heikkilä & Gerlak, 2013). Their strategy to build support for SuDS at LCC included such actions as: (1) emphasise *multiple benefits* of SuDS that go beyond flood risk management, including green space in urban areas, mental health, and urban biodiversity; (2) provide *visual maps and artistic impressions* in planning documents to make SuDS less abstract and more tangible; (3) provide *quantifiable benefits where possible* in terms of estimates of houses lifted from the flood risk zones and other benefits; (4) provide *specifics in how SuDS can be built and operated* using examples from other areas in the UK and beyond; and (5) *experiment with new developments* in the city with support from innovative private and public sector actors, such as the Asda supermarket or the Ellis Meadows water retention area (Interviewees 03, 04, 06, 08; LCC Officers). Table 1 summarises the findings with regard to collaborative learning products.

## 5.2. Learning processes: managing knowledge in collaboration

Table 2 summarises the findings with regard to the collaborative learning processes. Learning processes include the process of acquiring, translating and disseminating information. The major source of knowledge on SuDS within LCC is the Construction Industry Research and Information Association (CIRIA), which has its own SuDS guidance and was a source of inspiration for the SuDS champions at LCC (Woods Ballard et al., 2015). Drawing on the guidelines from CIRIA, two SuDS champions managed an active informal network of professionals from and outside of LCC that regularly met to discuss sustainable drainage and travelled to visit various sites to learn from SuDS elsewhere. Although informal in nature and driven by the enthusiasm of a SuDS champion to maintain the network, it had support from the LCC leadership that approved, for example, a recent trip of the LCC highway engineers to Sheffield to visit a SuDS scheme (Interviewee 03,

**Table 1.** Learning products for SuDS in Leicester.

Learning products	Summary of findings
Cognitive (beliefs and attitudes) Behavioural (documents and behavioural strategies or persuasion and communication)	<p>There is an on-going shift in the acceptance of SuDS</p> <p>The ‘SuDS Guide’ and the ‘Green Infrastructure Strategy’ at LCC explicitly mention SuDS; Two SuDS champions utilise an effective communication campaign to build acceptance of SuDS at LCC and beyond by:</p> <ul style="list-style-type: none"> <li>• Emphasising multiple benefits of SuDS</li> <li>• Providing visual maps and artistic impressions</li> <li>• Providing quantifiable benefits where possible</li> <li>• Providing specifics on how to make SuDS work</li> <li>• Experimenting with various designs and report on results</li> </ul>

**Table 2.** Learning processes for SuDS in Leicester.

Learning processes	Summary of findings
Acquiring information (learning about SuDS practices, experiences and ways of communicating SuDS to colleagues);	Construction Industry Research and Information Association (CIRIA) is the major source of information on SuDS for LCC officials and consultants; Various formal and informal networks of professionals in the UK sustained by a SuDS champion at LCC helped legitimise SuDS.
Translating information (processing and reflecting on information and knowledge);	Translation of information and learning from experience happens individually; no procedures for collective reflection on experiences at LCC; Nevertheless, there is room for improvement for collective and systematic reflection and sharing of experiences on SuDS following personal initiative of LCC employees.
Disseminating information and experiences with SuDS;	Dissemination of information on SuDS happens both informally and formally at LCC through the communications team and through networks in which SuDS champions partake.

LCC). Such trips and network participation contributed to both substantive learning about the implementation of SuDS practices and building support for this approach at the council. One SuDS champion built on the opportunity presented by the anticipation of the Flood & Water Management Act of 2011 to push SuDS at the council:

I was aware of the Pitt Review and I was aware of the changes that could be coming, so I started to make contacts here with the Head of Highways and things like that and said that this is what I wanted to do, I wanted to set up this learning group for planners so that when the Flood & Water Management Act came in, we would all be prepared and we would all have backup because when you work in a planning department, what developers like to do is to present you with a unique case, they make it difficult so you can't say "this is what we can apply" and SuDS of course is a bespoke solution to every problem. (Interviewee 03, LCC Planning Team)

Thus, SuDS is not mandatory but still commands strong normative legitimacy among policy actors who believe that SuDS is an appropriate and perhaps necessary mechanism for sustainable surface flood management (Alexander, Doorn, & Priest, 2017; Cashmore & Wejs, 2014). Nurturing social capital, trust, shared vocabulary and leadership present some room for manoeuvre to keep SuDS visible and on track within LCC Crossing boundaries and connecting various actors is another essential part of promoting SuDS. The SuDS champion described their work as follows:

... if a developer is thinking, "I've got housing here, I've got a road here, I've got an open space there, if I let the highway water drain across onto the open space, what would be the issues? Well traditionally ... Severn Trent would say they wouldn't accept the water into their pipes because that's land drainage. Now we've got through by going to Severn Trent and talking it through and getting them to see the scale of it ... (Interviewee 03, LCC Planning Team)

Importantly, we found that most learning within LCC is individual in nature and is not processed collectively in a structured or regular manner. Studying flood risk management in England, Benson et al. (2016) came to a similar conclusion that individual learning is ahead of collective learning. This may indicate at the need to promote organisational procedures for collective discussion of professional experiences at local authorities.

### 5.3. Institutional structure domain

In the case of Leicester, a lack of capacity translates in the inability to control whether proposed SuDS features by property developers are actually implemented in practice (Interviewee 06, LCC Floods and Drainage Team). The lack of capacity at local authorities compounded by the decentralised setting of flood risk policy in the UK, and no overarching authority to oversee SuDS implementation present formidable barriers to collaborative learning (Interviewee 15, Water Company; Dolowitz et al., 2018).

Another manifestation of the strained capacity of LCC is the less-than-desired level of engagement with citizens and citizen groups about the risks of flooding and protection measures against flooding – a part of collaborative governance agenda in flood risk governance. The LCC engages with population through school projects, through the scheme to recruit and educate engaged citizen-volunteers to act as 'flood wardens' during



and in the aftermath of flood events, and through participation in local festivals. Nevertheless, the Flooding and Drainage Team members reported the limited nature of such engagement due to the lack of dedicated personnel and time (Interviewee 06, LCC Floods and Drainage Team). A contributing factor to meagre efforts of public engagement is the lack of serious flooding in the area in the past fifty years and a low political and social salience of the issue (Interviewee 06, LCC Flood and Drainage Team).

That notwithstanding, there are multiple arenas to facilitate collaborative learning and public participation in Leicester. One such forum is the Regional Floods and Coastal Committee (RFCC) (Interviewee 01, Local Councillor; Benson et al., 2016), an institution introduced in 2011 with a mandate to promote a dialogue at the basin level in order to distribute financial contributions of various local authorities in a coordinated, participatory and equitable fashion (Benson et al., 2016). Another active forum is the River Soar Catchment Partnership hosted by the Trent Rivers Trust, a registered charity that works with a variety of organisations to protect the aquatic environment of the river Trent (Interviewee 14, Trent Rivers Trust; Interviewee 08, De Montfort University). The River Soar Catchment Partnership has been funded by Defra and EA as part of the Defra Catchment Based Approach policy to ecosystem planning. As a result, a number of organisations have been meeting since 2014 to discuss policy options with relevance to water and land resources of the river basin, including LCC, county, district and borough councils, EA, Canal and River Trust, Natural England, Severn Trent Water and other organisations. The recent Soar Catchment Management Plan includes references to SuDS practices across the catchment (RSCP, 2018).

In addition, an Integrated Flood Risk Management Strategy has been in the process of preparation at the time of the fieldwork which presented opportunities for deliberation and joint planning among LCC, Severn Trent Water, and the Environment Agency. These efforts help to gradually overcome disciplinary boundaries between drainage engineers, landscape architects, biodiversity officers and urban planners at LCC (Interviewee 05, LCC Biodiversity Officer). That said, the entrenched culture of conventional drainage engineering to deal with the surface water at the LCC however is one of the major structural barriers to SuDS, a finding that is corroborated also by other scholars of flooding in England (Dolowitz et al., 2018). Table 3 summarises the findings with regard to the institutional structure for collaborative learning in Leicester.

#### 5.4. Social dynamics domain

The social domain includes such factors as trust between actors, tolerance for differences in opinion, and openness of communication, levels of conflicts, the ability to resolve such conflicts, and the role of leadership in dealing with SuDS. All actors expressed a good inter-personal basis for dialogue and collaboration in their work. Furthermore, an interviewee from the Environment Agency (Interviewee 12) and a consultant (Interviewee 16) emphasised the importance of personal relationships in inter-organisational collaborations and the challenges that the personnel transience presents for building trust and maintaining good working relationships in the policy setting.

One of the measures of a socially cohesive collaborative system is the emergence of a shared vocabulary among actors from various departments, agencies and with different disciplinary backgrounds. Serious disciplinary boundaries remain between SuDS advocates and practitioners on one hand and conventional drainage

**Table 3.** Institutional structure domain for SuDS in Leicester.

Institutional structure domain	Summary of findings
Duties and responsibilities	The decentralised and fragmented UK flood risk governance system does not encourage SuDS due to the lack of clarity with responsibilities, no overarching authority to promote and enforce SuDS and the lack of resources at the level of local authorities.
Capacity and resources to manage surface flooding	Local authorities have been struggling with human and financial resources to manage new responsibilities after decentralisation.
Forum for deliberation and boundary objects	There are some forums for deliberation such as RFCC and the process to prepare the Integrated Flood Risk Management Strategy.
Disciplinary boundaries and path-dependencies	As legacy of path-dependency in flood policy and conventional drainage engineering tend to win over the newer 'green infrastructure approaches' at LCC operations.

**Table 4.** Social domain for collaborative learning in Leicester.

Social domain	Summary of findings
Inter-personal trust	There are high levels of trust among actors and social coherence
Open communication	Discussions are open with diversity of opinions and criticism tolerated
Leadership	Leadership is key in making SuDS mainstream as exemplified by two SuDS champions

engineers on the other, that are also manifested in professional vocabularies and ways of thinking about drainage. The following quote from an LCC planner is rather telling:

... I get many planning applications (that) go across my desk with ponds where the engineer has written “swale” on the pond and that’s worrying because it’s not a swale and it’s missing the whole point of what a swale does and that’s from somebody who calls themselves a drainage engineer ... that’s why I say about this, we’re at the edge, we’re still pushing. (Interviewee 03, LCC)

Overall, the social capital among individuals from various involved organisations, the channels of communication and the culture of openness for criticism is present in the case study both within LCC and the relationship of LCC with other policy actors. Table 4 summarises the findings with regard to the social factors that influence collaborative learning in Leicester.

### 5.5. Technological and functional domain

The framework on collaborative learning also includes the ‘technological and functional domain’ that depicts the capacity of the organisations to deal with the available information including transparency of how information is used in decision-making. Geographic information systems (GIS), and sharing databases between various departments at LCC, and between LCC and STW are common since the Water and Floods Act (UK Government, 2010). Internal communication at LCC is based on a number of databases some of which are confidential.

As mentioned earlier, LCC has limited capacity to process planning applications and monitor and enforce implementation of SuDS schemes. As the SAB proposal has not been implemented despite the call for it in the Pitt Review (2008), the SuDS policy de-facto is not monitored. At the same time, Local Authorities experience personnel, time and funding constraints (Benson et al., 2016). While there seems to be much information on both background of flooding issues and possible solutions, the problem does not lie in the amount or appropriateness of available information but in the capacity of local authorities to process it.

Overall, there is sufficient level of technological and information provision at LCC and other stakeholders; the bottleneck lies in the human capacity to process this professional information and act upon it, especially with regard to SuDS schemes. The lack of resources inhibits LCC from monitoring and enforcing SuDS implementation, as well as from engaging with citizens more actively to assist in putting SuDS in place or raising awareness about flooding and SuDS in schools or communities (Interviewee 06, LCC; Interviewee 08, De Montfort University). Table 5 presents a summary of our findings with regard to the use of technology and information processing in the setting.

## 6. Discussion

The major finding of this research is that active collaborative learning may result in cognitive and behavioural changes of actors without causing implementation of the innovation on the ground. Of the three contextual domains of Figure 1, social dynamics proved to be the most prominent while technological and functional domain factors proved to be less relevant. Structural factors, in turn, such as actors in positions of power, can facilitate social dynamics by establishing a professional dialogue (Dengler, 2007; Heikkila & Gerlak, 2013). In the absence of structural support for SuDS in Leicester, leadership of LCC champions became front-stage as illustrated in Section 5.2. By spanning boundaries between LCC, Severn Trent Water, and the Environment Agency, two SuDS champions created inter-relationships that involved trust and patterns of openness to new ideas (Lipshitz, Popper, & Friedman, 2002). They encouraged a dialogue between drainage

**Table 5.** Technological and functional domain factors for collaborative learning.

Technological & functional domain	Summary of findings
Capacity to process information	There is technological capacity to process information and data; lack of personnel to process information adequately;
Adequacy of information	No monitoring and enforcement of SuDS implementation after their approval;
Transparency of technological processes to all	The system of decision-making at LCC is not transparent to outsiders including citizens.

engineers and SuDS proponents (Ohlsson, 2011), and maintained an active network of SuDS practitioners in Leicester and beyond (Interviewee, 03, LCC). SuDS champions together with other actors worked on creating joint professional norms and language that would help bridge the disciplinary divide among various communities at LCC and broader (Heikkila & Gerlak, 2013; Sabatier et al., 2005). The interplay between the structural factors and social dynamics factors in this case study echoes the finding of Koebele (2019) that contextual factors may impact collective learning processes and products in a holistic manner and should be studied in tandem with attention also on how they may reinforce or hinder each other.

The learning-implementation gap in Leicester may be explained by the institutional and legal vacuum about SuDS at the national level, the government inertia towards policy innovations, and uncertainty about the costs attached to adopting and maintaining SuDS. Dolowitz et al. (2018, p. 85) claimed that '(m)ost Local Authorities now recommend SuDS through the development planning process, but enforcement is constrained by the lack of implementation of national policy relating to SuDS and new developments' (Dolowitz et al., 2018, p. 85). The recent survey of 541 water professionals in the UK further reported the lack of clear national level rules and methodologies for SuDS adoption, uncertainty around costs of maintenance, poor capacity of local authorities, and poor monitoring and enforcement of SuDS as major barriers to implementation (Melville-Shreeve et al., 2018).

The Leicester case study presented two further challenges for SuDS implementation: disciplinary boundaries at LCC and the 'agency culture' of the UK public administration system. Disciplinary and organisational boundaries between drainage engineers and planning department SuDS proponents clearly hinder joint learning. As long as these two communities continue holding on to different identities, and without a push from the outside, learning between them will be limited (Dawes et al., 2009, p. 397). Shifting from conventional drainage to SuDS may present a threat to drainage engineers due to the loss of exclusive control over this area and further inhibit an open dialogue and collaboration (Argyris & Schon, 1996; Dawes et al., 2009). A second challenge is what Benson et al. (2016, p. 333) referred to as 'agency culture', or the complex bureaucratic system that discourages public participation and inclusive governance. The 'collective decision-making process that is formal, consensus-oriented and deliberative' is largely absent in flood risk management at the local level, a statement supported also by earlier research (Ansell & Gash, 2008, p. 544; Benson et al., 2016; Dolowitz, 2018).

In response, Benson et al. (2016) and Ellis and Lundy (2016), stressed the need for multi-level governance arrangements with 'shared and supportive collaborative relationships' and the need for 'cross-organisational and cross-sectoral partnerships' (Ellis & Lundy, 2016, p. 4). Dawes et al. (2009, p. 398), in unison with Benson et al. (2016), Ellis and Lundy (2016), and Pitt (2008), have emphasised the need for national level policy and legislative support to SuDS. In this light, Scotland provides useful examples of how state legislation, through the Water Environment and Water Services Act (UK Government, 2003), made Scottish Water responsible for maintenance and replacement of all shared public SuDS and encouraged property developers to adopt SuDS when retrofitting old buildings and properties (Dolowitz et al., 2018).

Finally, we found the frameworks by Gerlak and Heikkila (2011) and Heikkila and Gerlak (2013) useful to research collaborative learning. A number of new factors emerged from our empirical analysis that may enrich the framework, such as the salience of a policy issue (flooding is a low-profile issue in Leicester due to non-occurrence), organisational culture of civil service ('the agency culture'), and disciplinary boundaries as barriers to SuDS implementation. Adding a wider description of the structural and social domains would allow future researchers include new inductively derived variables in their analysis. We also echo Koebele (2019) in the recommendation for more longitudinal studies of collaborative governance in order to examine the interplay of internal and external contextual factors in the framework for collaborative learning (Figure 1).

## 7. Conclusions

We examined whether collaborative learning has had any impact on the emergence and implementation of SuDS and found that there have been active cognitive learning products and the adoption of SuDS in the formal LCC planning documents for urban drainage. However, the progress with implementation of SuDS in practice is tenuous due to major barriers such as reluctance of drainage engineers to embrace SuDS, uncertainties related to costs of adoption and maintenance of SuDS and, most importantly, the lack of an effective institutional and legal framework on SuDS at the national level. We believe that the efforts of LCC to promote SuDS in these conditions are unlikely to produce a major shift in drainage practices and require external support.

We found that social dynamics factors are most important in fostering collaborative learning; two ‘SuDS champions’ managed to achieve insertion of SuDS in the LCC strategic documents and contributed to an ongoing change in professional norms. However, without a strong institutional support from the national government, such bottom-up efforts are likely to remain limited. A legal framework for mandatory SuDS for new development and mandatory retrofitting of existing properties in England is necessary for SuDS implementation. Alternatively, economic incentives to encourage property developers to adopt SuDS voluntarily may succeed. The national government may also support SuDS indirectly through social marketing campaigns and keeping SuDS ‘ranking lists’, a strategy common in voluntary reporting schemes. Future research may explore the feasibility of such strategies to implement SuDS in Leicester and other contexts. More specifically, such research could productively interrogate how state policies may support collaborative learning among different actors and across different governance scales. While our research points to the national level support to SuDS, it remains a dynamically growing governance approach around the world. More empirical research on how SuDS schemes are adopted in various governance settings would help scholars and practitioners understand whether a broader SuDS uptake may happen bottom-up or needs to be supported by top-down measures.

### Note

1. Asda is a chain of supermarkets in the UK, the particular site in Leicester is equipped with LCC (2015a).

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## Appendices

### **Annex 1. Interview Protocol (May, June 2018, Leicester, England)**

#### **I. Introduction questions**

Name:

Position:

Date:

Place:

What is your position and responsibilities within your organization?

How long have you been involved this in organization and with these issues more generally?

With whom within and outside of your organization do you work most?

#### **II. Learning products and processes, cognitive and behavioural**

Can you identify examples of a change of strategy in your work with other agencies or your partners within your organization in the recent years? For example you may learn in the process of your work that SUDS are important and that emphasis on this instrument is key to planning for floods?

Can you identify the changes in ideas, beliefs, and values which you think led to that change?

How do you receive or acquire information from internal or external sources when you collaborate?

How do you interpret new information? For example – through deliberation or analysis, some heuristics and criteria, some mental frames

How do you disseminate information and knowledge across a group and to the clients?

#### **II. Governance factors**

Now I would like to focus on the factors which enable and constrain learning in collective settings

Can you identify the level of shared norms and values (also agreement on the definition of problems and solutions)?

How would you characterise openness to new ideas in the setting and the levels of trust between actors?

And tolerance to constructive criticism?

Are there mechanisms to talk through and resolve conflicts if these appear?

Is there a common language and jargon used in discussions within and across organizations?

How is IT used in collaboration?

Is there technical expertise present in the setting?

Is there enough information processing capacity to match available information?

What are the most important exogenous factors in influencing your work in collaboratives?

Why is there a difference in action between Carisbrooke Road case (collaboration and change) and Northfields case?

Thank you very much for your time. We are happy to share the results of the interview when ready – later this year.