On the governmentalization of sustainability: the case of flood risk mitigation in Sweden

Becker, Per

2021

Document Version:
Publisher's PDF, also known as Version of record

Faculty of Human Sciences
Doctoral Thesis in Sociology

Mittuniversitetet
MID SWEDEN UNIVERSITY

On the Governmentalization of Sustainability: the Case of Flood Risk Mitigation in Sweden

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Faculty of Human Sciences
Thesis for Doctoral degree in Sociology
Mid Sweden University
Sundsvall/Östersund, 13 April 2021

Akademisk avhandling som med tillstånd av Mittuniversitetet i Östersund framläggs till offentlig granskning för avläggande av filosofie doktor fredagen den 28 maj 2021, med start 13:00, sal O212 och online, Mittuniversitetet Östersund. Seminariet kommer att hållas på engelska.

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Printed by Mid Sweden University, Sundsvall
ISSN: 1652-893X
ISBN: 978-91-88947-98-7

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To the curiosity that never killed the cat

Acknowledgement

I have always been curious and genuinely interested in how things work and hang together. When I do not understand, I ask, read, and study. The more I learn, the more I realize how complex, dynamic, uncertain, and ambiguous our world is. Hence, this doctoral thesis accounts for my second PhD and fifth academic degree. This would not have been possible without the support of my former Heads of Division and Department at Lund University: Marcus Abrahamsson and Jesper Arfvidsson; the only two people who never saw it as strange to study for a second PhD in another discipline, but instead as enriching for our organization. I am also immensely grateful to my colleagues at Mid Sweden University, who, after first seeing my wish as very strange, took me in and guided me on my journey towards becoming a sociologist. I would particularly like to thank Roine Johansson and Anna Olofsson, who endorsed my admission and became my supervisors, and to Jörgen Sparf, who agreed to take Anna's place as co-supervisor when my research focus evolved into the relational endeavour you have in front of you. This is not to ignore the vital input and genial encouragement from everybody at the Risk and Crisis Research Centre (RCR) and the Forum for Gender Studies, who I have been fortunate to meet more or less frequently over the last several years. I would also like to thank James Kennedy at the University of Edinburgh for kindling my interest in his discipline of sociology all those years ago, and everybody I have had interesting conversations with about society since then. I am thankful to all the participants in my study, for their time and invaluable input, and to everybody who has assisted me in various ways. Finally, my deepest gratitude goes to my family for allowing my curiosity, while keeping my priorities straight.

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Abstract

Contemporary society is confronted with numerous sustainability challenges. Some are new, others have been around since time immemorial, but none have been governed on the societal level since their emergence. Despite an abundant literature that addresses the governing of a range of such sustainability challenges, the processes through which they become something governable in the first place have not received much attention. This thesis, therefore, seeks to increase our understanding of how complex sustainability challenges become governmentalized in advanced liberal democracies. It presents an empirical investigation of the recent problematization of flood risk mitigation in a specific area. The goal is to answer two questions: (1) how flood risk mitigation is governed; and (2) how the process of governmentalization is conditioning this governing in Sweden. It combines theoretical perspectives of *governmentality* and *new institutionalism*. The case study focuses on the governing of flood risk mitigation in Lomma municipality and the Höje Å catchment area in Southern Sweden, and mixes structural and interpretative methods.

Data were collected through 217 interviews with all actors who actively contribute to flood risk mitigation in the area, together with numerous documentary sources. The findings reveal remarkable spatial, temporal, and functional fragmentation in the regime of practices mitigating flood risk, a concentration of responsibility for flood risk mitigation in municipal administrations, and an escalating penetration and diffusion of the market in its governing. Four constituent processes of governmentalization were identified. *Reductivization* refers to the process of conceptualizing the complex problem in smaller, disconnected parts. *Projectification* captures how the problem is addressed through piecemeal projects. *Responsibilization* is the process by which responsibility is transferred to an actor with less power and who lacks appropriate resources, and *commodification* refers to seeing the solution to the problem as the aggregation of standardized modules that can be sourced on the market. While these processes are intrinsically linked, and combine to seriously undermine the purpose of flood risk mitigation, they are also fundamental for it to become governable in the first place. This nexus may be a general feature of the governmentalization of complex sustainability challenges in advanced liberal democracies, albeit to various degrees and in different ways depending on the penetration and diffusion of neoliberalism.

Summary in Swedish

Det moderna samhället har många hållbarhetsutmaningar. Vissa är nya, andra har funnits sedan urminnes tider, men inga har styrts på samhällsnivå sedan deras uppkomst. Trots riklig litteratur som behandlar styrningen av en rad sådana hållbarhetsutmaningar har de processer genom vilka de blir till något styrbart inte fått mycket uppmärksamhet. Denna avhandling syftar därför till att öka vår förståelse för hur komplexa hållbarhetsutmaningar görs styrbara i avancerade liberala demokratier. Den presenterar en empirisk undersökning av den nyliga problematiseringen av förebyggande av översvämningsrisker inom ett specifikt område. Målet är att svara på två frågor: (1) hur förebyggande av översvämningsrisker styrs; och (2) hur governmentaliseringsprocessen påverkar denna styrning i Sverige. Den kombinerar teoretiska perspektiv från *governmentality* och *nyinstitutionalism*. Fallstudien fokuserar på styrningen av förebyggande av översvämningsrisk i Lomma kommun och Höje Å avrinningsområde i södra Sverige, och kombinerar strukturella och interpretivistiska metoder.

Data samlades in genom 217 intervjuer med alla aktörer som bidrar aktivt till att förebygga översvämningsrisk i området, tillsammans med en mängd dokumentkällor. Resultaten avslöjar anmärkningsvärd spatial, temporal och funktionell fragmentering i rådande praktikerregim för förebyggande av översvämningsrisk, en koncentration av ansvaret för det till kommunerna, samt eskalerande penetration och spridning av marknaden i dess styrning. Fyra ingående delprocesser av governmentalisering identifierades. *Reduktivisering* avser processen att konceptualisera det komplexa problemet i mindre, frikopplade delar. *Projektifiering* fångar upp hur problemet hanteras bitvis genom frikopplade projekt. *Responsibilisering* är den process genom vilken ansvar överförs till en aktör med mindre makt, och som saknar lämpliga resurser, och *kommodifiering* refererar till att se lösningen på problemet som en sammanläggning av standardiserade moduler som kan anskaffas på marknaden. Även om dessa processer är kopplade till varandra och resulterar i att allvarligt undergräva syftet med förebyggande av översvämningsrisk, visar de sig också grundläggande för att det ska kunna styras överhuvudtaget. Detta nexus av delprocesser kan vara generellt för komplexa hållbarhetsutmaningar i avancerade liberala demokratier; om än i olika grad och på olika sätt beroende på omfattningen av neoliberalismens penetration och diffusion i varje sammanhang.

List of papers

Becker, Per (2021). Fragmentation, commodification and responsibilisation in the governing of flood risk mitigation in Sweden. *Environment and Planning C* 39(2), 393-413. https://doi.org/10.1177/2399654420940727

Becker, Per (2018). Dependence, trust, and influence of external actors on municipal urban flood risk mitigation: The case of Lomma Municipality, Sweden. *International Journal of Disaster Risk Reduction* 31(1004), 1004–1012. https://doi.org/10.1016/j.ijdrr.2018.09.005

Becker, Per (accepted 16 March 2021). Tightly coupled policies and loosely coupled networks in the governing of flood risk mitigation in municipal administrations. *Ecology and Society.*

Becker, Per (2020). The problem of fit in flood risk governance: regulative, normative, and cultural-cognitive deliberations. *Politics and Governance* 8(4), 281-293. https://doi.org/10.17645/pag.v8i4.3059

Preface

Having spent several years thinking about the governing of flood risk mitigation in Lomma municipality and the Höje Å catchment area, it recently struck me that flood risk is, like other complex sustainability challenges, much like the proverbial elephant. It can stare policymakers, practitioners, and the general public square in the face for years, or even decades, without anyone talking about it; like the famous elephant in the room. Then, when it finally catches people's attention and is transformed into an issue to be governed for the sustainable development of society, it turns into the elephant in the ancient parable of the blind wise monks. Although told slightly differently across the world, the essence of the story is always their partial perspectives and different ideas about the elephant's actual appearance. The version closest to the famous Japanese painting that adorns the cover of this thesis goes something like this:

> A group of blind wise monks heard of a strange animal, called an elephant, which had been brought to town. Out of curiosity, they went to inspect it by touch, of which they were highly capable. For the first monk, who felt the head, it felt like a pot. For the second, whose hand touched its ear, it seemed like a winnowing basket. The third clasped its tusk and was certain it looked like a ploughshare, while the fourth placed his hand on its trunk and thought it felt like a plough. The fifth felt its body and described it as a granary at the same time as the sixth held its leg thinking it was a pillar. The seventh monk climbed on its back saying it felt like a mortar, while the last two men held the tail and its tuft thinking the animal looked like a pestle and brush.

Regardless of their great individual wisdom, such a complex creature could not be comprehended through the individual experience of each blind monk. For that, they would have needed to communicate with each other and figure out how the different pieces fitted together. But, regardless of how hard they tried, their descriptions of the elephant would always be ambiguous.

Flood risk is not only complex and ambiguous, but also dynamic. Heraclitus' famous dictum comes to mind, stating that you cannot step into the same river twice (Plato, 2008). Change is the fundamental essence of the universe; albeit at various paces. Even if a considerable proportion of the water in the hydrological cycle of the Höje Å catchment area is even older than the solar system itself (Cleeves et al., 2014), many of the water molecules that are currently passing through have never done so before, and they may

stay for days in the atmosphere, weeks in the river, years in wetlands, decades in lakes, and thousands of years as groundwater (Freeze and Cherry, 1979). The river has been draining the area ever since the land emerged from the sea in the aftermath of the last Ice Age, but its flow is ever-changing both in terms of volume and turbulence. When human beings appeared—initially roaming the landscape for millennia, then settling on scattered farms, before establishing villages and towns—the complexity and dynamic character of flood risk escalated. The river is the same as always, yet it is completely different. Also tomorrow.

We cannot predict our future. Not even the future consequences of floods in Lomma municipality and the Höje Å catchment area. The future is uncertain, and this uncertainty is intrinsically linked to the flood risk that various actors attempt to govern together. I demonstrate throughout this thesis that we govern complex sustainability challenges in a piecemeal fashion, much like the blind monks in the fable, and ignore all other changes around us while doing it.

Introduction

It started with the floods in July 2007. Although not catastrophic on an international scale, they were enough to disrupt everyday life for many people living in Lomma, Lund, and Staffanstorp municipalities lying in the catchment area of the river Höje Å in southern Sweden (Figure 1). Significant floods had happened relatively recently elsewhere in this part of Sweden (e.g. in Kristianstad in 2002), but flood risk had not been considered much of a problem before. Then, four years later, Copenhagen—the capital of Denmark visible from Lomma across the narrow strait of water separating the two countries—experienced its worst floods in modern history. Policymakers, professionals, and the public understood instantly that it was pure coincidence that the monstrous cloudburst had unloaded mainly over Denmark instead of Sweden. Then, on the last day of August 2014, the tables were turned when the sky opened once again, and flooded thousands of households in Malmö; the regional capital of southern Sweden, only 10 km away (Figure 1). Many households were also affected in Lomma. The initiatives launched by actors in 2007 escalated, and flood risk suddenly became a priority for the sustainable development of society.

Figure 1. The geographical area, comprising Lomma municipality and the parts of Lund and Staffanstorp municipalities in the Höje Å catchment area. The white parts of the area are hydrologically insignificant, and cover Svedala, Skurup, and Sjöbo municipalities in the south, along with Kävlinge municipality in the north (developed from www.vattenatlas.se).

Floods were not a new phenomenon, unknown before 2007. We can be virtually certain that areas along the river and coast, as well as local topographical low points, have been temporarily submerged throughout their

long history of human settlement. There are also documented examples of significant floods, such as the Christmas storm of 1902 (Simonsson et al., 2017), the 1924 floods (SMHA, 1924), the floods of 1979 (SMHI, 2018b), and the 1985 storm (SMHI, 2018a). Legal provisions for mitigating flood risk have been in place since the mid-1980s (SFS 1987:10, SFS 1986:1102, Prop. 1985/86:150 Bil. 3), and practices to reduce the risk of being affected by floods have been around since time immemorial (cf. Swierczynski et al., 2013). However, it is not until the last decade that the governing of flood risk mitigation is called into question, and programmes are launched to strengthen it. This recent problematization of flood risk prompts investigation into how flood risk mitigation is governed in contemporary Sweden, focusing empirically on Lomma municipality and the parts of Lund and Staffanstorp municipalities included in the Höje Å catchment area (Figure 1).

Flood risk is not the only sustainability challenge that is transforming into an issue that requires governing. Yet, little is known of the processes through which such challenges become governable on the societal level. This thesis, therefore, aims to contribute to increasing our understanding of the *governmentalization* of sustainability challenges, through studying the governing of flood risk mitigation in Sweden. It integrates governmentality and new institutionalism perspectives, and combines structural and interpretative analyses of the regime of practices of individual actors who actively contribute to flood risk mitigation.

1.1 Background

Contemporary society is confronted by numerous sustainability challenges, as described in the abundant scientific literature (Becker, 2014; Rockström et al., 2009; Wackernagel and Rees, 1996; WCED, 1987; Weinstein et al., 2017) and highlighted by the Sustainable Development Goals (SDGs) for 2015–2030. Although it is of paramount importance to ensure that humankind is not transgressing fundamental planetary boundaries of Earth's life support systems (Rockström et al., 2009), societies that aspire to meet the goals of sustainable development must also address the actual or potential impacts of a range of shocks and sudden, seasonal, or steady changes locally (Becker, 2014).

Some sustainability challenges are new, while others have been around since the dawn of civilization. For example, the loss of soil fertility and salinization processes that have challenged human settlements since the first cities emerged in Mesopotamia 5000 years ago (Desvaux, 2009: 224; Taylor, 2012: 429). In fact, some have never even been perceived as such by

policymakers or the public, but that is a topic for another thesis. Those that finally do catch their attention, however, may be transformed into issues requiring governing on the societal level. Despite a rich literature on the governing of a range of such sustainability challenges, as well as on the framing of them as challenges in the first place (e.g. Bardwell, 1991; Boström et al., 2017; Lakoff, 2010; Spence and Pidgeon, 2010), there is not much focus on the processes through which they become governable.

Floods constitute a major problem, and are the most common type of recorded disasters around the world (CRED, 2020). Flood risk is a great concern, and is addressed under several SDGs (Grobicki et al., 2015). It is not only a problem for developing countries, although that is where many of the most vulnerable live (Dilley et al., 2005). It also threatens to undermine sustainable development in the most affluent, advanced liberal democracies (Godden and Kung, 2011; Priest et al., 2016; Warren et al., 2004). Moreover, it is expected to escalate with climate change and other processes of change that continuously redraw the risk landscape (Alfieri et al., 2017; Becker, 2014; Berndtsson et al., 2019). As in many other countries, increasing flood risk is a key concern in Sweden, and has been explicitly addressed in several official government reports in recent decades (SOU 2007:60; SOU 2017:42).

These developments have spurred intense scientific interest in the systems that govern flood risk on various administrative levels (e.g. Bergsma, 2019; Johannessen et al., 2019; Thaler and Levin-Keitel, 2016). Although, worldwide, these systems differ significantly even in the small number of advanced liberal democracies, they are relatively similar in the Nordic region, where both responsibilities and resources are largely decentralized to the municipal level (Harjanne et al., 2016). However, regardless of level, governing is not only exercised by the state in advanced liberal democracies (Rose and Miller, 1992: 174), where it has been redirected towards improving the wellbeing of their populations (Foucault, 2007). Here, the governing of complex issues does not reside with government, in the sense of particular political institutions of hierarchical governing backed by formal authority (Rhodes, 2007; Rosenau, 1992). It is instead distributed and involving various actors across societal spheres and sectors (Dean, 2010; Miller and Rose, 2008). It is impossible for any single actor to mitigate flood risk in society alone (Sörensen et al., 2016). Instead, it must be jointly governed by a web of actors (Folke et al., 2005; Renn, 2008) and the patterns of social relations among these actors are fundamental to society's capacity to achieve this (Ingold et al., 2010).

Floods tend to disregard geopolitical, administrative or organizational borders (Becker, 2018). The only boundaries known to water are hydrological,

since it can only flow downstream. It is also important to note that the impacts of floods are inherently local (Schumann et al., 2013: 6248)—regardless of global, regional and national attention—and that all conceptions of flood risk on larger scales must be based on aggregation. The fundamental entity for understanding and governing flood risk is, therefore, the *catchment area* (Niemczynowicz, 1999: 12), which is, simply put, the area within which all rainfall eventually ends up in the same place (Davie, 2008); normally in an ocean or lake, or another topographical low point. Although the importance of the catchment perspective is pointed out in both the EU Floods Directive (Directive 2007/60/EC) and Swedish legislation (SFS 2009:956), it is rarely applied in practice (Johannessen and Granit, 2015; Norén et al., 2016).

While there are numerous catchment-level studies of the governing of flood risk and other water-related issues (e.g. Guerrin et al., 2014; Lebel et al., 2013; Pahl-Wostl et al., 2012; Sayles and Baggio, 2017; Widmer et al., 2019), these important contributions either focus on the institutional (macro) level, or on interactions between organizations (the meso level). Although some collect data through interviews with individuals, they rarely pay attention to the acting and interacting individuals (the micro level) who constitute organizations, and who reproduce institutions. This is unfortunate, as several influential sociologists insist that these levels of analysis are inseparable (Berger and Luckmann, 1966; Bourdieu, 1977; Elias, 1978; Foucault, 1995; Giddens, 1984). Linking micro, meso and macro levels may pave the way for new, important contributions to our understanding of the governing of flood risk mitigation, at the catchment scale.

Flood risk has not always required governing at the societal level. People have, of course, always done what they could to protect themselves (cf. Swierczynski et al., 2013), and many advanced liberal democracies implemented legislation many years ago[1]; the Netherlands was probably first (see Kuks, 2004). However, the problematization of flood risk as a priority issue requiring such governing has not only been delayed until much later in the southwestern corner of Sweden, as described above, but to various degrees across affluent liberal democracies in general (e.g. Bergsma, 2019; Butler and Pidgeon, 2011). Notwithstanding the intense scientific interest referred to above, the transformation of the issue into a matter that is governable on the societal level has received very little attention.

[1] For example, the Flood Control Act 1917 (USA), the Flood Prevention Act 1961 (Scotland), la Loi d'Orientation Foncière 1967 (France), Ley 29/1985, de aguas (Spain), Prop. 1985/86:150, Bil. 3: Förebyggande åtgärder m.m. mot jordskred och andra naturolyckor (Sweden).

To return to my starting point; not a single complex sustainability challenge has always been a priority issue for governing in any advanced liberal democracy, but some of them undergo a process of *governmentalization* through which they become governable on the societal level. In other words, and regardless of all their differences, they are problematized and transformed into issues that are amenable to governing in this context. Although both sustainability challenges and their framing have attracted immense interest across the social sciences (Béland, 2009; Boström et al., 2017; Rothstein et al., 2006; Taylor, 2000), little is known about what constitutes this governmentalization, and the topic would benefit from further investigation.

1.2 The knowledge gap

Contemporary society is faced with many complex sustainability challenges, notably, escalating flood risk. As a particular sustainability challenge becomes more salient to policymakers, practitioners and the public, it can be transformed into an issue that requires governing on the societal level. This is particularly the case in advanced liberal democracies, where the focus of governing is the wellbeing of the population. However, little is known about the processes through which such issues become governable. This gap is exacerbated, at least with regard to the governing of flood risk, by a lack of empirical studies that clearly link micro, meso and macro levels.

1.3 Purpose and research questions

The purpose of this thesis is to increase our understanding of how complex sustainability challenges become governmentalized in advanced liberal democracies; specifically, the processes through which they become governable at the societal level. Achieving this purpose relies upon an empirical investigation of the recent problematization of one such issue in a particular context. This thesis, therefore, sets out to answer the following two research questions:

RQ1: How is flood risk mitigation governed in Sweden?

RQ2: How is the process of governmentalization conditioning the governing of flood risk mitigation in Sweden?

1.4 Limitations

There are three, noteworthy limitations concerning the scope of the research, and, thus, its applicability, which are important to keep in mind.

Most fundamentally, *governmentality* should only be understood in the context of what Rose (1996a) refers to as "advanced liberal democracies", and is not suitable for other kinds of societies (Joseph, 2010). Neither the methodology nor conclusions are applicable outside this type of country, where power is distributed, and people are not only governed directly from above, but also through their own choices as free and responsible actors (Miller and Rose, 2008).

It is also crucial to consider the history and context of Sweden—a former epitome of the strong welfare state—which complicate any generalization even among the relatively few advanced liberal democracies in the world. The knowledge that is developed in this thesis should, therefore, not be generalized to other situations without a conscious reflection on contextual and historical similarities and differences (Greenwood and Levin, 2007: 70). This is most feasible among the Nordic countries, which share relatively similar pasts and presents. However, I argue in this thesis that the constituent processes of the governmentalization of flood risk mitigation are inherent parts of the governmentality intrinsic to advanced liberal democracies in general, but might be active to various degrees, and in different ways, depending on the context.

I make the same argument concerning the second limitation. The empirical investigation specifically focuses on the governing of flood risk mitigation in the municipality of Lomma and the Höje Å catchment area, while the purpose of the thesis is to contribute to our understanding of the governmentalization of complex sustainability challenges in general. Although any generalizations must pay attention to the specificities of the sustainability challenge and context, as for different advanced liberal democracies, I argue that the constituent processes are likely to be active—again to various degrees, and in different ways—regardless of the challenge and the context.

Finally, the empirical investigation only includes individual actors who make an active contribution through their role in some kind of organization. They include a broad range of formal actors—municipal politicians, consultants, civil servants at regional and national level, key landowners, construction entrepreneurs, researchers, etc., but private citizens are excluded. While it is obvious that private citizens do contribute—through what they do and do not do within their households, how they influence each other, how they voice their concerns, or not, etc.—this thesis focuses on how formal actors

govern flood risk mitigation together. It is otherwise completely inclusive of all individual actors actively contributing. It also includes other actors who these actively contributing actors depend on for some input, but who are not contributing actively themselves or cannot be interviewed. It is this network of formal actors that, together, govern flood risk mitigation.

1.5 Overview of thesis

This doctoral thesis is a compilation thesis consisting of four scientific journal articles and a preceding part that provides a summary and a synthesis of the research as a whole. The four articles—referred to as Papers I to IV—all focus on the same case, and provide different findings that together combine to answer the research questions and meet the purpose of the thesis. The table below offers an overview of the papers, and summarizes the methods, sources and key findings of each (Table 1).

In addition to these four papers, the thesis comprises six chapters that follow a rather conventional structure. The first chapter is the *introduction* you are currently reading, which presents the motivation for the research problem, and the purpose, research questions, and limitations of the thesis. This chapter also frames the problem in relation to previous research, and states the knowledge gap I attempt to address. The second chapter presents the underlying *theoretical framework*. It clarifies the conceptual foundations, and presents the applied theoretical perspectives: governmentality and new institutionalism. The third chapter presents the *methodology and methods* that are applied to answer the research questions. Here, a single case study provides the framework within which structural and interpretative approaches are combined to investigate how the mitigation of flood risk is governed in contemporary Sweden, as well as how it has become governable. The fourth chapter outlines the *empirical contributions*; it presents the key findings of the appended papers. The fifth chapter is a *discussion* of the central aspects of the governing and governmentalization of flood risk mitigation in Sweden, as well as what that suggests for the governmentalization of complex sustainability challenges in general. Finally, the sixth chapter presents the *conclusions* of the overall thesis, with a focus on the answers to the research questions and its contributions to closing the knowledge gap. This chapter also includes a brief outline of the potential implications of the study, and some ideas for future research.

Table 1. Overview of scientific journal articles (Papers I to IV).

Methods	Sources	Key findings
Paper I: Fragmentation, commodification and responsibilisation in the governing of flood risk mitigation in Sweden		
- Structured interviews/social network analysis - Qualitative interviews and document analysis/ genealogical analysis	- 35 participants; all individual actors actively contributing in Lomma municipal administration	- Multiple fragmentations of flood risk mitigation - Commodification of flood risk mitigation practices - Responsibilization of the municipal administration
Paper II: Dependence, trust, and influence of external actors in municipal urban flood risk mitigation: the case of Lomma Municipality, Sweden		
- Structured interviews/social network analysis	- 35 participants; all individual actors actively contributing in Lomma municipal administration	- Horizontal disconnect between municipalities - Vertical disconnect between municipal and national level, where private companies fill the gap.
Paper III: Tightly coupled policies and loosely coupled networks in the governing of flood risk mitigation		
- Structured interviews/social network analysis - Qualitative interviews/ interpretative analysis	- 143 participants; all individual actors actively contributing in Lomma, Lund and Staffanstorp municipal administrations	- Concurrent integration and separation of the implementation of relevant policy areas - Directional separation of institutionalization causing decoupling
Paper IV: The problem of fit in flood risk governance: regulative, normative, and cultural-cognitive deliberations		
- Structured interviews/social network analysis - Qualitative interviews/ interpretative analysis	- 217 participants; all individual actors actively contributing in the Höje Å catchment area	- Fragmented governing of flood risk mitigation between municipalities - Fragmentation in planning practices within municipalities

Theoretical framework

This chapter provides conceptual clarifications and presents the theoretical perspectives used in this thesis. It elaborates on flood risk and flood risk mitigation, on governing and the governmentality perspective applied in this thesis, and on institutionalization and the perspective of sociological new institutionalism that is also central to meeting the purpose of the thesis. It ends by presenting how governmentality and new institutionalism perspectives can be combined to provide the theoretical foundation for a relational study of the governmentalization of flood risk mitigation.

2.1 Flood risk and its mitigation

This thesis is about the governing of flood risk mitigation. *Flood* can be simply defined as "the temporary covering by water of land not normally covered by water" (EU, 2007: 29), but the underlying processes are complex (Alexander, 1993; White, 1945). Floods may be slow and gradual, or rapid and sudden, they may be over as quick as they came, or last for months (Evans, 2005; O'Grady et al., 2011). There are at least five main types (Table 2), and any particular flood event may be a combination of two or more (Becker, 2014: 60–64).

Globally, flood is the most frequent natural hazard (CRED, 2020). Analysing any hazard requires data related to its location, spatial extent, speed of onset, duration, frequency or likelihood, and magnitude or intensity (Coppola, 2011). It is important to examine the factors that contribute to the hazard, as these may be connected to, and intensified by, human activity (Hewitt, 1983; Kates et al., 1990; Mileti, 1999). At the same time, it is important to note that floods are vital for wetlands, biodiversity, certain farming practices, etc., which makes the governing of flood risk mitigation particularly challenging (Becker, 2014).

Table 2. Types of floods (Becker, 2014: 60–64).

Type of flood	Description
Pluvial flood	caused by insufficient drainage from local topographical lows
Fluvial floods	caused by too much water in a watercourse
Coastal floods	caused by storm surge or sea level rise
Groundwater flood	caused by rising groundwater
Breaching flood	caused by water breaching natural or man-made retention barriers

Risk is a more controversial concept. The various definitions create potential for miscommunication and misunderstanding (Aven and Renn, 2009; Fischhoff et al., 1984; Rosa, 1998). In everyday language, the term *risk* often denotes a destructive incident that may or may not occur (Sjöberg and Thedéen, 2003). Although scholars use the term more precisely, definitions vary significantly (cf. Aven and Renn, 2009; Lupton, 2013; Zinn, 2008; Zinn and Taylor-Gooby, 2006). Here, risk is defined as uncertainty about what could happen, and what the consequences would be (Aven and Renn, 2009). Although consequences, in principle, can be either positive or negative, here, they are solely seen as negative, in contrast to their positive counterpart, opportunity (Renn, 2008: 2).

It is important to note that there is nothing objective about risk (Wynne, 1982a, 1998), since any notion of it is based on perceptions (Slovic, 1987), is culturally mediated (Douglas and Wildavsky, 1983), and can be socially amplified (Kasperson and Kasperson, 1996). It is, thus, socially constructed and does not exist ontologically (Aven and Renn, 2009: 8–10; Renn, 2008: 2–3; Slovic, 1992: 119). However, what does exist are actual events that produce consequences that human beings experience, interpret and take into account when making sense of the present and envisaging the future (Becker, 2014: 133–134; Renn, 2008: 2). Few could dispute that people are actually harmed or even killed in accidents, disasters or by pollution (Shrader-Frechette, 1991: 30). This is in line with Foucault's (1983: 66–67) idea, which is fundamental to the governmentality perspective described below, namely, that focusing on the problematization of phenomena "is not a way of denying the reality of such phenomena" since the "problematization is an "answer" to a concrete situation which is real". These direct or indirect experiences create a link between risk, as a social construction, and reality (Renn, 2008: 2); meaning that it is vital not to mix ontology and epistemology in this context (Rosa, 2010).

There is widespread agreement that flood risk emerges at the intersection of hazard and vulnerability (Wisner et al., 2004). In other words, it must be possible for a location that is dry in everyday circumstances to become submerged, and it must harbour something human beings value that might be negatively affected by the water. Vulnerability is determined by multiple factors (Hearn Morrow, 1999; Wisner et al., 2004: 49–84), and is more closely linked to human activity (Hewitt, 1983: 24–29; Oliver-Smith, 1999) than flood hazard (Mileti et al., 1975). Floods are, therefore, not discrete, unfortunate, and detached from ordinary societal processes, but are instead intrinsic products of everyday human-environment relations over time (cf. Fordham, 2007: 25; Hewitt, 1983; Oliver-Smith, 1999).

Mitigation is, here, broadly defined as comprising all proactive activities that reduce the likelihood of flood events and/or their consequences before their occurrence (Coppola, 2011), but excludes preparedness for effective response and recovery. Flood risk mitigation addresses thus flood hazard, vulnerability to its impacts, or both. Although many studies focus on vulnerability (e.g. Brouwer et al., 2007; Colten, 2006; Tapsell et al., 2002), most work on flood risk has traditionally focused on hydrology and technical solutions (Burton et al., 1993; Cook et al., 2016).

There is essentially complete scientific consensus that the processes of the hydrological cycle are continuously circulating and redistributing water on, above, and below the surface of the Earth (Davie, 2008; Freeze and Cherry, 1979). Several of these processes are influenced by human activity—such as land use change, water use, the construction of dams, changes in the atmospheric composition—and are attracting intense scientific attention (e.g. Bradshaw et al., 2007; Bronstert, 2004; Held and Soden, 2006; Molden et al., 2007; O'Connell et al., 2007). This bias towards the physical is particularly pronounced in scientific studies of climate change, which usually emphasize climate conditions at the expense of social, cultural and economic processes (Parsons and Nalau, 2016); enough to suggest a burgeoning *environmental determinism* (Hulme, 2011; Liverman, 2009). On the other hand, a focus on a narrow definition of Durkheim's (1982) social fact (at least partly driven by an aversion to the latter environmental determinism) has led much of mainstream sociology to adopt a form of *human exemptionalism*, which assumes that human beings are independent of environmental influences and constraints (Dunlap and Catton, 1979, 1994). Neither environmental determinism nor human exemptionalism provide a firm foundation for explaining and understanding society in general, and comprehending and addressing flood risk in particular. Instead, it is important to link the social and the physical (e.g. Buttel, 2002; Dunlap, 2002; Foster, 1999; Hannigan, 2006; Lockie, 2015; Sorokin, 1928), especially in relation to flood risk (Colten, 2006; Hall et al., 2003; Renn, 2008).

It makes little sense to examine flood risk mitigation and its governing without considering how water flows in the landscape. The essential entity for understanding and governing flood risk is therefore the *catchment area* (Niemczynowicz, 1999: 12), which delimits the boundary for the flow of both surface water and groundwater (Kinzelbach et al., 1992). A catchment area can be simply defined as an area within which all water eventually ends up in the same place (Davie, 2008). The concept is fundamental to risk, regardless of whether floods are caused by overflowing rivers (fluvial floods) or by

inadequate local drainage (pluvial floods). It is just a matter of catchment scale. Similarly, coastal floods are largely determined by topography. The main difference is that they are not caused by rainfall in the catchment area, but by seawater being pushed over land until it reaches a certain altitude (Becker, 2014: 61–62), creating a differential catchment area depending on the height of the water level above normal.

2.2 Governing and governmentality

The governing of risk has been approached from many perspectives (e.g. Cedergren and Tehler, 2014; Hood et al., 2001; Renn, 2008; van Niekerk, 2015). Although it is commonly called *risk governance* (Aven and Renn, 2010; Renn, 2008), or sometimes the *government of risk* (Hood et al., 2001), here it is referred to as the *governing of risk*. This is because g*overnance* is commonly contrasted with *government*. The latter refers to a hierarchy of governing political institutions or, at least, activities backed by formal authority, while the former denotes distributed, networked modes of governing that are more suitable to the context of this thesis (Rhodes, 2007; Rosenau, 1992). It is also common to describe a shift from government to governance in modern western societies (Blatter, 2003; Milward and Provan, 2000). This distinction is, however, complicated by governmentality scholars who use *government* to describe all efforts to govern people, regardless of context, but also describe a fundamental transformation in the modes of governing in advanced liberal democracies (Dean, 1996; Foucault, 1982, 1991a; Rose, 1999). To overcome this conceptual impasse and ensure clarity, *governing* is used throughout this thesis, while drawing on complementary theories of governance and governmentality, though at first appearing like strange bedfellows (Bevir, 2011).

Foucault's contributions to the study of governing and power are so original—so striking in their importance for our thoughts and practices as social scientists—that his work has caught attention not only in sociology, but also in political science (Brass, 2000), human geography (Rutherford, 2016), and a range of other disciplines (Miller and Rose, 2008: 14). In his seminal lecture series at the Collège de France in 1977–78, he elaborated on a genealogy of the modern state—from ancient Greece to contemporary western neoliberalism—focusing on shifts in forms of power and the emergence of a new mode of governing (Foucault, 2007). In his work, he argues that the direct coercive power of the sovereign has not disappeared in advanced liberal democracies, nor has the power of disciplinary institutions been relinquished. They have simply been complemented by a new form of

power that penetrates further into the lives of the human beings being governed. Foucault introduces the notion of *governmentality* to describe this new mode of governing, and the process through which it emerged (Foucault, 1991a). Governmentality is, then, how governing is done in advanced liberal democracies (Joseph, 2010; Miller and Rose, 2008) where free individuals control, determine and delimit the liberty of others (Foucault et al., 1987: 130–131). This semantic unification of governing (*gouverner*) and modes of thinking (*mentalité*) stipulates that it is meaningless to study the technologies of governing without also considering the rationalities underpinning them (Lemke, 2002: 50).

Although useful as a starting point for this thesis, Rose (1999: 4–5) advocates a looser and more empirical interpretation of Foucault's work. Foucault's initial sketch of governmentality was extended by his colleagues in Paris, who focused on risk as a central technology and rationality for governing the self and society (Donzelot, 1979; Ewald, 1991). However, this thesis is not primarily about *risk as governmentality*, but the *governmentality of risk*. It is, thus, more aligned with another strand of governmentality research that takes its cue from the influential work of Dean (2010), and Rose and Miller (Miller and Rose, 2008; Rose and Miller, 1992). These scholars provide guidance regarding how to conduct a localized empirical investigation—not only of how flood risk mitigation is governed in a particular context, but also how it has become something that is governed in the first place.

Governing is, in this context, defined as the "conduct of conduct" (Dean, 2010: 17); the situated activities undertaken by various actors, employing a range of technologies and rationalities, seeking to shape conduct by influencing the beliefs, interests, desires, and aspirations of others, as well as themselves, for specific but shifting objectives and with relatively unpredictable outcomes (Dean, 2010; Rose and Miller, 1992). It thus entails governing both others and the self, and is based on a rather eloquent play between the French verb *conduire*—to lead or drive—and its reflexive form *se conduire*—to behave or conduct oneself (see Foucault, 2007: 257–258). *Rationalities* refers to modes of thinking; ways of rendering reality thinkable in such a way that it becomes amenable to analysis and action. *Technologies* refers to all people, techniques, tools, definitions, equipment and other resources that enable actors to envisage and act upon the conduct of others, individually and collectively, and often at a distance (Miller and Rose, 2008). Thus, investigating how flood risk mitigation is governed requires studying the regime of practices comprising the rationalities and technologies through which that is done (Dean, 2010: 40–44); the sets of fairly coherent, organized,

routinized, and ritualized ways of thinking and doing in a certain situation, at a certain time, and in a certain place (Dean, 2010: 31). It requires, in other words, studying the set of *institutionalized* ways of thinking and doing flood risk mitigation.

Governmentality has proven to be a useful heuristic when studying the governing of a range of risks (O'Malley, 2008), including flood risk (e.g. Butler and Pidgeon, 2011; Demeritt and Nobert, 2014). However, in contrast to traditional risk management, the governing of risk concerns situations where there are many actors, multiple and often conflicting values, and no single authority that can make binding decisions (Aven and Renn, 2010; Renn, 2008). It involves the perspective that flood risk mitigation is jointly governed by a network of actors (Folke et al., 2005; Renn, 2008), who are dependent on various resources and affected by the decisions and actions of others (Becker, 2014). These social relations are not only formed because actors are dependent upon each other for some resource, but also when they convince each other that their problems or objectives are shared or linked, and can be addressed by working together (Miller and Rose, 2008).

Regardless of how social relations are formed, once established, they denote a kind of dependence (Luhmann, 1979). The investigation of governing requires paying attention to complex interdependencies that enable governing practices to act upon the concerned places and actors (Miller and Rose, 2008: 33). This is especially relevant as the patterns of social relations among actors in these "networks of rule" (Rose and Miller, 1992: 189) are fundamental to society's capacity to reduce risk (Ingold et al., 2010). Since the governing of flood risk mitigation entails a "complex web of actors, rules, conventions, processes and mechanisms" (Renn, 2008: 9), studying it requires an expansion of Foucault's first notion of governmentality—as an assemblage of "the institutions, procedures, analyses and reflections, the calculations and tactics" (Foucault, 1991a: 102)—to an even more comprehensive conception of regimes of practices that also includes networks of involved actors (Miller and Rose, 2008: 34–35). This approach overcomes the institutionalist critique of Foucault's denial of the subject and his insistence on delocalizing discourse and power (cf. Friedland and Alford, 1991: 254).

2.3 Institutionalization and new institutionalism

The governmentality perspective introduced above suggests that the current regime of practices of the governing of flood risk mitigation is neither static, nor predetermined, but contingent and historically constituted (cf. Dean, 2010: 50). While Foucault's own analysis can be criticized for unhinging

governmentality from any particular institutional configuration (Friedland and Alford, 1991: 254), the empirically oriented utilization of governmentality developed in this thesis puts more emphasis on the importance of actors in the *institutionalization* of practices. The latter can be understood as the process through which a practice becomes a convention or expectation, and even taken for granted among particular actors in particular situations (Meyer et al., 1987: 13). To do so, the thesis draws upon *new institutionalism*; another influential school of thought in sociology and other disciplines (Scott, 2014) that has been suggested as an important complement in the study of social-ecological interactions (Hotimsky, Cobb, & Bond, 2006).

New institutionalism grew out of a sociological critique of early influential organizational theorists'—such as Weber's (1978) and Taylor's (1919)—notion of organizations as closed self-sufficient instruments for rational goal-oriented action (Johansson, 2002; Scott, 2014). By reacting to another strand of critique—showing that organizations are not only structured by internal factors, but also external factors, and that they adapt to environmental changes not only passively, but also actively in a strategic and goal-oriented manner (Hillman et al., 2009; Thompson, 1967)—early new institutionalists effectively debunked the myth that organizations are structured and functioning only for rational goal-oriented efficiency (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). Regardless of how common such ideas still are in society, new institutionalism demonstrates that organizations are also structured by institutional rules (DiMaggio and Powell, 1991; Scott, 2014), which can be regulative (e.g. legislation, policy), normative (e.g. norms, expectations) or cultural-cognitive (e.g. schema, frames) (Scott, 2014). While different scholars place different weight on the importance of each of these three elements, most empirical studies observe them in combination, and when all three are aligned, their combined force is most formidable (Figure 2) (Scott, 2014: 70–71); regardless of whether the resulting regime of practices is efficient or not (DiMaggio and Powell, 1983).

In this thesis, an *institution* is defined as comprising "regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" (Scott, 2014: 56). Institutions are socially constructed templates for action that are generated and maintained through ongoing social interaction (Meyer and Rowan, 1977: 346; Zucker, 1977: 727–728). Although generally persistent, they are both constituting and being constituted by the actions of actors who have the potential to innovate, act strategically and, thus, contribute to institutional change (DiMaggio, 1991; Oliver, 1991; Scott, 2014). Institutions and actions are,

therefore, inextricably linked, and *institutionalization* is best understood as a dynamic, continuous process (Barley and Tolbert, 1997).

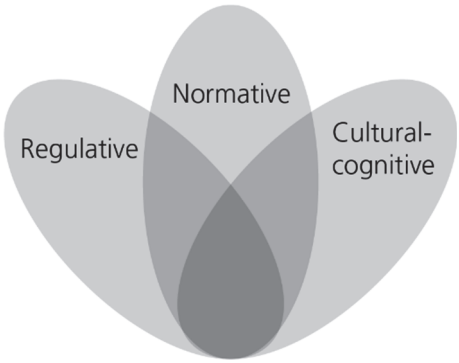

Figure 2. Types of institutional elements.

Regardless of the fundamental importance of agency in the process of institutionalization, there are generally similarities in how actors organize within particular organizational fields (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). Such *isomorphism* is driven by coercive, normative, and mimetic pressures (DiMaggio and Powell, 1983). Regulative elements of legislation and policy are *enforced* through formal authority and sanctions, normative elements, such as expectations, obligations and identities, are *imposed* through norms and moral sanctions, and cultural-cognitive elements, such as ideas and predispositions, are *acquired* through imitation and learning (Scott, 2014).

Practices form the intrinsic basis for institutions (Barley and Tolbert, 1997). But institutions are also conveyed by different types of "carriers" (Jepperson, 1991: 150–151) that are given more or less weight by different institutionalist scholars (Scott, 2014: 95). Symbolic carriers encompass the legislation, policies, values, norms, frames, and schemas that make up the core of regulative, normative and cultural-cognitive elements. Relational carriers are seen in the patterns of social relations among actors (Strang and Meyer, 1993). These patterns are not only fundamental because they are potential paths for the transmission of institutional elements, but they are also observable indicators of institutions themselves (Scott, 2014: 174–176). Finally, *artefacts* are a third type of carrier of institutions (Scott, 2014: 102–104). An artefact is defined as an object that is intentionally made for certain purposes (Hilpinen, 2011). It embodies both technical and symbolic elements (Suchman, 2003: 99), and may have relational effects (Lupton, 2014). That is to say that artefacts may have fundamental material aspects at the same time as their meaning may vary,

and could influence how actors interact with each other. They are, thus, partly socially constructed through the different meanings that actors attach to them. However, Orlikowska (1992) argues convincingly that artefacts tend to become reified and institutionalized, severing the link with their original purpose and meaning, and becoming part of the institutional properties of the situation through their habitualized and routinized use. It is important to note that artefacts do not determine institutions by themselves, but rather provide the circumstances for structuring them (Barley, 1986; Scott, 2014: 177).

Many institutionalist scholars have contributed to our knowledge of the foundations and direction of institutionalization (Scott, 2014). Stinchcombe (2000) was one of the first to suggest the importance of initial social conditions over time, and others point out the significance of a few decisive events at the national (Scott, 2014) or even global level (Drori et al., 2006). However, it has repeatedly been shown that the agency of actors has a more central influence on the institutionalization of regimes of practices than these accounts suggest (e.g. Johnson, 2007; King and Pearce, 2010; Migdal-Picker and Zilber, 2019; Schneiberg, 2007).

Rather than looking for an explanation based solely on a few, macro-level conditions and events, van de Ven and Garud (1994) suggest paying attention to the many micro-level events in which actors who are faced with a new situation coinvent ways to deal with it. They argue that after a period with behavioural variation, as actors test and adjust activities as they go along, some patterns of activities are increasingly preferred over others (rule-making events) until they dominate and become the convention (rule-following events). Actors thus coinvent and update practices together, with significant costs in terms of time, energy and resources. North (1990) calls this *large setup costs*, and uses the notion of *increasing returns* to explain why systemic flaws in current practices are not addressed, even when they are obvious (Figure 3). He emphasizes the role of incentives and argues that flawed practices continue because further work in the same direction continues to be rewarded, while the costs of changing to an alternative increase over time (Scott, 2014). This is particularly common in contexts where feedback is fuzzy and evaluations are subjective (North, 1990). The status quo is maintained due to a combination of three factors (North, 1990): (1) actors are reluctant to consider alternatives after having invested time and energy in learning current practices (learning effects); (2) the contribution of each actor is facilitated by all actors following the same practices (coordination effects); and (3) new actors are motivated to adopt current practices as they appear to be commonly accepted (adaptive expectations).

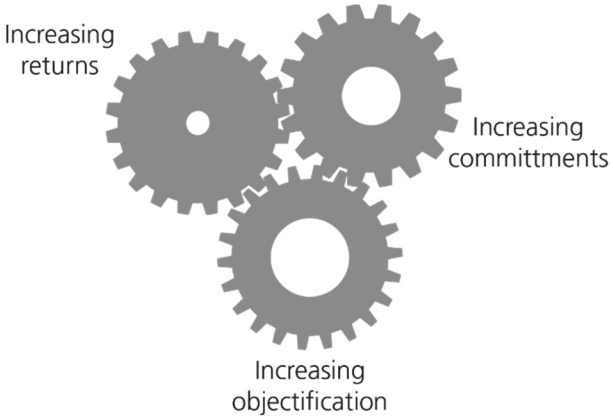

Figure 3. Mechanisms of institutionalization (see Scott, 2014: 144–151).

Selznick (1992: 232) suggests that it is not only through incentives that institutions are holding actors hostage to their own history, but also through their normative order that is both constituting and being constituted by actions over time. This is commonly associated with the idea of *increasing commitments* (Figure 3) and notions of *this is the way we do it*, often in relation to the identity and common practices of particular professional groups (Scott, 2014: 145–148). Although closely related to coordination effects (North, 1990), such normative expectations are invaluable as they "reduce the need for constant negotiation of expectations and behavioural contracts" (Handmer and Dovers, 2007: 30); but can also bind actors to flawed practices.

Institutionalization can also be driven by the *increasing objectification* of particular aspects of the regime of practices (Figure 3) (Berger and Luckmann, 1966). This is associated with notions of *this is how it is done*, which is a typical indicator of more cultural-cognitive elements of institutionalization (Berger and Luckmann, 1966: 77; Scott, 2014: 148). Here, it does not relate to incentives or identity, but is about the objectification of shared ideas. Objectification involves the development and diffusion of a certain degree of consensus among actors concerning the meaning and value of an idea, where the diffusion shifts from imitation to routinization; often connected to an increasingly normative base that leaves less and less room for alternative views (Tolbert and Zucker, 1996: 182–183). These shared ideas thus thicken and harden when diffused (Berger and Luckmann, 1966: 76), not only among newly incorporated actors, but also for those who are already subscribing to the particular understanding.

2.4 Studying governmentalization

This thesis examines how a complex sustainability challenge becomes an issue that requires governing on the societal level in advanced liberal democracies; here referred to as becoming governmentalized. Although the Oxford English Dictionary (2020) defines *governmentalization* as the "process of bringing something under the control or supervision of a government", it is used here in relation to the more distributed notion of governing that is outlined above. The concept of governmentalization is central in Foucault's (1991a) original work on governmentality. He uses it to describe an escalation in the capacity for governing in advanced liberal democracies, which is less about the state taking over society (*étatisation*) and more about the introduction of regimes of practices that shape the conduct of conduct among and between various actors. Governmentalization is, therefore, understood as a particular process of institutionalization that turns an issue into something that is governable on the *societal level*.

The purpose of this thesis consequently requires explicit attention to the institutionalization of current regimes of practices of governing risk in advanced liberal democracies. Hence, motivating a careful combination of governmentality and new institutionalism advocated by Lim (2011). Governmentality has proven to be a useful heuristic for grasping the complexities of governing sustainability, in general (e.g. Lövbrand et al., 2009), and water issues, in particular (e.g. Vos and Boelens, 2014). It emphasizes the underlying rationalities behind why something becomes institutionalized, but is less well suited to describe the mechanisms of institutionalization. New institutionalism, on the other hand, focuses explicitly on understanding these mechanisms, but has been criticized for not taking the analysis of *why* something becomes institutionalized far enough (Cooper et al., 2008). In short, governmentality perspectives mainly address how issues are constructed as governable (Dean, 2017: 2), while new institutionalism examines how governing is institutionalized (Scott, 2014).

Combining perspectives always runs the risk of provoking theoretical purists, but O'Malley (2008: 68–69) advocates pragmatism. This highly influential sociologist of governmentality and risk argues convincingly that governmentality perspectives are both theoretically and methodologically flexible. They can be articulated with a sociological analysis, if that suits the purpose. He even suggests that such cross-fertilization could be used to overcome common challenges. Johansson (2009) notes a similar eclecticism among institutionalist scholars in Sweden. This thesis draws, therefore, on the

respective strengths of each of these two theoretical perspectives, in an attempt to offset their respective weaknesses.

There are both areas of agreement and controversy between new institutionalism and the original Foucauldian idea of governmentality (see Power, 2011). However, their combination is facilitated by corresponding developments that have emerged in each of the two theoretical perspectives over the years.

The most persistent institutionalist critique of Foucault, and his more orthodox followers, concerns the lack of attention to actors (Friedland and Alford, 1991: 253–254; Power, 2011). While it could be argued that Foucault was never interested in action *per se*, rather the conditions under which actors are constituted (Power, 2011: 48–49), this critique is bypassed by influential governmentality scholars who explicitly introduce networks of actors into regimes of practices (Miller and Rose, 2008: 34–35). It is also important to note that many early contributions to new institutionalism are open to a similar critique in the "rhetorical defocalization of interest and agency" that DiMaggio (1988: 3) pointed out before introducing a more explicit focus on agency that has become common since then (e.g. Barley and Tolbert, 1997; DiMaggio, 1991; Johnson, 2007; Meyer, 2010; Migdal-Picker and Zilber, 2019; Oliver, 1991; Schneiberg, 2007). Investigating governmentalization in this way gives agency a prominent position in the analysis, regardless of past critiques of the two theoretical perspectives.

In addition to the explicit focus on agency, DiMaggio (1988) elaborated on notions of interest and power (King and Pearce, 2010; Meyer, 2010; Oliver, 1991). Institutionalization is seen as a profoundly political process that reflects the relative power of actors who mobilize around organized interests (DiMaggio, 1988: 13). However, the intrinsic link between actions and institutions introduces significant path dependency into processes of institutionalization (Schneiberg, 2007). This means that exercised agency and power in the past restrict and enable present agency and power (cf. Emirbayer, 1997: 294), through symbolic (regulative, normative, cultural-cognitive), relational, and artefactual means. It is here that the link is made with governmentality perspectives. While governmentality perspectives usually resist questions of possessions of power (Dean, 2010: 16–17), they focus on this more distributed power that is productive of meaning, processes, and objects (Miller and Rose, 2008: 9). This Foucauldian notion of power can be linked to DiMaggio and Powell's (1991) relaunch of new institutionalism as not only focusing on regulative- and normative elements, but also on cultural-cognitive elements (Power, 2011: 50). This shift towards emphasizing taken

for granted assumptions, habits, and routines echoes governmentality scholars' notion of the intrinsic link between technologies and rationalities of governing. Furthermore, DiMaggio (1991) argues that agency, interests and power are most apparent and amenable to study during the formation of a new institutional field. This is consistent with the advice from influential governmentality scholars to study problematizations (Dean, 2010). Thus, studying governmentalization requires paying attention to both technologies and rationalities; to the rules and regulations, strategies and plans, relations and networks, borders and boundaries, and procedures and tools, along with the norms and ideas that afford their meanings and motivations.

As in all social inquiry, governing and institutionalization can be addressed on different levels (Schneider, 2012; Scott, 2014: 104–107). Although governmentality perspectives rarely make an explicit issue of linking micro-, meso- and macro-levels of analysis, Miller and Rose (2008) suggest that any analysis of governing should begin with the practices of governing themselves. In this context, it is important to remember that flood risk is inherently local, and that governing its mitigation is intrinsically linked to hydrological catchment areas (see Section 2.1). The analysis of the regime of practices must, therefore, be equally localized, although not geographically but functionally delineated.

Numerous studies have looked at the governing of flood risk and other water-related issues (e.g. Guerrin et al., 2014; Lebel et al., 2013; Norén et al., 2016; Pahl-Wostl et al., 2012; Sayles and Baggio, 2017; Widmer et al., 2019). However, this literature is overwhelmingly focused on the institutional (macro) level, or on the interaction between organizations (the meso level), while little or no attention is paid to the level of the acting and interacting individuals who constitute organizations and reproduce institutions (the micro level). While there is a longstanding debate among sociologists about whether it is more appropriate to study either the micro or the macro level (Alexander and Giesen, 1987) here, they are seen as inseparable (Berger and Luckmann, 1966; Bourdieu, 1977; Elias, 1978; Foucault, 1995; Giddens, 1984). The current investigation of the governmentalization of flood risk mitigation thus attempts to link the micro, the meso, and the macro. The aim is to make explicit what is often implicit in conventional governmentality perspectives (cf. O'Malley et al., 1997; Power, 2011: 40).

Emirbayer (1997) suggests that a relational perspective is indispensable for linking micro, meso, and macro levels, as it makes it possible to reconceptualize distinct *sui generis* levels of analysis on a continuum that runs from interacting individuals to society. Governmentality is fundamentally

relational (Emirbayer, 1997; Flyvbjerg, 1998; Lemke, 2015; Power, 2011), and new institutionalism is conceived in relational terms (DiMaggio, 1992; Emirbayer and Mische, 1998: 983; Migdal-Picker and Zilber, 2019; Tolbert and Zucker, 1996). However, it is important to note that there are different empirical approaches to this relationality. Formal structural approaches represent social relations that are analysed using graphical or mathematical methods (Berkowitz, 1982; Wellman, 1988). Interpretative approaches study instead their meaning and context, either elicited from accounts and observations of involved actors (Denzin, 1969; Goffman, 1982; Joas, 1987) or from their imprints recorded in historical and contemporary documentation (Dean, 2010; Garland, 2014; Power, 2011). Although this division has often been defined by disagreement (Emirbayer and Goodwin, 1994)—such as the debate between Brint (1992) and White (1992)—it is only through their combination that the relational perspective can become whole (Crossley, 2010; de Nooy, 2003; DiMaggio, 1992; Fuhse and Mützel, 2011; Nadel, 1957; White, 1997). Investigating the governmentalization of an issue thus requires integrating structural and interpretative analyses on multiple levels (see Sections 3.3 and 3.4).

Social network analysis has been suggested as the most developed and widely-used structural approach (Emirbayer, 1997: 298). It can facilitate linking between different levels of analysis (Crossley, 2010; Granovetter, 1973), as there is no inherent or preferred level of analysis apart from the degree of abstraction currently applied (Nadel 1957, 97–124), with the only restriction being the fundamental unit of analysis in the particular study. In this case, the social relation between individual actors (see Section 3.3). The interpretative approach that is used in this thesis also focuses on connecting these levels. It is both bottom-up (Fine, 1993)—inquiring into the actions and interactions of individual actors—and top-down—examining regimes of practices in documentation recorded over time (Kearins and Hooper, 2002; Walters, 2012). This investigation of the governmentalization of flood risk mitigation thus integrates social network analysis and qualitative analysis.

Studying the governmentalization of flood risk mitigation presupposes that the involved actors can be identified. One way to start is to identify actors who are known to contribute actively to flood risk mitigation—with known, local "centres of calculation" if you like (Miller and Rose, 2008: 20)—and trace who they are dependent on in this regard (see Section 2.2). This requires the operationalization of relevant dependencies. Among the numerous types of input reported in the literature, and the many ways to categorize them, seven types were identified: reports of activities (Rowley, 1997), equipment and

material (Hoang and Antoncic, 2003), funding (Oliver, 1991), technical information (Leifeld and Schneider, 2012), rules and policy (Leifeld and Schneider, 2012), advice and technical support (Hillman et al., 2009), and pepping and moral support (Hoang and Antoncic, 2003). This list does not encompass every possible input, but is deemed sufficient to investigate dependence between actors in this context. Studying governmentalization thus entails analysing the patterns of dependencies among and between involved actors, as well as their meanings.

Dependency on input from another actor introduces the notion of *trust*, which can reduce complexity in terms of the range of actions or non-action an actor can consider (Luhmann, 1979). Trust is of utmost importance for cooperation (Gambetta, 1988), which is necessary for governing risk (Renn, 2008). Trust is a complex concept that has different definitions and uses in different disciplines (Blomqvist, 1997; Löfstedt, 2005). Here it is defined as an expectation based on incomplete knowledge about the likelihood of receiving the needed input, accompanied by incomplete control over that happening (Owen and Powell, 2006). Investigating governmentalization requires, therefore, an examination of the patterns of actors' confidence that they will receive the input they need from other actors to perform their tasks.

Dependence and trust are both related to *influence* (Gambetta, 1988; Luhmann, 1979), which denotes the capacity of one actor to affect the performance of another (cf. Oxford English Dictionary, 2020). It is obvious that being dependent on a particular input from another actor gives that actor influence over the first (Blau, 1964). However, influence goes beyond dependence (Luhmann, 1979). It includes all forms of dominance and authority (cf. Hearn, 2012), and is as such a fundamental element in the social relations between actors and plays an important role in investigating the governmentalization of flood risk mitigation.

Finally, friendship has close links with both trust (Gambetta, 1988; Giddens, 1990) and influence (Bowler and Brass, 2006). It is an important concept in sociology (see Allan, 1998; Bellotti, 2016), but is incidental to this thesis. Personal relationships are notoriously difficult to study (Bellotti, 2016), and, here, their quality is simply operationalized as a five-point scale that ranges from "do not know" to "can associate a name with a face", "an acquaintance", "know well", and "personal friend" (cf. Krackhardt and Stern, 1988).

To sum up, this study of the governmentalization of flood risk mitigation combines governmentality and new institutionalism perspectives. Although this may initially appear odd, several arguments have been put forward to

support the approach. This inherently relational endeavour requires a mix of structural and interpretative approaches, with a focus on the multifaceted social relations between actors who contribute to flood risk mitigation.

Methodology and methods

This chapter presents the methodology applied to answer the research questions and the methods used to collect and analyse data. First, it describes and provides motivations for using case study research based on a single-case design, with multiple embedded units of analysis, and on a combination of structural and interpretative analysis. Then it presents the processes of selecting the case and sources of data, and how empirical data were collected and analysed.

3.1 Case study research

Given the complexity of the research problem, this empirical study must focus on something that is more manageable than an entire society. Case study research is suitable when investigating contemporary phenomena that are difficult to demarcate in a real-world context (Yin, 2003: 13). It is appropriate for more localized and empirically oriented studies of governmentality (Dean, 2010; Miller and Rose, 2008), and has played a fundamental role in establishing the empirical basis for new institutionalism (Suddaby and Lefsrud, 2010). Case study research is thus deemed particularly apposite for the purpose of this thesis.

Case study research has been criticized for providing a weak foundation for generalizations (Flyvbjerg, 2001: 66; Hammersley, 2005: 101; Yin, 2003: 10), which is fundamental to the development of theory. While this argument is undoubtedly correct for statistical generalizations that depend on carefully selected samples to represent larger populations, it does not apply to analytical generalizations, for which it is useful (Flyvbjerg, 2001: 73–77). Case studies are, in other words, "generalizable to theoretical propositions and not to populations" of cases (Yin, 2003: 10). Although knowledge developed from one case cannot be generalized "through abstraction and loss of history and context", it may be transferred to other situations through "conscious reflection on similarities and differences between contextual features and historical factors" (Greenwood and Levin, 2007: 70). Flyvbjerg (2006) goes so far as to suggest that the context-dependence of a case should be embraced, arguing emphatically and convincingly for the importance of context-dependent knowledge in the study of human affairs. This point of view effectively turns the conventional notion—the primacy of general theoretical knowledge over concrete practical knowledge—on its head.

3.2 Demarcating a single case

Case study research can focus on one or more cases. Given the depth of inquiry, and the focus on grasping both phenomena and the context under study, this thesis examines a single case. Yin (2003: 39–42) presents several rationales for single case research designs, out of which the following three are relevant to the case-selection here. First, the governing of flood risk mitigation has, to the best of my knowledge, not been studied in this manner before. This provides an opportunity to study phenomena that have previously been inaccessible to scientific investigation. It can thus be considered, to some extent, as a *revelatory case*. Secondly, in Sweden, there are many catchment areas where towns are located along flood-prone rivers. Although there are likely to be differences in the factors determining flood risk and the collective capacity to govern it, they all function in the same legal and institutional system, with similar cultural, social, and political settings. It is thus fair to assume that there are similarities in the governing of flood risk mitigation, and the selected case may be seen, to some extent, as a *representative case*. At the same time, potential variation should not be ignored when selecting the case. Given a range of cases that are more or less similar, it is often most appropriate to select one that is deemed to be close to the end of the range (Flyvbjerg, 2006: 229). Therefore, in this thesis, the case was selected using the logic of the *extreme case* (Yin, 2003: 40–41). In this context, it should be noted that the notion of 'extreme' has less to do with the magnitude of the flood risk, and more to do with the complexity of the flood problem, since such cases "activate more actors and more basic mechanisms in the situation studied" (Flyvbjerg, 2006: 229). The selection of the actual case is presented in more detail below.

A complex flood problem is characterized by many types of floods, and significant change in terms of population growth and urbanization, the exploitation of new areas, and the densification of existing areas, across borders. Each type of flood results from different processes (Section 2.1), and it is vital to identify a case that captures this variety. This is most straightforward for fluvial floods, as the river's catchment area provides a hydrologically significant boundary. It is more complicated for coastal floods, where the topography provides a boundary for the maximum extent of floodwater up from the coastline—depending on sea level and wave height—but not often along the coast. In the absence of any natural or artificial formations—such as a cliff or a dyke—there is no hydrologically significant boundary that can delimit the governing of flood risk mitigation. The boundary is necessarily arbitrary and, for practical purposes, can be defined

as the border of the coastal municipality, where the river meets the sea. Pluvial floods can happen anywhere water collects, and groundwater floods are bounded by catchment areas. The area in question can thus be geographically delimited by the boundaries of the coastal municipality and the river's catchment area upstream (Figure 1). However, the case study focuses on the governing of flood risk mitigation within this geographical area and is therefore functionally, not geographically bounded (cf. Scott and Meyer, 1991: 117–118).

3.3 Multiple, embedded units of analysis

The theoretical framework presented above makes it clear that governing takes place, and can be studied, on multiple levels. Even when studying a single case, as demarcated above, it can entail different embedded units of analysis (Yin, 2003: 39–40). It includes in this thesis the institutional arrangements and the whole network of all actors contributing to mitigating flood risk, various kinds of groups of actors—based on organizational association, policy area, and interactional patterns—and individual actors. However, the most fundamental unit of analysis, regardless of level, is the social relation between individual actors (Borgatti et al., 2018; Emirbayer, 1997). Through these relations, interacting individuals form groups and the overall network, and reproduce institutional arrangements. The different units of analysis are in this sense nested and studying them provides different perspectives on the governing of flood risk mitigation that together combine to answer the research questions of this thesis.

3.4 Structural and interpretative analyses

The theoretical framework also makes it clear that understanding the governing of flood risk mitigation requires both structural and interpretative analyses. In other words, it is neither sufficient to only analyse the structural organization of social relations between actors, nor only the institutional context they are embedded into (DiMaggio, 1992; Nadel, 1957). Both structural and interpretative analyses are indispensable, as the strengths of each offset the weaknesses of the other (White, 1997). While structural analysis of social networks—nowadays aided by mathematics, graphical representations, and computers—has proven to be useful in identifying and investigating a wide range of patterns and processes that are often invisible using other approaches (Mische, 2011; Robins et al., 2012; Wasserman and Faust, 1994), they provide no insight into the meaning that actors ascribe to these processes (Brint, 1992). Conversely, although interpretative analysis is

known to be useful in this respect (Charmaz, 2006; Silverman, 2014), it is blind to the structural patterns and processes that are thought to be fundamental for governing risk (Folke et al., 2005; Ingold et al., 2010; Renn, 2008). Both structural and interpretative analyses, therefore, are combined to address the research questions presented here.

The question of combining qualitative and quantitative methodologies has been widely debated (Creswell and Creswell, 2005; Sale et al., 2002). Reservations are largely based on the argument that they are grounded in incommensurable epistemological assumptions; as if numbers and positivism are intrinsically linked to each other. Such oversimplification is a relic of the quantitative-qualitative debate that raged in the 1970–90s (Bryman, 1984, 1988; Sieber, 1973), since we know that numbers can also be considered as social constructions (Babones, 2015; Barnes et al., 1996; Bloor, 1991; Gorard, 2006). Providing that the same underlying assumption is maintained; namely, that all knowledge is socially constructed in context, regardless of whether it is represented by a quantitative figure or a qualitative account, there is no fundamental problem in combining the two. However, here, the aim is not to pinpoint an underlying pattern—as in classical triangulation—but to use them to complement each other and overcome their respective weaknesses (Small, 2011) by addressing distinct, but intersecting queries (Mason, 2006: 9–10).

3.5 Selection of the case

A fundamental issue in case study research is case selection (Flyvbjerg, 2006). Following the rationale presented above, the case was selected by identifying coastal municipalities with flood-prone urban areas crossed by a river, with a catchment area comprising several municipalities. Coastal municipalities with topography and geology that amplified the risk of pluvial and groundwater floods were considered to be particularly interesting. Finally, cases where humans have had a significant impact on the hydrology of the catchment area, and with substantial ongoing urban developments, were shortlisted.

Lomma is a coastal town in southern Sweden that is experiencing extraordinary change. It is rapidly extending into new areas along both the coast and the river Höje Å, and its centre is undergoing significant densification in terms of buildings and infrastructure. Large parts of the town are exposed to either coastal or fluvial floods, or both. Its topography and geology, combined with intense and increasing rainfall, have increased exposure to pluvial floods, potentially aggravated by groundwater floods.

The risk of all these types of floods is expected to increase with climate change; coastal floods through sea-level rise and increasingly intense storms, fluvial and pluvial floods through more frequent and intense rainfall, and groundwater floods through sea-level rise and increased annual rainfall. Moreover, it is likely that climate change will cause all of these types of flood, which may occur simultaneously, to happen more often, escalating the complexity of the problem.

Finally, the hydrology of the Höje Å catchment area has been profoundly altered by human activity. Since the beginning of the 19th century, around 90% of its wetlands have been drained, and the length of the watercourse has been reduced by half through culverting and straightening (Thiere and Johansson, 2013). Upstream municipalities have also experienced widespread expansion over the past century. The extension of urban areas has increased impermeable surfaces, expanded drainage systems that convey water rapidly to the river, and increased the number and density of people, property, and infrastructure. These characteristics make flood risk mitigation in Lomma municipality and the Höje Å catchment area a suitable case for this thesis.

Although the overall Höje Å catchment area covers seven municipalities, the case is limited to Lomma and those parts of Lund and Staffanstorp municipalities that are included in the catchment area (Figure 1). This is because the parts of the catchment that are located in Kävlinge, Svedala, Skurup, and Sjöbo municipalities are hydrologically insignificant and there is insufficient human activity to alter their hydrology. This limitation does not impact the validity of the investigation of the governing of flood risk mitigation, since the excluded municipalities do not contribute to it.

3.6 Selection of sources

Given the units of analysis described above, a whole network approach to social network analysis was adopted (Borgatti et al., 2018). *All* actively contributing formal actors should be included. Since it was impossible to know from the outset exactly who contributed to the governing of flood risk mitigation, participants were selected through snowball sampling (Borgatti et al., 2018: 40; Robins, 2015: 56–57). Sampling started with ten participants in each of the three municipal administrations, who were identified as likely to contribute to the mitigation of flood risk. These individuals were working in fields such as water & sewage, planning, etc. Each participant was then asked to identify other individual actors who they depended on for input. Sampling continued until no more new participants were identified.

For each individual, a judgement was made about the likelihood that they actively contributed to the governing of flood risk mitigation. Criteria were as inclusive as possible, but the following were excluded: (1) friends and family members who gave general advice; (2) staff and subcontractors only engaged in specific technical tasks; (3) administrative staff; and (4) actors or resources that could not be interviewed (for example, people who had died or moved away). In cases of doubt, a decision was reached after asking the identified individuals about their work. There were also a few instances of participants identifying important input from groups or organizations, software, or legislation or guidelines, which were impossible to interview but still included as supporting nodes in the network.

Two potential candidates refused to participate; both were working in planning in the municipality of Lund. Nevertheless, the response rate was over 99%. One of the two only provided input to one other participant, and the other provided input to three participants. This indicated that neither played a central role, and one was peripheral. The effect of their non-participation was thus assumed to be negligible.

Snowballing produced a network of 217 formal actors who actively contributed to the governing of flood risk mitigation. They ranged from politicians to researchers and landowners, from civil servants to consultants and contractors, across municipal, regional, and national levels. This core group identified 256 other actors (or resources) that they depended on for input. This group was not interviewed because its members either did not actively contribute or could not be interviewed. It is important to note the distinction between the two groups—actively contributing actors and supporting actors—when analysing data and understanding the results.

While participants were the primary data source, the study also examined a wide variety of documentary sources. These included legislation, policies, and guidelines regulating a broad range of activities. Both past and current regulations were included. Historical and contemporary maps of the area were compared to investigate spatial and temporal patterns of flood risk. A range of municipal strategies were reviewed, along with the comprehensive plans prepared by the three municipalities. Detailed development plans that had not been approved by the County Administrative Board were particularly interesting. Finally, to deepen the analysis, all available comprehensive plans for Lomma (from 1990, 2000, and 2010), as well as all 176 detailed development plans that were in force at the time the research (dating from 1932 to just months earlier), were studied.

3.7 Data collection

Social network data were collected through structured interviews guided by questions related to various attributes (the individual's organization, gender, age, work experience, and education) and ties to the other formal actors they had identified. Dependency between actors was operationalized as the importance of seven types of input (Section 2.4), rated on a five-point Likert scale ranging from 'not at all' (0) to 'extremely important' (4). Participants were also asked to rate their level of trust that they would receive the input they needed from each identified actor (on a similar Likert scale, ranging from 'no trust' to 'full trust'), and to rate the level of influence these actors had over their own ability to contribute to mitigating flood risk (from 'no influence' to 'extremely significant influence'). Participants were also asked to describe their relationship with each identified individual, rated on a five-point scale ranging from 'do not know' to 'personal friend' (Section 2.4).

Qualitative data were collected using an open, reputational question during the interview. Participants were asked, *who, what organization, part of the organization, or type of actor, in the entire universe, they considered had the most influence over the mitigation of flood risk* in the selected case. The question was repeated until the participant ran out of ideas (no rank), or a maximum of five had been listed. Qualitative data were also collected from informal conversations during the structured interview, recorded in the form of notes.

Most interviews lasted between 60 and 90 minutes, while a few shorter interviews concerned actors who were less engaged in flood risk mitigation. All but six interviews were done face-to-face regardless of the high demand for time and resources. This was because whole network approaches are sensitive to missing data, and personal contact minimizes non-responses (Borgatti et al., 2018). Face-to-face interviews also allow for clarification of questions, and support elicitation and probing, which can improve respondent recall (Bernard, 2006; Borgatti et al., 2018). The remaining six interviews were held by telephone for logistical reasons, but all concerned peripheral actors who provided input to only one or two other actors. Around 1000 hours were dedicated to the collection of interview data, beginning with contacting participants and ending with structuring the data for analysis.

3.8 Data analysis

To be able to investigate how flood risk mitigation is governed and governmentalized in the selected case, different parts of the collected empirical data were analysed in the four papers; Paper I focuses on Lomma, Paper II looks at external actors' input to the municipal administration in

Lomma, Paper III compares the three municipal administrations, and Paper IV focuses on the entire case study area (Figure 4). This approach not only facilitated the publication of results during data collection, but also the empirical focus of each paper offers a different perspective on the two research questions. Data were analysed in different ways, depending on their purpose and the research question (Table 3).

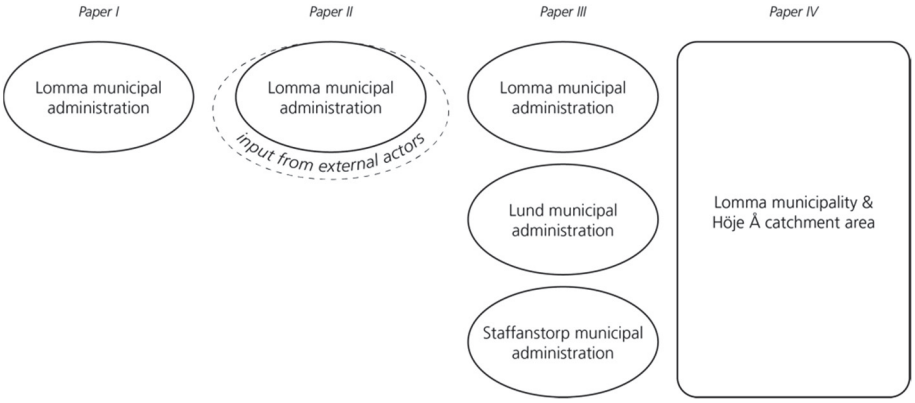

Figure 4. The empirical foci of the analyses in the four papers.

The genealogical analysis

Paper I is a combination of social network analysis and genealogy (Walters, 2012). It focuses on the governing of flood risk mitigation in Lomma municipal administration, and analyses data collected from the 35 politicians and civil servants who actively contributed to flood risk mitigation within the organization, together with a broad range of documentary sources (Figure 4).

While the social network analysis concentrated on quantitative structural data, described in detail below, the genealogical analysis used both structural and interpretative data to provide a "diagnostic of the present by 'problematizing' taken-for-granted assumptions" (Dean, 2010: 3). It therefore attempted to provide a detailed history of events that preceded the current regime of practices (Walters, 2012). The principal aim was to give perspective rather than to serve as a data analysis method, while the latter took the form of qualitative interpretative analysis of networks, interviews, and documents.

Table 3. Overview of the data analyses in the appended papers.

Type of analysis	Analysis methods
Paper I: Fragmentation, commodification and responsibilisation in the governing of flood risk mitigation in Sweden	
- Genealogical analysis	- qualitative analysis of networks - qualitative analysis of interviews - qualitative analysis of documents
- Social network analysis	- exploratory analysis and visualization - faction analysis - analyses of centrality
Paper II: Dependence, trust, and influence of external actors in municipal urban flood risk mitigation: the case of Lomma Municipality, Sweden	
- Social network analysis	- exploratory analysis and visualization - density and density ratio - QAP correlation - QAP regression
Paper III: Tightly coupled policies and loosely coupled networks in the governing of flood risk mitigation	
- Interpretative analysis	- coding and categorization of informal conversations - content analysis of the reputational part of interviews
- Social network analysis	- exploratory analysis and visualization - analyses of centrality
Paper IV: The problem of fit in flood risk governance: regulative, normative, and cultural-cognitive deliberations	
- Interpretative analysis	- coding and categorization of informal conversations - content analysis of the reputational part of interviews
- Social network analysis	- exploratory analysis and visualization - analyses of centrality

The interpretative analysis

Papers III and IV explicitly combine social network analysis and interpretative analysis. However, the following description is also relevant to Paper I, since much of the genealogical analysis followed a similar *modus operandi*. Paper III focuses on a comparative analysis of the three studied municipal administrations, notably internal interactions between actors who implemented tightly-coupled policies governing flood risk mitigation (Figure 4). Data were collected from the 143 politicians and civil servants who actively contributed to mitigating flood risk: 35 worked for the Lomma municipal administration; 88 worked for the Lund municipal administration or the VA SYD (the regional water & sewage organization that Lund is part of); and 20 worked for the Staffanstorp municipal administration. Paper IV looks at the dataset as a whole (Figure 4). The analysis focused on all 217 interviews, and sought to investigate the institutional fit between the hydrology driving flood risk and the institutional arrangements of actors engaged in its governing.

Although the interpretative analysis also proved to be a useful way to generate ideas that could be tested with social network analysis (see below), the main benefit was that it provided interpretative meaning for the phenomena under study (Bernard, 2006). Data were analysed through coding and categorization (Charmaz, 2006). The aim was not only to elicit the meaning participants gave to their various practices, but also to provide an empirical foundation for investigating how the regime of practices had become institutionalized. This was addressed by analysing *how* they described their practices; for example, by looking for descriptions of interests and incentives (*this is why we do it this way*), commitments and identities (*this is the way we do it*), and understandings and ideas (*this is how it is done*) (Scott, 2014: 144–151).

A second aspect of the analysis focused on eliciting participants' modes of thinking about influence over flood risk mitigation. This took the form of a content analysis of the data gathered using the reputational question (Bernard, 2006). Answers were categorized into perspectives, depending on what the participant saw as having the most influence over the mitigation of flood risk. The composition of these categories provided an insight into a more or less complex mode of thinking of each participant.

The social network analysis

All four papers include social network analysis. Paper I examines interaction patterns among the 35 actors who actively contributed to flood risk mitigation in the Lomma municipal administration, while Paper II focuses on

the relationship between the latter and external actors (Figure 4), based on the same 35 interviews. Paper III presents a comparative analysis of interaction patterns within each of the three municipal administrations, based on 35 interviews at Lomma, 88 at Lund, and 20 at Staffanstorp. Finally, Paper IV analyses the entire network based on all 217 interviews with individual actors contributing actively to flood risk mitigation in the Höje Å catchment area. It includes for some analysis also the 256 others supporting them with various input necessary to complete their tasks.

Social network data were analysed using the UCINET software package (Borgatti et al., 2002) and visualized with its companion suite, NetDraw. The SPSS package (IBM, 2017) was used to compare the average strength of ties between different types of actors[2]. The importance of each of the seven types of input were only analysed in Paper II. All other analyses were based on the aggregated and normalized[3] overall importance of all seven types, which produced a scale ranging from zero (no importance) to one (maximum importance) for each tie. The strength of trust and influence ties were similarly normalized to ensure coherence.

An exploratory analysis of social network data was based on visualizations and descriptive statistics. In some cases, this was based on aggregate levels of different groups of individual actors categorized, for instance, by policy area, administrative department, organization, or type of organization. More specifically, the analysis that is reported in Paper II used the density[4] and density ratio between internal and external ties[5] for each of the seven inputs to investigate the relative importance of each input from external actors, compared to input from internal actors.

In Paper I, social network data were also analysed to identify *factions*. Here, the aim was to investigate the existence of groups of actors based on their observed patterns of interaction. Faction analysis is a conventional way to identify subgroups in a network based on how actors interact in practice, regardless of their formal organizational associations (Borgatti et al., 2018). The division of actors is optimized into a set number of groups, based on the extent to which groups form separate clique-like structures (Borgatti et al., 2002). The final calculation assesses the fit of the optimization function (0 = no fit; 1 = perfect fit).

[2] Independent sample t-tests, which assumed participants' answers were independent.

[3] Total sum, divided by the maximum possible sum of 28.

[4] *Density* refers to the total of all tie strengths divided by the number of possible ties (Borgatti et al., 2002).

[5] The internal/external density ratio measures the proportion of dependence on other actors within the municipal administration, relative to dependence on external actors.

Paper II focuses not only on network and group levels, but also on associations between ties. These associations were analysed using QAP correlation, based on a quadratic assignment procedure (Borgatti et al., 2018: 147–148), which is a well-known way to look for statistically significant associations between the ties that make up the social relations between pairs of actors. In this case, dependence on the seven types of input, friendship, trust, and influence. QAP regression (Borgatti et al., 2018: 149–151) was also used to analyse both the modelled combined strength of association (R^2) and the effect of each of the seven types of input (β) on friendship, trust, and influence.

Papers I, III, and IV report the results of different centrality measure analyses. Such measures are commonly used to analyse power structurally (Scott, 2004), but have here particular meanings since the relations between actors comprise different inputs for actors to be able to contribute to flood risk mitigation. These inputs can be seen as resources that flow in the networks governing flood risk mitigation, and controlling them confers influence in the network (Brass and Burkhardt, 1992). In-degree centrality was used to capture local control over resources by summarizing, for each actor, the total direct dependence of all directly connected actors on inputs from that actor (Borgatti et al., 2018). Directional betweenness centrality was used to operationalize control over resource flows through networks. This measure captures the extent to which each actor lies on the shortest path between pairs of other actors (Brass and Burkhardt, 1992). Finally, in-eigenvector centrality was used to operationalize the influence of an actor over other influential actors in the network (Brass and Burkhardt, 1992). This measure not only considers how dependent an actor is on another actor's input, but also how dependent other actors are on them in turn.

These centrality measures were not only useful in identifying particularly important actors, but also for investigating the potential for coordination between actors across these networks. While a lack of input is an obvious sign of decoupling between parts of a network, it is also a sign of weak couplings if the actors linking otherwise decoupled parts, by receiving input from actors across such divides, are locally unimportant for the practices of the rest of the actors around them (low in-degree centrality).

Empirical contributions

This chapter presents the empirical contributions of the thesis. It draws on the four appended papers that the thesis builds on, and presents the key findings of the synthesis of the papers necessary to answer its overall research questions.

4.1 Catching up with an escalating problem

The first key findings of this investigation into the governing of flood risk mitigation concern the evolution of flood risk itself, and the problematization of it in the studied case.

Flood risk as a path-dependent problem

The results suggest that there have always been times when parts of the studied geographical area, not normally covered by water, have been flooded (Paper I). Be it from intense rainfall, an overflowing river, high sea level or waves, exceptionally high groundwater, or a combination of two or more of these factors. However, that is not to say that flood hazard has been constant throughout the ages. While climate change is expected to play an increasingly significant role in aggravating future flood hazard, the results demonstrate several other ways through which human activity has been transforming it more locally and continue to do so. Although people have lived in the area for many millennia, it is only in the past two centuries that they have substantially altered the hydrology of the landscape. Initially, this took the form of agricultural drainage systems to extend and improve farmland, increase food security and enhance economic development (19th and early 20th century). Later, this also happened through draining the extending and increasingly impermeable urban areas to make room for a growing and urbanizing population (20th century onwards) (Paper I). These changes have considerably altered hydrological connectivity. Not only has flood hazard been exacerbated as precipitation quickly finds its way to watercourses or topographical low points, but also upstream activities have had significant effects on the situation downstream (Papers I & IV).

Although these human-induced changes in flood hazard are significant, the results demonstrate changes in vulnerability that are even more critical for the transformation of flood risk in the last two centuries. Even if the town of Lomma existed at the mouth of the river Höje Å already a thousand years ago, by the early 19th century it still only consisted of about 20 houses situated along the more elevated, eastern bank (Paper I). This small population was

not significantly exposed to floods, as water could amass in uninhabited, lower zones. The start of the 20th century saw increasing industrialization. Labour was required for the new and expanding brickyards, along with other factories, and to provide all kinds of services for the growing population. By the mid-20th century, many industries had started to stagnate and close down, and the last major factory closed in the late 1970s.

However, Lomma did not only survive this decline, but has transformed itself in recent decades from a disadvantaged working-class town into an affluent seaside resort within commuting distance to several cities in the region (Paper I). People now want to live close to water, in previously unexploited areas, and Lomma has taken advantage of that and successfully attracted many wealthy citizens. Each century, the population has grown by an order of magnitude; from hundreds in the early 19th century, to tens of thousands today (Paper I). An increasing number of whom are exposed to floods along the river and coastline, as well as in local topographical low points due to lack of room for the water and insufficient urban drainage systems.

Current flood risk is largely determined by complex combinations of decisions and actions that were taken over a long period. In theory, they can be dated all the way back to the first settlers but, in practice, they mainly concern the past two centuries. Risk is thus not only constructed in the intersection of hazard and vulnerability, but essentially through the historical processes that affect them (Paper I). Moreover, previous decisions and actions limit the set of possible decisions and actions at any point in time, and increasingly over time. For instance, it was easier to decide to transform a wetland to prime farmland and control the course of the river at a time of significant food insecurity and poverty. It is more difficult to decide to again allow the river to meander naturally among all buildings and infrastructure constructed since then, and to restore privately-owned farmland that has been cultivated for generations to wetland to mitigate flood risk. The same path dependency emerges in the growth of the studied urban areas. For example, neither the original centre of Lomma, nor the more recent centre (it shifted to the area around the train station in the late 19th century) were exposed to floods. However, the decision to build and provide services in the centre influenced subsequent development decisions, resulting in a more or less radial expansion of the urban space into areas more exposed to floods (Paper I).

The recent problematization of flood risk

While both flood hazard and vulnerability to the impact of floods have increased over time, the results clearly show that flood risk did not become an issue until around 2007 (Papers I, III & IV). Although there were significant local floods in the past, and more recent ones in the same region (Paper I), they did not require governing on the societal level. The Swedish legal framework started to explicitly demand flood risk measures be put in place in the mid-1980s (Papers I, III & IV). However, in the following two decades, measures were implemented more or less exclusively by planners and water & sewage professionals, focusing on the legally required function of urban drainage systems in relation to a rainfall intensity with a statistical recurrence period of 10 years; commonly referred to as the *10-year rainfall*.

Planning legislation that was adopted in the mid-1980s was followed by local, comprehensive plans that stipulated overall land use. Flood risk was not mentioned in the first two versions of these plans, but became a key assumption in the third version, published around a decade ago (Papers I & IV). Similarly, an analysis of Lomma's 176 detailed development plans, dating from 1932 to the present day, shows that flood risk started to be explicitly considered in 2005, when plans were drawn up for new urban development along the river and coastline, and it has attracted increasing attention ever since (Paper I).

It is, therefore, an oversimplification to ascribe the timing of the problematization of flood risk solely to the 2007 floods. Although the results indicate that these events were important (Papers I, III & IV), they also suggest that the timing and the sequence of events played a role. Flood risk had already begun to gain attention, and the situation coincided with the recruitment of an environmental strategist in Lomma, who later became the key actor in the governing of flood risk mitigation (Paper I), which suggests that agency played a more profound role in the process (Papers I & III). It is, in other words, not only the evolution of flood risk that appears to follow a path-dependent process, but also the problematization of it as an issue requiring governing (Paper I). Given that these two path-dependent processes are interconnected, it could be said that the actors governing flood risk mitigation launched a joint attempt to catch up with an escalating problem.

4.2 The more the merrier

The next key findings necessary to answer the overall research questions concern the amount and types of actors contributing to the governing of flood risk mitigation in the studied case.

The number and diversity of actors

The study highlights the remarkable number and diversity of actors. A total of 217 individuals actively contributed, supported by 256 others who provided various types of supplementary input (Paper IV). While the Swedish legal framework allocates the lion's share of responsibility for governing flood risk mitigation to municipal administrations, the identified actors include not only municipal politicians and civil servants, but also VA SYD[6], Höje Å River Council[7], other municipal organizations[8], the County Administrative Board, national authorities, universities, consultants, other private companies, landowners, etc. (Paper IV). The sheer number and variety of involved actors is interesting in itself, and provides further support for the claim that flood risk mitigation has been problematized. However, these actors do not govern flood risk mitigation individually, in isolation; rather, they act collectively as a network of interacting individuals.

A network centred on municipal administrations

Notwithstanding this diversity, the results underline the importance of municipal administrations. Two-thirds of the actively contributing actors are either politicians or civil servants at the three municipal administrations, while about one-third of the supporting actors are affiliated with them (Papers III & IV). The results also demonstrate significant, but varying diversity in the types of actors within these administrations. Least diversity is seen in Staffanstorp, there is much more in Lomma, and even more in Lund (Paper III). This means that the various involved actors form a network that is centred around the municipal administrations (Paper IV). However, the presence of diverse actors, in itself, means little with respect to the governing of flood risk mitigation. It is also necessary to analyse the patterns of social relations between them.

4.3 Gaps within and between municipalities

The next key findings come from the relational analysis, and concern the regime of practices among municipal administrations. Here, the focus is on the social relations between municipal actors who implement the main policies guiding flood risk mitigation, how flood risk is mitigated in the

[6] A regional water & sewage organization owned by Lund and a number of other municipalities.
[7] A voluntary association of municipalities, industries, water treatment companies, and others affected by the water in the catchment area.
[8] Representatives of the Fire and Rescue Services, the Erosion Damage Centre, a neighbouring municipality outside the catchment area, and a municipality in another part of Sweden.

planning process, and relations between municipal administrations concerning the issue.

Loosely coupled implementation of tightly coupled policies

The Swedish legal framework concentrates responsibility for mitigating flood risk at the municipal level (Papers I, III & IV). Local self-government is stipulated in the constitution (1974:152), and the Planning and Building Act (2010:900) grants municipal administrations the sovereign right to adopt land use plans, explicitly pointing out that consideration must be given to health, safety and flood risk (Ch.2, Sect.5). Municipal administrations are responsible for removing surface water from settled areas (SFS 2006:412), drawing up an action programme to mitigate risk (SFS 2003:778), and assessing risk and vulnerability within their jurisdiction (SFS 2006:544). Formal guidelines that are applicable to both municipal action programmes and risk and vulnerability analyses explicitly highlight flood risk (MSB, 2011a, 2011b), and state that a main purpose of the risk and vulnerability analysis is to provide input to land use planning (MSB, 2011b). Thus, the Swedish legal framework not only concentrates responsibility for governing flood risk mitigation in the three municipal administrations, but also consists of tightly coupled policies that require coordination between the municipal actors who implement them (Paper III).

An analysis of the patterns of social relations among actors responsible for implementing *planning*, *water & sewage*, and *risk & vulnerability* activities in the three municipal administrations revealed significant isomorphism (Paper III). It is clear that actors engaged in *planning* and *water & sewage* interact relatively intensely with each other. It is equally clear that actors engaged in *risk & vulnerability* interact very little with any of the others (Lomma and Lund), if at all (Staffanstorp). In other words, these networks are neither fully integrated, nor entirely fragmented. Moreover, it is not possible to develop a meaningful scale to describe the level of integration or fragmentation, as some parts of the network are in close interaction, while, at the same time, other parts of the same network are loosely coupled, or even decoupled. I call this pattern of relative integration between two types of actors, who are more-or-less completely separate from a third type, *cinderellic fragmentation*, alluding to the fairy tale of Cinderella and her two stepsisters. Although "Cinderella" is defined in the Oxford English Dictionary (2014) as "a person or thing that is undeservedly neglected or ignored", the analogy I make is more intricate and relational (Paper III).

The results indicate that cinderellic fragmentation is not a coincidence, but the result of parallel processes of institutionalization that are separate with respect to both their foundation and orientation, and which emphasize different regulative, normative, and cultural-cognitive elements (Paper III). Although current *risk & vulnerability* policy explicitly demands interaction with the two other, tightly-coupled, areas, it is possible to give the appearance of compliance without any genuine interaction. When that is repeatedly done over the years, with little or no interest of busy actors engaged in *planning* and *water & sewage* and positive feedback from politicians and managers, the decoupled practices get institutionalized with normative and cultural-cognitive backings. This decoupling is also institutionalized in the practices of actors engaging in *planning* and *water & sewage,* who set out to address flood risk mitigation together due to pre-existing relations, without needing to include actors engaged in *risk & vulnerability*. Here again, normative and cultural-cognitive elements trump regulative elements in the legal framework. Cinderellic fragmentation is thus not accidental, but a consequence of a *directional separation of institutionalization*, where the more bottom-up and problem-oriented institutionalization of practices concerning flood risk mitigation in *planning* and *water & sewage* and the more top-down and compliance-oriented institutionalization of practices in *risk & vulnerability* pull the network of actors apart (Paper III).

Variation in the position of other civil servants and decision-makers

While the results demonstrate significant isomorphism in interactions between actors engaged in *planning*, *water & sewage*, and *risk & vulnerability*, the positions of other civil servants and decision-makers vary significantly between the three municipal administrations. Politicians & senior management are peripheral in Staffanstorp, more central in Lund, and among the most central actors in Lomma. Other civil servants are least central in Staffanstorp, and significantly more central in Lund and Lomma (Paper III). In Staffanstorp, the network is dominated by actors who are engaged in *water & sewage* to a greater extent than the other administrations, while the problem of flood risk is mainly articulated in terms of the capacity of urban drainage systems (Paper IV). Together with the lower number and diversity of actors, these findings suggest that flood risk mitigation is problematized as a technical issue in Staffanstorp, while it is problematized as a wider political issue in Lund and Lomma[9].

[9] See Petridou et al. (2021) for a detailed analysis of this difference.

Each detailed development plan is an island

The results reveal that the institutionalization of flood risk mitigation practices has not only fragmented the implementation of tightly-coupled policies, but also how flood risk is taken into consideration in the planning process itself. While it is explicitly considered in the preparation of each detailed development plan, each planning area is considered in isolation (Papers I & IV).

Developers (including the municipality) are subject to a legal requirement to provide assessments of urban drainage and flood risk for the area they plan to develop. Planning areas are usually delineated by land ownership, with boundaries generally without any hydrological significance. This means that any alterations during the development of the area may have an impact on the flood risk of other planning areas. Although these are mostly neighbouring, they also concern planning areas farther afield, in the same sub-catchment, or connected to the same urban drainage system (Paper I). However, the assessments of flood risk only focus on the planning area itself, and ignore both current and future potential impacts on other areas (Paper IV). The development of a planning area may, in other words, inadvertently shift floodwater towards other developed areas, previously deemed safe. It may also unwittingly impact the future use of other still unplanned areas, as it can alter inputs to assessments of flood risk in upcoming planning processes (Paper I).

This institutionalized fragmentation of practices is not entirely unnoticed by competent civil servants (Paper I & IV), but is not addressed regardless of its obvious detrimental effects on flood risk mitigation. The results suggest that this is due to the institutionalization of the regime of practices itself (Paper IV). When flood risk mitigation started to attract increasing attention, it was the actors ensuring sufficient urban drainage for more everyday rainfall who got involved first. Their practices, which were mainly focused on *water & sewage* or *planning*, provided the initial patterns from which the regime of flood risk mitigation practices evolved (Paper IV); heavily structured by the key technology of the detailed development plan (Paper I). Since the legal requirements for urban drainage of these two policy areas had been regarded as met by piecemeal attention to it ever since flood risk was first considered in the Swedish legal framework, the same decoupled practices were initially applied and rather rapidly becoming the established practice also for flood risk mitigation. The status quo is then maintained partly through a combination of actors being reluctant to consider alternatives after having invested time and energy to learn the current practices, the contribution of

each actor being facilitated by others following the same practices, and new actors being motivated to adopt the current practices as they appear commonly accepted (Paper IV). However, the results suggest that the status quo is also maintained through more normative- and cultural-cognitive elements of institutionalization, as recurrent practices become increasingly expected among groups of professionals and routinized to the extent that they become taken for granted, or even invisible to the involved actors (Paper IV).

Horizontal disconnect between municipalities

The fragmentation of the regime of practices of flood risk mitigation remains when analysing the social relations also between actors working for different municipal administrations (Paper I, II & IV). The network is not only noticeably clustered around municipal administrations, but there are very few direct interactions between them (Paper IV). The little interaction there is, largely involves actors representing municipal administrations on the Höje Å River Council. While several of them have prominent appointments in the bureaucratic hierarchies of each municipality, they are relatively marginal in the networks of actors mitigating flood risk within them. One representative from Lomma is a notable exception. However, none of the actors representing Lomma appear to receive input from their upstream colleagues (Papers II & IV), indicating a stark horizontal disconnect between these three municipal administrations that share the same catchment area (Paper IV).

These results suggest that fragmentation can, once again, be explained by the institutionalization of the regime of practices of flood risk mitigation (Paper IV). However, here, the incentivization, normalization, and routinization of practices operates in the context of firm municipal borders (Paper I). Although these borders are historically contingent—largely following the outer borders of clusters of early medieval parishes formed to provide viable congregations to already constructed churches—and could be drawn in very different ways, they are so fundamentally ingrained in Swedish society that they not only demarcate legal responsibilities, but also define how actors view the world (Paper I); regardless of the actual flow of water in the landscape.

4.4 Temporal fragmentation in practices

The governing of flood risk mitigation is not only spatially fragmented within and between municipalities, but also temporally fragmented in different, but connected ways. The first concerns the regulation of the implementation of

planning specifications, and the second concerns the assumption that everything but the planned development remains the same over time.

Limited expiry date for planning specifications

The detailed development plan is a comprehensive document. It spans myriad sectors and interests, and is based on a complex set of planning specifications. However, the analysis of the 176 detailed development plans for Lomma identified many specifications that could not be regulated after the plan had been approved, and the area had been developed. At the same time, the municipal administration is solely responsible for urban drainage and flood risk mitigation (Paper I). Thus, key planning specifications that are used as input to assessments of urban drainage and flood risk may, at a later stage, be ignored, with potentially substantial effects on flood risk.

Ceteris paribus in planning

Limited opportunities to regulate the implementation of crucial planning specifications are tightly linked to a broader, implicit assumption that nothing else changes over time. The results show that both detailed development plans and urban drainage systems in the planning areas are based on an assumption that all other relevant conditions will remain the same. This *ceteris paribus* rationale is particularly evident in the use of results from hydrological and hydraulic modelling. Although this key technology is often used in the governing of flood risk mitigation, it is time-consuming, expensive, and requires significant expertise (see Section 4.7). Modelling results, therefore, continue to be used, long after many of the fundamental inputs and assumptions have changed. A particularly clear illustration is the comprehensive flood risk map in Lomma, which is still used after years of extensive urban development (Paper I).

This rationality of *ceteris paribus* makes the planning process prone to using crucial inputs to assessments of flood risk that may already be obsolete. It also conceals the unfortunate fact that a developed area deemed safe concerning floods at the time of its detailed development plan entering legal force may be rendered unsafe by later developments in other planning areas, as pointed out above.

4.5 Municipal relations with external actors

As noted above, although municipal administrations are central in the governing of flood risk mitigation, the individual actors within them depend on inputs from other, external actors. The key findings, here, concern the

relative importance of different types of input, and their associations with friendship, trust, and influence.

The relative importance of inputs from external actors

The results demonstrate that municipal actors are more dependent on input from other actors within the same municipal administration than external actors (Paper II). This pattern is consistent for all seven types of input (*reports of activities*, *equipment and material*, *funding*, *technical information*, *rules and policy*, *advice and technical support*, and *pepping and moral support*). However, the results also indicate that municipal actors are relatively more dependent on some types of input from external actors than others (Paper II). External actors provide a larger share of *technical information*, *reports of activities*, and *advice and technical support,* than *equipment and material* and *rules and policy* along with, to a lesser extent *pepping and moral support* and, to an even lesser extent, *funding*.

This means that external actors are most important for providing inputs with more technical and informational character, rather important for providing normative input instructing actors what to do, much less important for providing social support, and hardly at all important for financing flood risk mitigation (Paper II).

Patterns of inputs concerning friendship, trust, and influence

Some interesting patterns also emerge when analysing dependence on the seven types of input, and friendship, trust, and influence between individual actors (Paper II). These patterns were identified using correlation and regression analyses of network data (see Section 3.8).

Although there is a very strong correlation between friendship and trust (0.93)—meaning that the better friends the actors are, the more trust in each other they express—it is important to note a few differences in the bases for them in the network. The analyses identified a strong association between *level of friendship* and the seven inputs (R^2=0.84). *Pepping and moral support* dominated the regression model (β=0.49), followed by *reports of activities* (β=0.22), *advice and technical support* (β=0.15), and the other types of input (Paper II). There is also a strong association between *trust* and the seven inputs (R^2=0.85). Here, *pepping and moral support* again have the strongest effect (β=0.45), followed by the effects of *reports of activities* (β=0.31), *rules and policy* (β=0.22) and *technical information* (β=0.19). This means that providing social support is, by far, the most important input for friendship, and it is also most important for trust. However, trust is more strongly associated with *reports of activities,* and much more strongly associated with *technical information* and

rules and policy than friendship. This implies that the trust actors express that other actors will provide the necessary input is not mainly based on the social support strongly associated with their level of friendship. It is also connected to aspects of their social relations concerning receiving reports on the results of particular activities (connoting a dependency on the output of what others are doing), being provided with directives for their tasks, and obtaining particular technical information.

It is interesting to consider these differences in relation to actors' influence over each other. The regression analysis showed a strong association between *influence* and the seven inputs (R^2=0.87). However, the effect of *pepping and moral support* was weakest (β=0.08) and *reports of activities* was strongest (β=0.43), followed by *rules and policy* (β=0.31) and *funding* (β=0.30). The remaining inputs had weak effects. This indicates that social support, which is so important in friendship and trust, has little to do with the influence actors have over each other. In the latter case, receiving reports on the results of particular activities, normative directives, and getting sufficient financial resources are most important.

4.6 Authorities pass the buck and guard the gate

Some of the key findings concerning the regime of practices relate to national authorities and the County Administrative Board, and their social relations with the studied municipal administrations.

A vertical disconnect between municipal and national levels

The results suggest a vertical disconnect between municipal administrations and the variety of national authorities that are expected to provide guidelines for the governing of flood risk mitigation (Papers I, II & IV). Although many national authorities are involved in the network governing flood risk mitigation (Paper IV), interesting patterns emerge when analysing their social relations with the municipal administrations they are supporting. While authorities wield substantial influence over municipal administrations' efforts to mitigate flood risk, they provide the least important input and are least trusted to provide what is needed (Papers I & II). Several participants explicitly mentioned that they appear to have withdrawn from their responsibility of providing guidelines to the municipal administration.

The results demonstrate that responsibility for flood risk mitigation resides with the state (Papers I, II & IV). Actors at the national level are perceived as having significant influence over flood risk mitigation, while municipal actors have little trust that they will get what they need. Only a

quarter of municipal actors mentioned the national level when asked to list influential actors (see Section 4.9). Although the Swedish parliament passes laws that are implemented by the government, represented regionally by the County Administrative Board, the municipal administrations perceive that national authorities are reluctant to provide guidelines on how to implement this legislation locally. The national level is, thus, seen as simply passing on the responsibilities of governing flood risk mitigation to municipal administrations, under the oversight of the County Administrative Board (Paper I).

Regional oversight, but no coordination

The County Administrative Board represents the government at the regional level. It has a broad mandate to oversee the implementation of national legislation and policies, and general development, within its jurisdiction. Compared to national authorities, it provides significantly more important input to municipal administrations and is significantly more trusted to provide what they need (Papers I & II). Its actors are seen as much more important and dependable than their national counterparts, but less than private companies (see Section 4.7).

While the County Administrative Board plays an important role, some interesting patterns emerge when analysing the social relations between its civil servants and other actors. More specifically, it is poorly placed to facilitate coordination, which the Swedish implementation of the EU Floods Directive explicitly assigns to it. Although there is one actor who could be said to act as a broker between municipal administrations (Paper IV), this person only provides input to four actors in Lomma, and one in Staffanstorp. This weakness was also highlighted by the qualitative analysis; not one participant mentioned coordination in relation to the regional authority (Paper IV). This suggests that the County Administrative Board mainly acts as a gatekeeper that oversees the implementation of the legal framework, but does not coordinate the governing of flood risk mitigation. In fact, the only example of coordination between municipal administrations concerns the Höje Å River Council (Paper IV). However, the river council is a voluntary association without any formal authority and the municipal representatives to it are, as mentioned above, generally peripheral to the governing of flood risk mitigation within them (see Section 4.3). This seriously undermines its coordination capacity (Paper IV).

These results suggest that the County Administrative Board also passes on responsibility for flood risk mitigation to municipal administrations, and that

it acts more as a gatekeeper than as a coordinator. This responsibilization of the municipal administrations is also occurring by blocking the mobilization of other important actors (Paper I). This is particularly evident concerning the issue of the municipal administrations attempting to demand retention of water on private property, which is likely to be indispensable for climate change adaptation since it is impossible to manage all future water on the fraction of useful urban land that is public. Even after the main conclusion of the Swedish Commission on Climate and Vulnerability (2007) stipulated the need to allocate more responsibility for risk reduction to private property owners and households, the County Administrative Board blocks any such demands and a recent court ruling against one of the municipalities further cements this interpretation of the legislation (Paper I).

4.7 Consultants swoop in

There are not only state actors on municipal-, regional-, and national levels involved in the governing of flood risk mitigation, but also a range of private companies; spanning from housing developers to insurance companies, and from contractors to various consultants.

The position of private companies in general

The results suggest that private companies play a very important role in the governing of flood risk mitigation (Papers I & II). This is perhaps unsurprising for keen observers of advanced liberal democracies but, nevertheless, warrants a detailed analysis of the intricacies of their position. The findings are particularly interesting regarding input from private companies to the municipal administrations, and the latters' trust that they will receive what they need.

While there are no statistically significant differences in the average influence of private companies over municipal actors' ability to contribute to flood risk mitigation, compared to the County Administrative Board, national authorities, and even colleagues in the same municipal administration, their input is more important than from any other type of external actors (Paper I). Furthermore, they enjoy the same high level of trust as the County Administrative Board, and this level is much higher than for national authorities (Paper I). These results suggest that private companies are the premier partners of municipal administrations (Paper II), despite the fact that the County Administrative Board and several national authorities have been given central formal roles by the Swedish legal framework for flood risk mitigation.

The role of consultants

Although public authorities have long relied on private companies for carrying out a range of decisions—concerning construction, maintenance, supplies, etc.—they have more recently become dependent on an equally broad range of consultants to provide the basis for the decisions themselves. The results exhibit a significantly large and varied group of consultants in the network of individual actors governing flood risk mitigation (Paper IV). Much of the input from private companies (described above) takes the form of assessments, reports, designs, etc. that are produced by various consultants and used by municipal administrations as a foundation for their decisions and activities (Paper I). Consultants are generally seen as being able to deliver what they are hired to do (Paper I). Considering their dominance among the external actors around municipal administrations, it is fair to assume that their input plays a significant role behind external actors' high relative importance in providing *technical information*, *advice and technical support*, and *reports of activities* (Paper II).

Fragmented procurement practices

The results also demonstrate that, while input from consultants is important, its provision is fragmented (Paper I). This is not because of the need to engage several consultants to address the broad range of flood risk mitigation issues—spanning from hydrological and hydraulic modelling to landscaping (Paper I)—which is a natural outcome of the division of labour, and unrelated to the highlighted fragmentation.

The fragmentation of interest is instead the outcome of piecemeal procurement. Consultants are only engaged for a specific task, different consultants can undertake the same task but in different projects, and different consultants can be used in different phases of the same project (Paper I). It seems that municipal administrations expect to be able to procure modules of flood risk mitigation on the market and that safety and sustainability can be generated by a simple process of aggregation (Paper I). The findings show that even in projects that concerned neighbouring, and simultaneously processed detailed development plans, different consultants were engaged to assess flood risk. Similarly, the same water-related issues are addressed by different consultants in different phases of the same planning process (Paper I). This severely limits any opportunity to utilize what is learnt, as it cannot be either summarized in, or easily extracted from, the necessarily condensed documentation that is delivered at the end of the contract. While procurement regulations are vital in preventing unfair competition and

corruption, they could be applied more strategically to address unnecessary fragmentation (Paper I).

4.8 To absent friends

While it is interesting and important to consider the actors who contribute to the governing of flood risk mitigation, we should not forget those who are not involved. Such an analysis can easily expand indefinitely, and it is important to establish the scope, which is here provided by the functional focus of the boundary of the studied network of individual actors. This approach resulted in the identification of two main types of actors that could be expected to play a more significant role; Region Skåne and civil society.

Region Skåne lost

Region Skåne is the regional authority responsible for healthcare and public transport, and for coordinating infrastructure, planning, and environmental and climate-related issues. It is, therefore, striking to find that not a single participant mentioned them in relation to flood risk mitigation. They were only referred to as the provider of public transport (by a water & sewage expert), as a funder of projects (by a consultant), and as a large property owner in central Lund (by a second water & sewage expert). This is surprising as it claims to be responsible for facilitating the coordination of climate change adaptation, which, in Sweden, is closely linked with flood risk. This is not to say that the regional authority ignores flood risk—it has both staff and processes to address such issues for its own property. What it does mean is that it is not engaged in coordinating climate change adaptation, despite any claims to the contrary.

Missing civil society

The results also revealed the virtual absence of civil society organizations (Papers II & IV). These organizations play an important role in mitigating disaster risk in other contexts, and Sweden is consistently ranked as having a strong civil society (Paper II). It is therefore surprising to find that they play an insignificant role. One participant was linked to an agricultural drainage association, one to the Swedish Society for Nature Conservation, and one to two representatives of the Federation of Swedish Farmers. Even when actively seeking up and interviewing a local representative of the Civil Protection Association there were no links back to any actors contributing to flood risk mitigation. In short, civil society plays no active part in the governing of flood risk mitigation in the studied case.

4.9 Modes of thinking

Some of the key findings concerning the studied regime of practices in the governing of flood risk mitigation involve patterns in the modes of thinking among contributing individual actors. These modes of thinking were partly captured by their elicited perspectives on what actors wield the most influence over flood risk mitigation, and partly in their overwhelmingly local focus when talking about flood risk. The perspectives on influence then combine into different modes of thinking depending on the combination of such perspectives each of them included.

Elicited perspectives on influence

The results demonstrate that a municipal perspective on influence over flood risk mitigation was completely dominant, with almost all participants including such perspective regardless if only asking municipal actors in Lomma (Paper I) or all contributing individual actors (Paper IV). Nearly a third of the participants in Lomma municipal administration—on the coast and at the mouth of the river—only included such municipal perspective in their modes of thinking about the most influential actors, by mentioning only actors internal to the municipal administration; either the municipal administration itself, some of its parts, or specific politicians or civil servants (Paper I). This proportion of actors was lower but still substantial when analysing the entire network, with around a fifth of the actors only expressing municipal perspectives (Paper IV). Another third of the participants from Lomma municipal administration also included one or more other administrative levels in purely hierarchical modes of thinking (Paper I), while such modes of thinking were entertained by a bit more than a fifth of all participants (Paper IV). This means that significantly more than half of the participants in Lomma municipal administration (Paper I) and a bit less than half of the participants in the entire network of actors (Paper IV) only included municipal actors (purely municipal mode of thinking) or also only actors on other administrative levels (purely hierarchical modes of thinking).

This is in sharp contrast to the one participant having a purely hydrological mode of thinking, only mentioning actors influencing upstream hydrology. Such hydrological perspectives were more commonly mixed with other perspectives, but only included by around a tenth of the participants in Lomma municipal administration (Paper I) and by around a fifth of all participants (Paper IV). When analysing the modes of thinking of all actors in the network, such hydrological perspective was most often mixed with municipal- or hierarchical modes of thinking, with only one participant

mixing it with a local perspective stressing the importance of citizens and property owners locally, or with several other perspectives composing mixed modes of thinking without a discernible focus (Paper IV).

Local rationalities

Diverse modes of thinking also emerged from qualitative data. Here, different actors voiced different, and often conflicting views on both the problem and the solution in relation to flood risk. However, their modes of thinking all shared a common feature: they were locally rational, but more or less globally irrational.

Although municipal or hierarchical modes of thinking dominate among actors in the (downstream) Lomma municipal administration, the most influential actors grasp the hydrological foundation of the problem. These people understand that upstream water retention is an essential part of the solution (Paper IV). This is in sharp contrast to the modes of thinking observed in the narrative of most upstream actors. While agreeing with downstream actors that flood risk is a concern, they describe it almost exclusively as a local issue. They see the solution as constructing/renovating levees to prevent the river overflowing (Paper I), or improving drainage of water from their areas (Paper IV).

These two approaches are fundamentally incompatible. While it is possible to make arrangements to compensate upstream actors allowing the allocation of specific parts of their land for increasing the retention of water during peak flow in the river, there are no viable ways to address the conflicting upstream and downstream interests of reducing retention. It is important to note that these conflicting approaches are both locally rational, but globally irrational (Paper IV). At least if the downstream interest of increasing retention is not matched by sufficient incentives for landowners upstream to allow it voluntarily.

Discussion

This chapter elaborates on the meaning of the empirical findings concerning the research questions and engages with relevant theory to do so. It starts by discussing the governing of flood risk mitigation in relation to the first research question, before directing attention to the second research question by discussing the governmentalization of flood risk mitigation and four discernible processes constituting it. It ends with a discussion of what general lessons can be learnt concerning the governmentalization of complex sustainability challenges in advanced liberal democracies.

5.1 The governing of flood risk mitigation

The first research question concerns how flood risk mitigation is governed in Sweden. Following Foucault, it is important to consider the striking historical juxtaposition of past and current, thinking and doing (Garland, 2014: 377). While we tend to reconstruct memories to provide a sense of continuity and historical coherence (Foucault, 1978), flood risk mitigation only started to emerge as a priority in the mid-2000s. This rather recent institutionalization has three, particularly interesting features: (1) multifarious fragmentation, (2) the location of responsibility, and (3) the role of the market. I suggest that these characteristics are generally found in the governing of flood risk mitigation in Sweden, regardless of differences in the details between contexts. First, I discuss these features, then I turn your attention towards how they have become institutionalized. It is perhaps here that the benefit of combining a more localized and empirically oriented governmentality perspective, and sociological new institutionalism, becomes most visible. The former facilitates understanding of how issues are constructed as governable (Dean, 2017: 2), while the latter helps in comprehending how governing becomes institutionalized (Scott, 2014). I end this part of the discussion by revisiting the distinction between *risk as governmentality* and the *governmentality of risk* made earlier.

Institutionalized fragmentation across multiple divides

Fragmentation is the most striking feature of the governing of flood risk mitigation in the studied case. Water moves across the landscape, and can have effects on what people value, despite any boundaries that they construct to make sense of and govern social life. The actors engaged in flood risk mitigation are not only as confined by these boundaries as any citizens, but

also actively involved in maintaining established ones and in constructing new ones.

The results demonstrate how the municipal borders structure the regime of practices of flood risk mitigation—comprising both thinking and doing—consistently ignoring that water flows across them. Each municipal administration is essentially addressing flood risk within its jurisdiction, with little or no attention to the effects that may have on circumstances in other municipalities. Although these borders are practically identical with the outer borders of groups of early medieval parishes that comprise the municipalities today, the results suggest that these borders could have been drawn very differently. Regardless of their contingent nature, the *municipal borders* are a central technology in governing flood risk mitigation. The apparent explanation for this is the combination of the extended tradition of local self-governance, reaching as far back as the Viking assemblies, and the recurring extension of municipal obligations. Although others suggest that the legal framework hinders cross-border linkages (Johannessen and Granit, 2015), the explanation becomes richer when considering this technology as intrinsically linked with a dominant rationality—as is indicative of governmentality (Miller and Rose, 2008)—that reduces the spatial complexity of flood risk in order to fit the legal and institutional environment.

It is important to note that such reductionist rationality is not only dominant among municipal actors, but among most actors not explicitly focused on the hydrological causes of floods or directly affected by floods that can be attributed to changes in hydrology elsewhere. However, the results suggest that irrespective of actors considering flood risk mitigation in terms of increasing retention of water upstream or improving local drainage capacity (i.e. reducing the retention of water), both sides are locally rational in the sense of addressing their own experienced problem. While increasing upstream retention has a range of effects (e.g. Acreman et al., 2007), it can be implemented with acceptable trade-offs for other actors (Thaler, 2019). This is not necessarily globally irrational, but can be. Improving local drainage, on the other hand, always increases flow and downstream flood risk, if no other measures are implemented. It is thus locally rational, but globally irrational. This tension in rationality is alluded to in several seminal contributions to the social study of complex issues (e.g. Flyvbjerg, 1998; Wynne, 1982b), and it is important to note that there are no objective criteria to judge who is right. A potential way forward, however, is to ensure that what is valuable and worth protecting is made explicit (Nilsson and Becker, 2009). Informed dialogue has been suggested as a way to achieve this (Becker and Tehler, 2013). Even if

actors may perceive risks differently (e.g. Armaş, 2006; Flynn et al., 1994), they may still share similar priorities (Becker, 2011).

The results suggest that the same reductionist rationality shapes how flood risk mitigation is governed also within each municipality. This is particularly evident in planning. While comprehensive plans follow municipal borders, detailed development plans are equally spatially fixated. It is evident that urban drainage and flood risk are assessed and addressed for each planning area in isolation, and take no account of the fact that their boundaries almost never coincide with hydrological boundaries. Water flows freely between planning areas, and any measures that affect topography, permeability, and other hydrologically relevant factors in one area may impact flood risk in another. Implementing a detailed development plan may, thus, cause or aggravate flood risk in other planning areas, and restrict future land use. In this context, the comprehensive plan and the detailed development plan are key technologies (cf. Moisio and Luukkonen, 2015) that are intrinsically linked to the same spatially-reductionist rationality as the municipal border.

The rationality reducing the complexity of flood risk mitigation in spatial terms is closely linked to a similar, temporal rationality, visible in the regime of practices. Detailed development plans, and their associated measures to address urban drainage and flood risk, are based on a snapshot in time of what the planning area would look like, assuming that everything else remains the same. This rationality of *ceteris paribus* assumes that a range of essential conditions remain the same, at the same time as many of them cannot be regulated and are likely to change over time. Although such assumptions are common in the application of any technology (Luhmann, 1993: 88), since they are required for forward-looking assessments of effects (Sayer, 1992: 216), they must be explicitly considered in the governing of flood risk mitigation and not allowed to completely undermine its intentions.

This temporally-reductionist rationality is also visible in the use of consultants. The results demonstrate how different consultants are engaged in the same topical parts but different phases of the planning process. This means that there are regularly different groups of actors working together at different points in time, with the project documentation, the formal deliverables from earlier consultants, notes and minutes, and the individual memory of each of the remaining actors comprising the only link over time. There is thus a significant potential for fragmentation, as previous research point out that recurrent or constant change of involved actors generally results in erosion of institutional memory and the ability to learn (Carley, 1992;

Hagelsteen and Becker, 2014b; Handmer and Dovers, 2007: 155; Raju and Becker, 2013: 89).

Finally, the results also suggest fragmentation regarding the 10-year rainfall, under which it is the formal responsibility of the water & sewage organization and over which it is a more diffuse responsibility of the municipal administration as a whole. This is particularly problematic in Lund, where the water & sewage organization (VA SYD) is detached from the municipal administration with a legal agreement to be responsible for managing precipitation of intensities up to the 10-year rainfall. This *10-year rainfall* is as such a key technology in the governing of flood risk mitigation that is not only fragmenting it, but based on a flawed assumption of stationarity when rainfall patterns are indeed changing (Milly et al., 2008). The future is not anymore, if ever, an extrapolation of the past (Becker and Payo, 2013), and what is now considered a 10-year rainfall is anticipated to occur more frequently in the future (IPCC, 2012). This demands a completely new approach to designing urban drainage systems (Haghighatafshar et al., 2020)—as key technologies for governing flood risk mitigation (Boyd et al., 2014)—that can overcome the current fragmenting 10-year rainfall fetishism, and address our innate affinity for basing crucial decisions mainly on past experiences that may limit our options to govern the issue in the future (Payo et al., 2015).

Finally, the governing of flood risk mitigation is also functionally fragmented. Fragmentation is evident between actors who implement distinct, yet tightly coupled policies. While some groups of actors interact extensively, others have little or no contact, even when the legal framework explicitly stipulates that the output of one should be used as input to the work of another. Such decoupling is a common theme in organizational theory (e.g. DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Scott, 2014; Weick, 1976), and I will return to it when discussing viable explanations for the institutionalized fragmentation of the regime of practices.

These three types of fragmentation in the regime of practices appear to be general features in the governing of flood risk mitigation in Sweden. Municipal borders and planning boundaries are equally important in structuring regimes of practices everywhere, notwithstanding significant differences in hydrological, hydraulic and urban characteristics. The assumption of *ceteris paribus* is built into the very core of Swedish planning practices. The procurement of consultants is following the same rules and practices across the country. The 10-year rainfall structures both the design of urban drainage systems and the distribution of responsibility. Finally,

decoupling is a pervasive finding in studies of Swedish municipal administrations (e.g. Godenhjelm et al., 2015; Hagbjer et al., 2017; Sköldberg, 1994).

Municipal administrations carry the can

Another interesting feature of the governing of flood risk mitigation is the location of responsibility. The results clearly demonstrate that, regardless of the number and diversity of contributing actors, the main locus of responsibility is municipal administrations. This is unsurprising considering the long and strong tradition of local self-governance. The responsibilities of the municipal administrations have expanded immensely from the original 19th century duties of education and caring for the poor to their comprehensive portfolio of today. This expansion has been significantly driven by decentralization.

It is important to note that the process of concentrating responsibility for flood risk mitigation in municipal administrations cannot be considered as decentralization towards polycentrism, as advocated by influential scholars in relation to governing complex issues (Ostrom, 1990; Pahl-Wostl et al., 2012). First of all, decentralization is commonly associated with a corresponding allocation of resources (Saito, 2011), which is not the case in flood risk mitigation in Sweden. Secondly, polycentrism is not an automatic result of decentralization. At least not if the original meaning of the concept is maintained, and not used as a mere synonym of decentralization (e.g. Johannessen et al., 2019). Polycentrism describes distributed power with no loss of coordination between actors across administrative boundaries, levels, or societal spheres, concerning a spatially bounded issue (Andersson and Ostrom, 2008; Pahl-Wostl et al., 2012). It is increasingly being applied in relation to governmentality (e.g. Boelens et al., 2015; Moisio and Luukkonen, 2015). The concentration of responsibility for flood risk mitigation to municipal administrations can instead be seen, in combination with its fragmentation discussed above, as a clear sign of weak polycentrism (cf. Andersson and Ostrom, 2008).

It has been pointed out that governing can be more or less polycentric (Andersson and Ostrom, 2008), and the present case provides several examples. However, passive or withdrawing national authorities, as well as a County Administrative Board not engaging in the coordination of flood risk mitigation, undermine the governing of flood risk mitigation, as a lack of interaction with actors on higher administrative levels has been shown to have negative effects on governing outcomes (Angst et al., 2018). This study

also confirms the importance of integrating multiple administrative levels in any attempt to understand or assess society's capacity to mitigate risk, as suggested elsewhere (Becker, 2012).

It is also important to note the ambivalence of municipal administrations concerning their responsibility for flood risk mitigation. While municipal actors emphasize their sovereign right to adopt land use plans, as also suggested by others (Högström et al., 2018), they demand better guidelines and more coordination from higher administrative levels, and for other actors to share the responsibility. These two wishes are currently ignored by national and regional authorities, who also block local attempts to mobilize other important actors. The latter point is clearly illustrated by municipal administrations that want to oblige private property owners to retain water on their land. Such mitigation measures are likely to become indispensable in the future, as it will be impossible to manage all drainage needs with the fraction of urban land that remains public. Giving private property owners and households more responsibility for risk reduction was also the main conclusion of the Swedish Commission on Climate and Vulnerability (2007). However, the County Administrative Board has blocked such demands, and a recent court ruling against one of the municipal administrations further cemented the situation. It appears that municipal administrations all over the country have been left to carry the can, in a rigged game of buck-passing that has left a vacuum between responsibility and resources.

Consultants fill the vacuum

The final important feature discussed here is the role of the market; as one of the three main institutional spheres of advanced liberal democracies, together with the state and civil society (Mol, 2010a, 2010b). Here, it is more than just "an allocative mechanism but also an institutionally specific cultural system" (Friedland and Alford, 1991: 234). Municipal administrations rely heavily on input from various private companies—the quintessential market actors—not for coordination or for connecting between different groups of actors, but for providing a broad range of goods and services perceived necessary for the governing of flood risk mitigation. This is perhaps not surprising considering the fundamental role of the market for production, and private companies have been implementing various flood risk mitigation measures decided and funded by the municipal administrations. This reliance on private companies for providing public services—effectively making municipal administrations important sources of income for Swedish businesses—has been pointed out by others (Edling et al., 2015: 54). However, the results suggest that the role of

the market has expanded to also provide crucial input to the decision-making processes per se; clearly visible in the dependence on input from various consultants. In other words, private companies are no longer only carrying out activities to implement particular decisions, but also providing the foundations for the decisions themselves.

This expanded role of the market is, of course, neither limited to the governing of flood risk mitigation, nor is it isolated to Sweden. Numerous studies show how consultants are central to a range of important decisions on different administrative levels (e.g. Öjehag-Pettersson and Granberg, 2019; Pedersen, 2004). Others demonstrate their input to decision-making in climate change adaptation in other Scandinavian countries (Anne Jensen et al., 2016; Orderud and Naustdalslid, 2020) and other advanced liberal democracies (e.g. Boyd et al., 2011). However, their influence does not stop there. They are not only bidding to win contracts, but are also influencing perceptions of what needs to be done in the first place. The recent growth of consultancies is, in other words, not only driven by a growing need for input to different decision-making processes, as aptly suggested by Boyd and colleagues (2011), but also by their ability to create a need for services that the state actors do not even know exist yet. Their input drives demand for more input, motivated by further improvement in the governing of flood risk mitigation. Some studies even suggest that consultants play a key role in the formulation of public policy itself (e.g. Jupe and Funnell, 2015). This point is discussed in more detail in relation to *neoliberalization* (Section 5.3).

The role of the market is intrinsically linked to fragmentation. Bevir (2011) notes the relationship between fragmentation and the increasing dependence of state actors on other actors. The results suggest that these 'other actors' are overwhelmingly market actors. However, the expanding role of the market is connected to the concentration of responsibility in municipal administrations. The increasingly important role of consultants is a strategy that is used by municipal actors to cope with this recently materialized responsibility, with their existing resources. It is, in other words, in the vacuum of increasing responsibility, without a commensurate increase in the resources available to execute it, that the municipal administrations turn to consultants, who in turn provide whatever services the municipal administrations want to pay for. This is very likely a general phenomenon in Sweden, and has also been identified in Denmark, where municipal administrations have increased their use of consultants to overcome perceived shortcomings in inputs from national actors (Anne Jensen et al., 2016: 38).

Interdependent mechanisms of institutionalization

The multifarious fragmentation that is seen in the regime of practices governing flood risk mitigation seems to be a common theme across the world (see Hegger et al., 2016; Marks, 2019; Rivera et al., 2015). Although there is "no such thing as "good organization" in any absolute sense" (Ashby, 1962: 263), there is a broad understanding that fragmentation seriously undermines the governing of complex issues in general (e.g. Alford and Head, 2017; Becker, 2009; Bouckaert et al., 2010; Cejudo and Michel, 2017; Folke et al., 2007). This is perhaps best explained by Ashby's (1957) law of requisite variety, which stipulates that any system governing another larger complex system must have a degree of complexity that is comparable to that system. From this perspective, the governing of flood risk mitigation must be able to accommodate the complexity of flood risk, and not reduce it. The literature is rife with attempts to explain fragmentation, often attributing it to a push for specialization to improve efficiency (see Bouckaert et al., 2010; Cejudo and Michel, 2017; Hood and Dixon, 2015). While these public administration-oriented contributions are persuasive, they fail to explain the range of fragmentation identified here. For that, we need to focus on the institutionalization of the regime of practices identified through the applied governmentality perspective.

The results show that the regime of practices—the set of institutionalized ways of thinking and doing flood risk mitigation—is neither primordial, nor did it appear out of thin air. Rather, it emerged recently as a contingent reaction to a path-dependent problem. While the floods in 2007 are commonly considered the initiating event, and influential scholars stress the importance of decisive events (e.g. Drori et al., 2006), the results indicate that a more complex mix of factors has driven the recent problematization of flood risk mitigation. The regime of practices emerged from established practices for managing urban drainage of more everyday rainfall. It carried, as such, with it a symbolic (regulative, normative, cultural-cognitive), relational, and artefactual legacy (cf. Scott, 2014: 95–104). This legacy has provided the foundation for, and the initial direction of, the institutionalization of the governing of flood risk mitigation.

The first actors to engage in flood risk mitigation were civil servants working with water & sewage or planning, who already interacted to implement existing legislation. This means that although these actors had to coinvent updated practices to address the nascent issue of flood risk mitigation, they were not starting from scratch. They had the same legislation as before, their professional norms and identities, their shared ideas and

predispositions, their established social relations, and a set of artefacts that enabled as well as restricted their activities. Although there was still some room for initial behavioural variation, even after bringing all of that to bear on the issue of flood risk mitigation, the results indicate that particular patterns of activities started to emerge rather quickly and then repeatedly to become the convention.

This is not to say that the regime of practices is static, as there have been several and somewhat varied updates in the regime of practices of each municipal administration since then. I suggest instead that such changes appear to follow the same process, proposed by van de Ven and Garud (1994), of trying different adaptations of the convention (behavioural variation), using a particular adaptation more often than others (rule-making), and then using that adapted regime of practices repeatedly (rule-following) until a new change is perceived necessary. This is in line with Barley and Tolbert's (1997) view of institutionalization as a dynamic, continuous process. However, fragmentation remains apparent, regardless of any updates. To explain this, I draw upon a combination of theories of increasing returns (North, 1990), increasing commitments (Selznick, 1992), and increasing objectification (Berger and Luckmann, 1966).

The results suggest that municipal borders were at least as fundamental in structuring social life fifteen years ago as they are today. This is indicated by the growing prevalence of inter-municipal cooperation (cf. Bel and Sebő, 2019; Bendz and Boholm, 2019). The legislation for water & sewage has not changed, and legal provisions governing comprehensive and detailed development plans have been in place for decades. Although already objectified to various degrees, the municipal borders and the boundaries of detailed development planning areas were carried over when the first two professional groups engaged in the emerging issue of flood risk mitigation. They also carried with them the focus on the 10-year rainfall, which had developed as a legal capacity demand on urban drainage systems in the 1980s. With their shared ideas, professional norms, and legal framework, they invested significant time, energy, and resources in coinventing the first regime of practices for flood risk mitigation.

Drawing on North (1990), it is fair to assume that these actors incurred large setup costs in coming up with ways to do their job. They had little reason to consider alternatives as long as their results were accepted, or even praised, by managers and politicians, who in turn largely focus on satisfying rather fuzzy legal requirements. Especially if these requirements can be met by simply exhibiting a set of disconnected consultancy reports. There is,

consequently, less and less incentives for the involved actors to address the fragmentation, the more time and energy they have already invested in learning the current practices (learning effects) that also facilitate to get their job done as long as all actors follow them (coordination effects). There is also a clear normative aspect connected to the latter, as it generates expectations that facilitate cooperation regardless of binding actors to flawed practices (Scott, 2014: 145–148). New actors are then motivated to adopt current practices, since they appear commonly accepted (adaptive expectations) (see North, 1990).

While actors engaging in water & sewage or planning had a historical legacy managing urban drainage of more everyday rainfall, actors engaging in risk & vulnerability appeared around the same time as the initiation of the problematization of flood risk mitigation. However, the context was very different. New legislation required each municipality to prepare a risk & vulnerability analysis, coupled with earmarked national funding for the work but no established professional norms or social relations with other actors. This resulted in these actors producing the first risk & vulnerability analyses in more or less complete isolation. The initially varying practices were all structured by the municipal borders, out of which a few patterns of practices have emerged as conventions so far (cf. Hassel, 2012). The results indicate that these actors generally aspire to mobilize other actors for the work, but without success (cf. Lin and Abrahamsson, 2015). Nor are they interacting with the actors engaging in water & sewage or planning, although the legislation requires the latter's work to be informed by risk & vulnerability analyses. However, the main legal requirements are met regardless, at the same time as more and more investments are made into the current regime of practices.

This area has also seen increasing professionalization (cf. Nohrstedt et al., 2018), which Dimaggio and Powell (1983: 152) defines as "the collective struggle of members of an occupation to define the conditions and methods of their work". It generates, as such, mounting normative pressure for particular patterns of practices. Parallel to increasing returns and commitments, the results also indicate increasing objectification of aspects of fragmentation that have become routinized and engulf all alternatives (cf. Berger and Luckmann, 1966). However, such objectification is often associated with increased normative commitments, leaving less and less room for alternative views (Tolbert and Zucker, 1996: 182–183). These three mechanisms of institutionalization, thus, operate in parallel and are intrinsically linked to each other, making it infeasible to ascertain their individual effects.

Risk as governmentality anyway

Although I stated earlier that this thesis is not about *risk as governmentality*, but about the *governmentality of risk* (Section 2.2), a strict distinction between the two becomes untenable when reflecting on the governing of flood risk mitigation in the studied case. I maintain that my focus is firmly directed towards how flood risk mitigation is governed and has become governable in Sweden, but the results show, in various ways how *risk*, in itself, has become a central rationality and technology in the regime of practices I study. Not only in formally required risk and vulnerability analyses, which are rather tokenistically performed by designated staff who work more or less in isolation, but in the mitigation of flood risk more generally.

In this context, risk is a central rationality for imagining the world as governable, in the sense of being able to intentionally steer it towards some preferable future (cf. Luhmann, 1993; O'Malley, 2008); or at least away from futures that for different reasons are deemed undesirable. It also provides vital technologies for achieving that in practice. This is most explicitly visible in risk and vulnerability analyses, where calculations provide the foundations for decision-making, which the first governmentality scholars pointed out as central in risk as governmentality (e.g. Donzelot, 1979; Ewald, 1991). It is tempting to interpret the isomorphic decoupling of actors engaging in this explicit "risk work" (Gale et al., 2016) as an indication of resistance to such governmentality among the other actors involved within the municipal administrations. However, the same rationality is intrinsically linked also to the main technologies of other actors contributing actively to analysing and addressing flood risk, such as actors engaged in water & sewage and planning, but who are not at all decoupled. Their technologies are also largely based on calculations of what can happen, more or less explicit estimations of how likely that is, and some implicit assumptions of what the consequences would be. A clear example is the application of hydrological and hydraulic modelling as a foundation for decision-making about land use and associated requirements to mitigate flood risk. Although risk as governmentality may not help to directly explain the decoupling of actors, it appears that it may be impossible to study the *governmentality of risk* without considering *risk as governmentality*.

Risk, as a rationality and a technology in itself, is likely to be fundamental in the governing of complex sustainability challenges in general, since associated regimes of practices are inherently oriented towards an uncertain future (cf. Miller and Rose, 2008: 2016–217). Even in studies that focus exclusively on the governing of sustainability challenges, it always involves

something human beings value, a preferred future trajectory concerning its state, and a range of decisions and events with uncertain likelihoods and consequences (Becker, 2014). In other words, they are all about governing risk. Therein lies the pervasiveness of risk as governmentality.

5.2 The governmentalization of flood risk mitigation

Now, I turn to the second research question concerning how the process of governmentalization is conditioning the governing of flood risk mitigation in Sweden. Approaching the topic from the perspectives of governmentality and new institutionalism requires a systemic consideration of how the regime of flood risk mitigation practices has become institutionalized. It is about studying processes, rather than the processed (cf. Desmond, 2014).

The results demonstrate that flood risk mitigation has not always been an issue that requires governing on the societal level in the past. However, its more recent *governmentalization*—the process of institutionalization that turned flood risk mitigation into something governable on the societal level—is neither simple nor homogenous, but composite and multifaceted. There are at least four constituent processes: (1) *reductivization*, (2) *projectification*, (3) *responsibilization*, and (4) *commodification* (Figure 5).

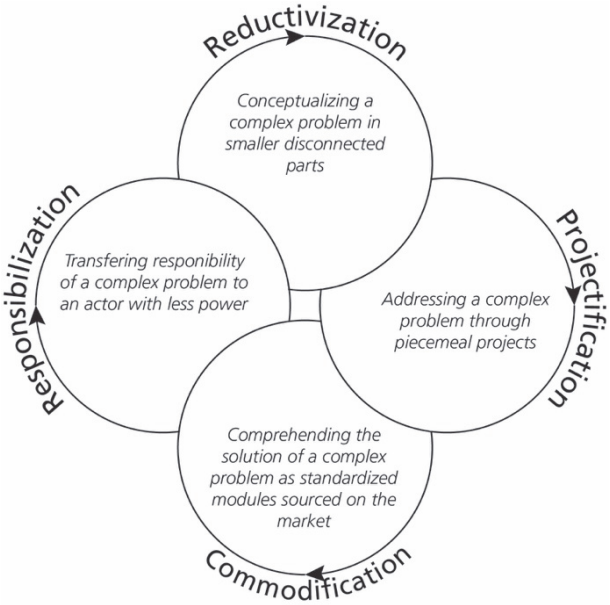

Figure 5. The four constituent processes of governmentalization.

Governmentalization as reductivization

The most fundamental constituent process of the governmentalization of flood risk mitigation identifiable in the results concerns an inherent reductivism applied to the problem. While the problem is clearly complex in both its constitution and potential solutions, the investigated regime of practices entails intricate fragmentation; not only in the ways of doing flood risk mitigation (technologies), but also in the ways of thinking about it (rationalities). This reductivism concerns the latter, even if it is important to remember that they are intrinsically linked and both are necessary to grasp the governing of anything (Dean, 2010; Miller and Rose, 2008).

Much of the fragmenting rationalities so clearly visible in the regime of practices are reducing the complexity of flood risk mitigation by partitioning it into disconnected parts that are easier to grasp in isolation. This pervasive reduction of complexity is evidently undermining flood risk mitigation. However, the process of reducing the complexity of flood risk mitigation is fundamental for the issue to become governable in the first place, as it renders reality understandable in a way that makes it amenable to analysis and action (cf. Miller and Rose, 2008: 15–16). I refer to this process as *reductivization*, in order to stress the active process of conceptualizing a complex problem as many smaller, disconnected parts.

Luhmann (1979) suggests that reducing complexity is an existential need of all human beings. While not everything in the world has become increasingly complex, much has, and continues to (Nowotny, 2005). Especially in the social sphere (e.g. Durkheim, 1984; Luhmann, 1995: 403). The sense of increasing complexity is also epistemological and driven by increasing knowledge of how things work. When faced with unfathomable complexity, human beings struggle to gain a sense of control, in an otherwise unbearable situation (Nowotny, 2005: 19–20), by reducing the complexity through a broad range of social, cultural or technological means (Luhmann, 1995). The reductivization of flood risk mitigation is, then, a typical human response to the otherwise seemingly overwhelming complexity of the problem.

Other scholars suggest that simplifying complex problems and the available solutions can make it seem that actors have them under control (van Bommel et al., 2009) and silence alternative viewpoints (Boyd et al., 2014: 148–149). Power over the framing of the problem is, thus, crucial (see Boström et al., 2017). This is visible in the dominant mode of thinking of flood risk as a local problem that requires local solutions. If a more relational, catchment-oriented mode of thinking were to prevail, flood risk mitigation would

demand more attention and coordination, and many current solutions would become infeasible without significant additional investments in mitigation measures. However, the results provide little evidence of direct strategic calculation in this regard, but allude to prevalent routinization of the fragmented rationalities. Power is exercised in the rationalization of the current regime of practices (Flyvbjerg, 1998), and fragmentation is taken for granted, hidden in plain sight. The reductivization of flood risk mitigation is, as such, institutionalized through the mechanism of increased objectification, which was discussed earlier.

The reduction of complexity is not only institutionalized in the governing of flood risk mitigation, but forms the basis for the dominant Newtonian paradigm in science (Heylighen et al., 2007). This paradigm holds that "to understand any complex phenomenon, you need to take it apart, i.e. reduce it to its individual components. If these are still complex, you need to take your analysis one step further, and look at their components" (Heylighen et al., 2007: 118). Although there is a growing critique of such reductivism (e.g. Byrne and Callaghan, 2014; Castellani and Hafferty, 2009; Nowotny, 2005; Urry, 2005; Walby, 2007), it still dominates both in research and education. Reductivization, therefore, appears to be profoundly institutionalized in science: the main source of legitimization in the modern world. Although all theories require a certain degree of reduction of complexity (Cilliers, 2005), a theory that completely undermines our thinking and doing is not a particularly useful theory.

To summarize, *reductivization* is one of the constituent processes of the governmentalization of flood risk mitigation. It refers to the conceptualization of a complex problem as smaller, disconnected parts (Figure 5).

Governmentalization as projectification

The second constituent process is tightly linked to the first, and concerns how the issue is addressed. While the problem is clearly complex, as just discussed above, it is divided up into more or less arbitrary pieces addressed in detached projects. Each action (e.g. a detailed development plan, the dyke protecting Lomma from coastal floods, or the restoration of agricultural drainage) is turned into a project with its own objectives, activities, actors, and budget. I refer to this process as *projectification* and define it as the process of addressing a complex problem through a multitude of piecemeal projects. It comprises thus, in a sense, an important part of the technology-side of the conspicuous fragmentation in the governing of flood risk mitigation, with the rationality-side being covered by the process of *reductivization* elaborated on above.

It is important to note that concepts of projectification have been used in a range of scientific disciplines since Midler (1995) first coined the term and Maylor (2006) relaunched it in the social scientific literature. Most notably in the domain of business administration and management (e.g. Bergman et al., 2013; Maylor et al., 2006), but also in the context of public administration (e.g. Fred, 2015; Godenhjelm et al., 2015). Notwithstanding substantial variation in definitions and approaches, it generally refers to a repackaging of activities into projects and the associated adaptations to practices. Examples include creating project teams from different formal organizational structures (Fred, 2020), shifting from vertical to horizontal communication, and power from hierarchical line managers to project managers (Maylor et al., 2006). It has been claimed that the combination of relatively stable organizational structures and the flexible mobilization of actors and resources brings controllability and creativity to bear on the challenges faced by public organizations (Fred, 2015: 49–50). While these contributions are helpful to explain change within the involved organizations, I would like to draw upon a broader sociological critique to further grasp the governmentalization of flood risk mitigation.

Boltanski and Chiapello (2005) show how *the project* has not only become the dominant form of managing formal issues in both corporate and public spheres, but also a main vehicle for personal fulfilment. Individual actors engage in projects with particular objectives, and are rewarded when the project ends and the stated objectives are met. Then, they move on to the next, and perhaps even more interesting project, creating a sense of meaning and accomplishment (Boltanski and Chiapello, 2005: 90–96). This phenomenon is claimed to be pervasive in both professional and private life (Anders Jensen et al., 2016). Meeting the project's objectives is thus the principal goal of actors. However, these objectives are in themselves disintegrated as the projects are designed in piecemeal fashion over time, and result in an array of projects that are related along various crucial dimensions, but lack coordination and a common direction (cf. Jennings, 1994: 53). There is consequently a strong link between a fragmented public sector and the increasing importance of projects, which has been demonstrated before in Sweden (e.g. Fred, 2015; Jensen and Trägårdh, 2012).

While projects can be an efficient way to organize activities that generate expected results and meet particular objectives, it is evident that these objectives can clash when considering the many projects in the governing of flood risk mitigation as a whole. While one project can meet its objectives—making it a success to be celebrated—it's results can undermine the objectives

of other projects and may aggravate flood risk somewhere else. Such unanticipated consequences of purposive action have attracted attention from researchers for centuries (e.g. Smith, 1869: 84–85) and are a fundamental aspect of projectification.

The unanticipated consequences of flood risk mitigation projects can be partly explained by the paramount concern of actors to meet their objectives. Merton (1936: 901) calls this the "imperious immediacy of interest", which overshadows any considerations of other consequences of the same activities. This focus is institutionalized through the mechanism of increasing returns, discussed earlier. Merton (1936) also asserts the role of certain fundamental values in directing the involved actors towards a certain action, effectively blinding them of its further consequences in the catchment area. Although Merton (1936) is correct in pointing out significant differences between these two causes of unanticipated consequences, these values are institutionalized through the mechanism of increasing commitments to normative expectations (Selznick, 1949: 256–257) that in turn can grow out of the repeated practices of focusing on generating the expected results. The two seem, in other words, to be closely linked.

The results suggest an additional cause to Merton's (1936) framework of unanticipated consequences of purposive action. This is clearly visible in the routinized and taken for granted ways many actors engage in their projects of flood risk mitigation. Here, unanticipated consequences are not caused by actors who are pursuing an immediate interest or fulfilling a normative expectation, but by their routinized action without reflection over other interests and expectations. This routinization is driven by the mechanism of increasing objectification (Berger and Luckmann, 1966), but can grow out of the repeated practices of focusing on generating the expected results or fulfilling normative expectations (cf. Scott, 2014: 147–150).

It is clear that the projectification of flood risk mitigation opens up a Pandora's box of unanticipated consequences that threaten to exacerbate flood risk. On the other hand, it has also provided the involved actors with projects that can be implemented. Projectification denotes, therefore, more than a qualitative transformation in the organization of activities into projects and associated practices to meet some predefined objectives, and a quantitative increase in the number of such projects, regardless if driven by ideas of increased efficiency or merely as a fashionable way of organizing activities (Godenhjelm et al., 2015: 326–327). It is also a process of reducing complexity (cf. Fred, 2015: 51; Godenhjelm et al., 2015: 327) and plays a fundamental role in making flood risk mitigation governable.

To summarize, *projectification* is a constituent process in the governmentalization of flood risk mitigation, in which the complex problem is addressed through piecemeal projects (Figure 5).

Governmentalization as responsibilization

The third constituent process concerns the allocation of responsibility among actors. It is clear that the responsibility for flood risk mitigation has emerged rather recently. It is equally clear that this responsibility is not evenly distributed between the various actors, but instead largely concentrated to municipal administrations. I refer to this as *responsibilization* and define it as the process of transferring responsibility for a complex problem to an actor with less power and without appropriate resources to assume it.

There is a rich literature using concepts of responsibilization to describe and explain how subjects become responsible for aspects of social life that were previously the duty of another—usually a state actor—or not recognized as a responsibility at all (e.g. Dean, 1997; Joseph and Juncos, 2019; Rose, 1999; Shamir, 2008). It is most commonly considered in relation to individual subjects, but can also refer to collectives of private citizens, such as families, households, and communities (Dean, 2010: 194), as well as organizations (Rose, 1999: 236–237). While private citizens are increasingly responsibilized to prepare for and respond to actual floods (Rådestad and Larsson, 2018), and the results contain attempts of responsibilizing them also for mitigating flood risk, it is so far mainly the municipal administrations that are subject to the responsibilization of flood risk mitigation.

I acknowledge that this is a somewhat unconventional application of the concept of responsibilization, since municipal administrations are themselves state actors. However, the process is the same, and I argue that this broader conceptualization of responsibilization may be constructive when used in relation to governmentality in general. While the distinction between the private and the state is crucial in such theoretical perspectives, it is the asymmetry of power that is the decisive feature in any responsibilization (cf. Hannah-Moffat, 2000). Lemke (2002: 53) alludes to this when asserting that it is the responsibilization of subjects that is "forcing them to "free" decisionmaking in fields of action", and Shamir (2008: 7) explains that this kind of power "relies on predisposing social actors to assume responsibility for their actions". This intrinsic connexion between power and responsibility has been explicitly suggested in relation to the governing of flood risk (Butler and Pidgeon, 2011).

Selznick (2002) distinguishes between following rules and assuming responsibility. He suggests that the former concerns an actor who engages in activities under the threat of sanctions if she or he does not abide by the rules, while the latter presupposes that the actor is motivated to act without coercion. Responsibilization can thus work by predisposing actors to *doing the right thing*, through the cultivation of certain values (Shamir, 2008). This focus on normative values is found throughout the governmentality literature (e.g. Lemke, 2001; O'Malley, 1996; Schweber, 2014), but is only related to one of the three principal mechanisms of institutionalization incorporated in new institutionalism (Scott, 2014): increasing commitments to normative values.

The institutionalization of responsibility is also driven by increasing returns in relation to incentives, epitomized in Sweden by the before-mentioned earmarked national funding for risk & vulnerability analyses. Although the role of incentives in the responsibilization of actors is less explicit in the governmentality literature, it appears in Gordon's (1991: 26) introduction to *The Foucault effect* (Burchell et al., 1991)—the seminal launch of governmentality as a theoretical perspective—as well as in more recent studies of the governing of flood risk (Hutter et al., 2014: 279; Rinne and Nygren, 2016: 17–18).

The results show that the institutionalization of responsibility for flood risk mitigation is also driven by an increasing objectification of ideas and predispositions, which limits actors to simply *doing the conceivable thing*. While governmentality perspectives pay less explicit attention to this process, objectification is at their very core (Dean, 2010; Foucault, 1991b). Responsibilization is then driven by the routinization of ideas and predispositions that are acquired through imitation and learning.

Applying the concept of responsibilization to municipal administrations highlights the importance of considering the resources that are available to actors to assume the responsibility. Otherwise, it is easily conflated with processes of decentralization that transfer responsibility to lower administrative levels. While both processes distribute responsibility, decentralization is associated with a commensurate allocation of resources, at least in an ideal sense (Saito, 2011). Responsibilization, on the other hand, connotes a transfer of responsibility without apposite resources (Joseph, 2013). The conceptual relationship between responsibilization and empowerment is identical (Bergström, 2018), which supports my suggestion to explicitly consider the resources available to actors to assume the transferred responsibility important also in relation to private citizens.

To summarize, *responsibilization* is a constituent process in the governmentalization of flood risk mitigation. It refers to the transfer of responsibility for the complex problem to an actor with less power and without appropriate resources to assume it (Figure 5).

Governmentalization as commodification

The fourth constituent process concerns the way many activities are sourced as standardized modules on the market. This refers not only to relying on private companies to execute particular decisions, but also to their input to these decisions. I refer to this process as *commodification*—fully aware of the legacy of this concept, which I elaborate on below—and define it as the process of comprehending the solution of a complex problem as the aggregated effect of standardized modules sourced on the market. I am indebted to Almklov and Antonsen's (2010) seminal paper on what they refer to as *commoditization*, which is equally conceptually entangled, but in business and marketing literature, and not used here to reduce potential Babylonian confusion (see Hagelsteen and Becker, 2014a).

The theoretical underpinnings of commodification come from Marx, and refer to a process through which human activities become commodities with monetary value that can be traded on markets (Abercrombie et al., 2006: 68). Marxists consider such commodification as the engine that drives the continuous expansion of capitalism (Friedland and Alford, 1991: 263) and many influential—Marxist and non-Marxist—scholars agree that there is a tendency towards the commodification of every aspect of social life (Callinicos, 2007: 258): from identities (Rose, 1996b: 344) to ecosystems (Pellizzoni, 2016: 319). It is therefore unsurprising to find significant commodification, in this traditional sense, in the governing of flood risk mitigation. Many of the technologies of the governing of flood risk mitigation, or parts of such technologies, are procured on the market by municipal administrations and, to a lesser degree, by the County Administrative Board and national authorities. However, it is not only each of the procured parts that are turned into commodities, but also the expected resulting safety from floods (cf. Almklov and Antonsen, 2010). Miller (2003) puts forward similar observations concerning the commodification of academic education. Flood risk mitigation itself has become the subject of commodification, in an expanded sense, since it largely takes the form of the ritualized procurement of increasingly standardized modules. Often for the purpose of merely being able to exhibit them to demonstrate that flood risk has been seriously considered.

Commodification of flood risk mitigation is closely linked to the other three constituent processes of governmentalization. It is dependent on, and facilitates, the reductivization of flood risk mitigation. This is in line with the intrinsic reductivism of commodification that Radin (1996) demonstrates so eloquently. It is interdependent with projectification, where different types of projects and sets of associated standardized modules emerge and become increasingly institutionalized over time. Finally, it is largely driven by responsibilization. It is evident that municipal administrations turn to the market when they lack the capacity to assume their responsibilities, which are operationalized in a way so they can fulfil their obligations by simply procuring standardized modules.

To summarize, the governmentalization of flood risk mitigation involves the constituent process of *commodification*, in which the solution to the complex problem is seen as the aggregation of standardized modules that can be sourced on the market (Figure 5).

5.3 The governmentalization of sustainability

Next, I turn to what the governmentalization of flood risk mitigation, in particular, can teach us about the governmentalization of complex sustainability challenges, in general. It is particularly important to remember that my discussion is limited to advanced liberal democracies. The generalizations that are suggested here are, at best, only applicable to governmentalization in such societies. This discussion is divided into two parts that focus on: (1) the potential for analytical generalizations *per se*, and (2) the value of an empirical focus on the most disaggregated unit of analysis.

The neoliberalization of sustainability

It is difficult to find a convincing argument for the generalization of the findings from a particular case study to other cases. Even given the arguments put forward earlier (Sections 1.4 & 3.1), it is always difficult to satisfy critical readers without actual empirical studies that indicate similarities in at least some other cases. Especially those readers with an affinity for the statistical generalizations found in quantitative methods. However, also readers that are more sympathetic to the utility of case study research rightly demand transparent reflection on contextual and historical similarities and differences as a basis for their appraisal of the proposed generalizations (Greenwood and Levin, 2007: 70). Here, I attempt to argue for the generalizability of the four constituent processes of governmentalization; not only regarding the governing of flood risk mitigation in the other Nordic countries, but also of

complex sustainability challenges in advanced liberal democracies in general. Although my argument is partly based on empirical studies that indicate similarities in relation to particular constituent processes in other particular cases discussed above, it is mainly theoretical and seeks to relate the constituent processes to governmentality, which is intrinsic to advanced liberal democracies, and to the underlying process of *neoliberalization*.

It is important to note that neoliberalism can be approached as a policy, an ideology, or governmentality (Larner, 2000), out of which the latter is most useful for this thesis. Here, it is neither "a concrete economic doctrine", nor "a definite set of political projects", but rather "a complex, often incoherent, unstable and even contradictory set of practices" (Shamir, 2008: 3). Neoliberalization denotes the processes that produce these practices, out of which "marketization and commodification have a long pedigree during the geohistory of capitalism" (Brenner et al., 2010: 184). I argue, however, that *reductivization*, *projectification*, and *responsibilization* are also inherent in neoliberalization, and thus general to the governmentalization of complex sustainability challenges in advanced liberal democracies, albeit to various degrees and in different ways depending on the penetration and diffusion of neoliberalism in each context.

Bevir (2011: 459) asserts that neoliberalism is less characterized by the emergence of effectively performing markets "than by the proliferation of networks, the fragmentation of the public sector and the erosion of central control". Fragmentation has also been pointed out as inherent to the New Public Management (Cejudo and Michel, 2017) so tightly connected to neoliberalism (Bevir, 2011: 464; Rose et al., 2006: 95). This indicates that the fragmentation of the governing of flood risk mitigation is likely to be a pervasive effect of neoliberalism. The generality of this claim can be further substantiated if the fragmentation of the regime of practices is separated into the fragmentation of doing (projectification) and the fragmentation of thinking (reductivization).

Boltanski and Chiapello (2005) dedicate a significant part of their eloquent critique of the new spirit of capitalism to demonstrating how projectification is an immanent effect of neoliberalism. It is not the case that the market is the only institutional logic in advanced liberal democracies, but rather that it is in the intersection and contradiction of multiple institutional logics that such transformation may occur (Friedland and Alford, 1991). The projectification of governing can, consequently, be understood as the enactment of multiple institutional logics, where neoliberalism introduces and emphasizes market and project logics in relation to bureaucratic and political logics (Fred, 2020).

Projectification is said to be a general feature in efforts to promote sustainable development in this context (Cerne and Jansson, 2019), and neoliberalism is widely suggested as fundamentally reductivist (e.g. Gidley et al., 2010; McAfee, 2003; Nikolakaki, 2012; Wang, 2020). Reducing the complexity of a sustainability challenge is fundamental for it to become governable, as this renders it amenable to analysis and action (cf. Miller and Rose, 2008: 15–16). It is therefore fair to assume that the reductivization and projectification suggested in this thesis are active to various degrees and in various ways in the governmentalization of complex sustainability challenges in advanced liberal democracies in general.

It is also fair to assume that responsibilization is a general feature of such governmentalization. Governmentality in advanced liberal democracies is defined by the notion of free individuals who control, determine, and delimit the liberty of others and themselves (Dean, 2010; Rose and Miller, 1992). Neoliberalism promotes such freedom, understood as a personal choice that transfers responsibility to actors themselves (Bevir, 2011: 465–466). Governing is, thus, largely about making other actors assume responsibility for their own situation and actions. While the concept of responsibilization is widespread in the governmentality literature, its generalizability as a constituent process of governmentalization increases when its conventional focus on private citizens is expanded to all less-powerful actors who lack appropriate resources to assume the assigned responsibility. In this context, I argue that responsibilization is general to the governmentalization of complex sustainability challenges in advanced liberal democracies. However, I would also argue that this conceptualization is more useful also when maintaining the conventional focus on private citizens. This is because an explicit focus on the asymmetry of power and insufficiency of resources, rather than the private sphere *per se*, may help to overcome increasing ambiguities in distinctions between the main institutional spheres of society (see Mol, 2010b: 32).

While commodification has been affirmed as a central feature of neoliberalization (Brenner et al., 2010), it is worth noting the particular importance of agency in this commodification. This is best exemplified by consultants who partly drive an increasing need for their services (Section 5.1). However, other studies suggest that consultants are playing an important role in pushing for neoliberalization itself (Jupe and Funnell, 2015; Martin, 1993: 6). As my results are not suited to such an analysis, I can only suggest that additional research should investigate this interesting and important issue further.

To briefly summarize this discussion, the constituent processes of governmentalization are likely to be active—to various degrees and in different ways—regardless of the sustainability challenge and the context. This would confirm the neoliberalization of sustainability itself, suggested by others (e.g. Hanna et al., 2018; McKenzie et al., 2015), since the ways through which we conceptualize and confront sustainability are laden with processes that are inherent to neoliberalization.

The value of the most disaggregated unit of analysis

Finally, I turn to the value of collecting data at the most fundamental unit of analysis—the social relation between individual actors—when investigating the governmentalization of sustainability challenges. Many of the findings would have been overlooked by more conventional empirical approaches focused on the institutional (macro) level, or on interactions between organizations (the meso level). Even when data collection takes the form of interviewing individuals, most studies miss the micro level as a few participants are selected to represent their organizations and these people are simply asked if their organizations interact or not. This approach disregards the social relations within organizations that, in the present study, proved to be crucial for grasping governing. Moreover, it simplifies the social relations between organizations to the extent that the data becomes thoroughly misleading. For instance, by ignoring the internal structural position of the actors linking two organizations.

These arguments find solid theoretical backing from diverse sources. Ahrne (1994: 28) asserts that "organizations cannot speak or move; they have no legs to walk with, and no eyes to see with. When organizations do something it is always individuals who act". I find this compelling. Actors do not act for themselves, but on behalf of their organizations, which is also how Johansson (2008) describes inter-organizational relations. Organizations interact, in other words, through the individuals who act on behalf of them. Studying inter-organizational relations, therefore, presupposes studying interacting individual actors who represent their organizations. However, as Callon and Latour (1981) suggest, in their seminal chapter on macro-actors, individual actors do not represent their organizations equally, and may be unequally successful in translating the interests, desires, and forces of other actors with whom they form alliances or argue. A systematic description of inter-organizational relations relies not on paying attention to only one arbitrarily selected pair of individual actors who happen to interact across organizational boundaries, but to all such pairs.

Although immensely time-consuming, I am an emphatic advocate of the need to collect relational data at the most fundamental level of analysis, and then analyse it on multiple levels along a relational continuum that spans interacting individuals and society. It is by linking the micro, meso, and macro levels that we can best contribute to increasing our understanding of the complexities of governing risk in general.

Conclusion

In this closing chapter I explicitly answer the research questions, and elaborate on how the thesis meets its purpose, and contributes to closing the knowledge gap. This chapter also explores the potential implications of the study and presents some ideas for future research.

6.1 Answering the research questions

Although there are no short answers to the two research questions, here I expand on the key insights from my work. The aim is to demonstrate how they further our understanding of how complex sustainability challenges become governmentalized in advanced liberal democracies.

Three important features emerge when investigating how flood risk mitigation is governed in Sweden. The most conspicuous is the overwhelming spatial, temporal, and functional fragmentation in the regime of practices, which only serves to undermine the desired effects. The second concerns responsibility for flood risk mitigation, which is firmly placed and maintained in municipal administrations, regardless of attempts to mobilize other actors. The third concerns the role of the market, which has expanded both qualitatively and quantitatively. It is increasingly the case that market actors not only execute specific decisions, but also provide the basis for the decisions. It is thus clear that there is a significant escalation in both the penetration and diffusion of the market into the public sphere.

When examining how the process of governmentalization is conditioning the governing of flood risk mitigation in Sweden, I identify four constituent processes. It involves *reductivization*, in which the complex problem of flood risk mitigation is conceptualized as smaller, disconnected parts. The second is *projectification*, in which the complex problem is addressed through piecemeal projects. While these two processes are intrinsically linked, and combine to undermine mitigation efforts, they are also fundamental for the issue to become governable in the first place. The third process is *responsibilization*, in which responsibility for the complex problem is transferred to an actor that has less power, and lacks appropriate resources to assume it. Here, responsibilization goes beyond the more conventional focus on private citizens, and extends to any actor, based on the argument that it is the asymmetry of power and insufficiency of resources that are its defining features. Finally, the fourth is *commodification*, in which the solution is seen as the aggregation of standardized modules that can be sourced on the market. This conceptualization encompasses both the commodification of a

technology, or part of a technology, and of flood risk mitigation itself, which increasingly takes the form of the ritualized procurement of standardized modules. Commodification materializes in a vacuum of responsibilization, as obligations are imposed on public authorities without commensurate resources. These four constituent processes are interdependent and form a nexus of governmentalization.

6.2 Contribution to the knowledge gap

In this thesis, I set out to contribute to increasing our understanding of how complex sustainability challenges become governmentalized in advanced liberal democracies. The aim is not to close the knowledge gap but, more modestly, to play a part in making it smaller. I hope I have accomplished this and that we now know a little more about the processes through which a complex sustainability challenge become governable on the societal level. I also hope that I have presented a convincing case for a relational sociology that genuinely links micro, meso, and macro levels. There is still much work to be done, however, and I suggest some ideas for future research below.

6.3 Implications of the research

This systemic critique of the governing of flood risk mitigation in Lomma municipality and the Höje Å catchment area has been shared with all participants and a range of other actors. However, I hope that this thesis will have broader theoretical, methodological, and practical implications.

Theoretically, I hope that it provides a foundation for further research into the governmentalization of complex sustainability challenges in advanced liberal democracies, which all are among the biggest contributors to most such challenges today. The sociological perspective that is adopted combines the respective strengths of governmentality and new institutionalism. This approach may not only be useful for studying governmentalization, as such, but also the governing of risk more generally and, more specifically, the development of capacity for governing risk (see Hagelsteen and Becker, 2013, 2019; Scott et al., 2014).

Methodologically, I hope that it will inspire more empirical research that explicitly links micro, meso, and macro levels of the governing of risk and sustainability, with the social relation between individual actors as the fundamental unit of analysis. While combining quantitative and qualitative methods is increasingly common, most studies only collect data from individual participants in their capacity as representatives of their organizations and, therefore, entirely exclude the micro level. Studies that do

use the social relation between individual actors as the fundamental unit of analysis are often either reductionist (in the sense of only studying an arbitrary part of a much larger network of actors), or lack validity due to a low response rate. The latter is particularly problematical as whole network approaches are exceptionally sensitive to missing data. I understand the reluctance to invest extraordinary time into data collection, but I hope that my thesis shows that it may be worth it.

Practically, I hope the thesis can contribute to a broader and deeper awareness of the intricacies of how complex sustainability challenges are being governed, as well as becoming governable, and the problems that entails for our collective capacity to address them. This is a fundamentally important point, as the sustainability of our societies depends on overcoming them. Let us not continue to be like the blind monks approaching the elephant.

6.4 Future research

The more I have learnt myself, the more I realize that additional research is needed. Most pressingly, I would like to be able to interview and observe specific actors who hold key, structural positions in the network, to get a deeper, qualitative understanding of their roles, before the current network changes too much. I would also like to see studies of the governmentalization of other sustainability challenges in Sweden or other Nordic countries, or of flood risk mitigation in other advanced liberal democracies (preferably applying a similar methodology). Such studies would be a welcome opportunity to further examine the generalizability of my theoretical contributions. Another interesting avenue would be to study the governmentalization of complex sustainability challenges through ethnography, and examine sequences of interaction qualitatively, and over time. Such a methodological approach would also be time-consuming, but potentially rewarding as it would provide an opportunity to grasp the deeper meaning of the various characteristics of governmentalization. Finally, it would be useful to run a comparative study of the governing of flood risk mitigation and the governing of the response to actual floods. This would be interesting both in terms of the actors and their roles in the networks that govern these related issues and, more broadly, the institutionalization of their regimes of practices.

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Paper I

Article

Politics and Space

EPC: Politics and Space
2021, Vol. 39(2) 393–413

DOI: 10.1177/2399654420940727
journals.sagepub.com/home/epc


Fragmentation, commodification and responsibilisation in the governing of flood risk mitigation in Sweden

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Abstract

The purpose of this paper is to increase our understanding of the governing of flood risk mitigation in advanced liberal society, through an in-depth Swedish case study. By combining social network analysis and genealogy, this paper investigates who is involved, how they organise, their modes of thinking, how they mitigate flood risk, as well as how such regime of practises have come into being. The findings suggest dominant rationalities that reduce the actual complexity of flood risk in spatial and temporal terms to fit the legal and institutional environment. The resulting fragmentation is associated with a commodification of flood risk mitigation, in which actors expect to be able to procure modules of safety and sustainability on the market. This commodification materialises in a vacuum of responsibilisation, when obligations are imposed without commensurate guidelines. These processes of fragmentation, commodification, and responsibilisation are core constituents of neoliberalisation, which is clearly shaping the governing of flood risk mitigation even in Sweden; a bastion of the strong welfare state. Regardless of the notable individual capacities of the involved actors, systemic constraints in the governmentality have generated these detrimental processes in the face of overwhelming complexity. These systemic constraints must be removed or overcome for the governing of flood risk mitigation to match the complexity of flood risk in the catchment area. This paper thus provides input that can inform policy changes for a more sustainable future in the face of unprecedented change.

Keywords

Governmentality, governing, flood risk, fragmentation, commodification

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Introduction

Flood risk is a great global concern (Grobicki et al., 2015).While many of the most vulnerable live in developing countries (Dilley et al., 2005), flood risk is threatening to undermine sustainable development also in the most affluent liberal democracies (Priest et al., 2016). This has spurred intense interest in the systems governing flood risk across administrative levels (Johannessen et al., 2019). Foucault's contribution focuses explicitly on governing in advanced liberal society—conceptualised as governmentality (Miller and Rose, 2008)—and has informed important thinking about governing sustainability in general (e.g. Lövbrand et al., 2009) and water issues in particular (e.g. Vos and Boelens, 2014). However, few scholars have applied these perspectives to the governing of flood risk (e.g. Butler and Pidgeon, 2011; Demeritt and Nobert, 2014).

Sweden is an advanced liberal society, struggling with escalating flood risk. The Swedish legal framework concentrates responsibility for mitigating flood risk to the municipal level. The constitution (SFS 1974:152) stipulates local self-government and the Planning and Building Act (SFS 2010:900) grants municipalities sovereign right to adopt land use plans, explicitly pointing out considerations for health, safety, and floods (Ch.2, Sect.5). The municipalities are responsible for removing surface water from settled areas (SFS 2006:412), for mitigating risk (SFS 2003:778), and for assessing risk and vulnerability within their jurisdiction (SFS 2006:544). The decentralisation cuts across most policy areas in Sweden, making municipal administrations relatively large and complex organisations. Governmentality has been suggested to be a particularly well suited analytical perspective when studying such organisational settings (Fougère, 2010).

It is not until the last decade that flood risk has become a priority issue for many Swedish municipalities. For Lomma Municipality in Southern Sweden, it started with the floods in July 2007. Although not catastrophic, they were enough to disrupt everyday life for many people. Significant floods had happened 75 km away in Kristianstad in 2002, but flood risk had not been considered much of a problem in Lomma before. Then, the cities of Copenhagen (2010) and Malmö (2014) experienced the worst floods in modern history. It was instantly appreciated by policymakers, professionals, and the public that those cloudbursts could just as well have occurred in Lomma, only 10–30 km away. The flood risk mitigation activities that had started to attract more attention in 2007 escalated and flood risk was suddenly a priority issue to govern for the sustainable development of society. But floods did not start to happen in 2007. There are documented examples of significant floods in Lomma throughout the last century (Simonsson et al., 2017). There have been legal provisions for mitigating flood risk in Sweden since the mid 1980s (SFS 1987:10; SFS 1986:1102; Prop., 1985/86:150 Bil. 3), and practices to reduce the risk of being affected by floods have been around since time immemorial (cf. Swierczynski et al., 2013). However, it is not until the last decade that the governing of flood risk is called into question, and programmes are launched to strengthen it. This recent problematisation of flood risk is particularly interesting to study with a governmentality perspective, which focuses not only on how flood risk mitigation is governed in contemporary Sweden, but also on how it has become something governed in the first place (Dean, 2010).

Although all Swedish municipal administrations have civil servants working at least part-time on issues explicitly related to the mitigation of flood risk, its governing entails a network of actors from both within and outside the administration (Renn, 2008). This paper therefore involves an approach to governmentality that combines structural and genealogical analysis, expanding Foucault's first notion of governmentality, as an assemblage of "the institutions, procedures, analyses and reflections, the calculations and tactics" (Foucault,

1991: 102), to an even more catholic conception of rationalities and technologies that also include networks of involved actors (Miller and Rose, 2008: 34–35).

The purpose of this paper is to contribute to our understanding of the governing of flood risk mitigation in advanced liberal society, through an in-depth case study of Lomma municipality in Sweden. By investigating who is involved, how these actors organise, their modes of thinking, how they mitigate flood risk, as well as how such regime of practises have come into being, the paper attempts to provide a critique that can contribute to more effective governing of flood risk mitigation for the sustainable development of society. To meet its purpose, the paper attempts to answer the following research question:

How is the current problematisation of flood risk mitigation affecting its governing in Lomma Municipality, Sweden?

Theoretical framework

The processes behind floods are complex and any specific flood event can be the result of a combination of pluvial, fluvial, coastal, and groundwater processes in the hydrological cycle (Becker, 2018). Mitigation of flood risk is here defined as comprising all proactive activities that reduce the likelihood of floods and/or their consequences before occurring (Coppola, 2011). Although risk is a more contested concept (Aven and Renn, 2009), most definitions share some explicit or implicit notion of risk as a combination of likelihood and consequence (Becker, 2014). However, it is important to note that there is nothing objective about risk, since any notion of it is based on perceptions, is culturally mediated, and can be socially amplified (Renn, 2008). Risk can also be viewed as governmentality in itself; a rationality and technology for governing the self and society (Ewald, 1991). However, this paper is not about *risk as governmentality*, but about the *governmentality of risk*. It is about the governing of the mitigation of flood risk, where uncertain and socially constructed notions of likelihood and consequence are acted upon to anticipate and address potential floods.

The governing of risk has been approached from a range of perspectives, spanning from rather technocratic frameworks (Meyer and Reniers, 2016: 294) to more descriptive accounts of different risk regulation regimes (Hood et al., 2001). Risk governance, in contrast to traditional risk management, emphasises situations with many actors, but no single authority who can make binding decisions, considering multiple and often conflicting values (Renn, 2008). It examines "the complex web of actors, rules, conventions, processes and mechanisms" engaged in governing risk (Renn, 2008: 9). Governmentality has proven a useful heuristic when studying the governing of a range of risks (O'Malley, 2008), including flood risk (e.g. Butler and Pidgeon, 2011; Demeritt and Nobert, 2014). It is customised to investigate governing in advanced liberal societies (or late modern), where power is distributed and people are not only governed directly from above, but also through their own regulated choices as free and responsible actors (Miller and Rose, 2008).

Miller and Rose (2008) suggest to start any analysis of governing in such contexts from the practices of governing themselves. Governing is in this context defined as the "conduct of conduct" (Dean, 2010: 17). It is the situated activities undertaken by various actors, employing a range of technologies and rationalities, seeking to shape conduct by influencing the beliefs, interests, desires and aspirations of others, as well as themselves, for specific but shifting objectives and with relatively unpredictable outcomes (Dean, 2010; Rose and Miller, 1992). Governmentality is then how governing is done in advanced liberal society (Miller and Rose, 2008). Rationalities are here modes of thinking; ways of rendering reality

thinkable in such a way that it is amenable to analysis and action. Technologies, on the other hand, refer to all people, techniques, tools, definitions, equipment and other resources that enable actors to envisage and act upon the conduct of others, individually and collectively, and often on a distance (Miller and Rose, 2008). Investigating how the current problematisation of flood risk mitigation is affecting its governing requires studying the regime of practices comprising the rationalities and technologies through which that is done (Dean, 2010).

Studying governing entails attention to the complex interdependencies that enable programmes of governing to act upon the places and actors of concern (Miller and Rose, 2008). This involves the perspective that the mitigation of flood risk is jointly governed by a network of actors (Renn, 2008), who are not independent of each other but dependent on various resources and affected by the decisions and actions of others (Becker, 2014). The patterns of social relations among actors in such "networks of rule" (Rose and Miller, 1992: 189) are fundamental for society's capacity to reduce risk (Becker, 2018; Ingold et al., 2010). These social relations are not only formed because actors are dependent upon each other for some resource, but also when actors convince each other that their problems or objectives are shared or linked, and can be addressed together (Miller and Rose, 2008). Regardless of how the social relations are formed, they denote some kind of dependence after being established (Luhmann, 1979).

Governmentality is as such fundamentally relational (Emirbayer, 1997), but there are different approaches to such relationality: Structural approaches that represent various social relations formally to be analysed using graphical or mathematical methods (Borgatti et al., 2018), and interpretative approaches that study their meaning and the context they are embedded into (Dean, 2010; Walters, 2012). While both has their respective strengths and weaknesses, combining the two has been suggested for a rich relational analysis (Crossley, 2010).

Studying a regime of practices presupposes the identification of the actors involved. One way of doing that is to start with actors known to contribute actively to mitigating flood risk—with known local "centres of calculation" if you like (Miller and Rose, 2008: 20)—and trace who they are dependent on in this regard. This requires an operationalisation of relevant dependencies. Although there are numerous kinds of dependencies and many ways to categorise them, Becker (2018) suggests a framework of seven types that is deemed sufficient for the purpose of this study: reports of activities, equipment and material, funding, technical information, rules and policy, advice and technical support, and pepping and moral support.

Methodology

Case study research is a central methodology for more localised and empirically oriented studies of governmentality (Dean, 2010; Miller and Rose, 2008). A single-case study research design with multiple embedded units of analysis was used (Yin, 2003), selecting an extreme case. However, to be considered extreme has less to do with extreme magnitudes of flood risk and more with the complexity of the flood problem. Lomma is a town in southern Sweden that fits that description (Becker, 2018). It is exposed to as many types of floods as possible and is currently experiencing significant changes in terms of population growth and urbanisation, exploitation of new areas, and densification of existing areas.

Social network analysis (Borgatti et al., 2018) and genealogy (Walters, 2012) were combined to study both structural and interpretative aspects of the governing of flood risk

mitigation. Although social network analysis is unconventional for studying governmentality, O'Malley (2008:68–69) argues that governmentality perspectives are both theoretically and methodologically flexible, and thus open to be articulated with sociological analysis. He even carefully suggests such cross-fertilisation to overcome common challenges. Social network analysis has been suggested the most developed and widely used structural approach (Emirbayer, 1997: 298) and genealogy the conventional interpretative approach to governmentality. Both parts presuppose knowledge of the social organisation of contributing actors in its entirety. Since its boundary was unknown from the outset, the respondents were selected by means of snowballing (Borgatti et al., 2018). The snowballing started with 10 respondents within the municipal administration identified as likely to contribute to the mitigation of flood risk, using a name-generating question concerning who each respondent depends upon for input to be able to contribute to mitigating flood risk. It continued until no more new respondents were identified. This resulted in 35 respondents within the municipal administration, together identifying 105 formal actors (including the respondents themselves) who contribute to the governing of the mitigation of flood risk in the municipality (Table 1).

The social network data were collected through structured interviews. The dependence between actors was operationalised as the importance of the seven different types of input listed above, rated on a five-point Likert scale from not at all (0) to extremely important (4). The respondents were also asked to rate the level of trust they have that they will be provided with the input they need from each identified actor (on a similar Likert scale from no trust to full trust), and to rate the level of influence these actors have over the respondents' ability to contribute to mitigate flood risk (from no influence to extremely big influence). The importance of the different inputs was then aggregated and normalised (divided by the maximum possible sum of 28) to produce a scale between zero (no importance) and one (maximum importance). The strengths of trust and influence were also equally normalised for coherence.

Table 1. Types of actors contributing to the governing of flood risk mitigation in Lomma Municipality.

Type of actor	#	Note
Lomma municipal administration	35 + 16 = 51	35 respondents plus 4 that have left the organization, 3 administrative managers not considering themselves as contributing, 8 technical staff performing practical tasks (only interviewing their team leaders), and 1 municipal call centre
Other municipal organizations	5	Höje Å Water Council, the Fire and Rescue Services, the Erosion Damage Centre, a neighbouring municipality outside the catchment area, and a municipality in another part of Sweden
County Administrative Board	6	6 civil servants
National authorities	13	4 named individuals and 9 identified with the name of the organizations
Private companies	23	Mainly consultancy firms and contractors, but also insurance companies in relation to past flood damages of households that are used as input for flood risk mitigation
Universities	2	2 nearby universities
Private citizens	2	Citizens and landowners
No organization type	3	A legislation, former court rulings, and a reference group
TOTAL	*105*	

Qualitative data were collected through an open qualitative question during the interviews, asking the respondents who, what organisation, part of organisation or type of actor, in the entire universe, they consider having most influence over the mitigation of flood risk in Lomma. The question was probed until the respondents could not list more (no rank), or a maximum of five had been listed. Qualitative data were also collected through the informal interviews ensuing from the conversations around the formal interview parts. Data for the genealogy were also collected in the form of maps, legislation, policies, court rulings, strategies, plans, and consultation minutes.

Each interview took between 60 and 90 minutes, with a few shorter interviews with actors less engaged in flood risk mitigation. All interviews were done face-to-face to minimise non-responses and to allow for clarifications and probing (Borgatti et al., 2018) and the informal interviews. The social network data were analysed with the assistance of the software UCINET (Borgatti et al., 2002) and the qualitative data were analysed using a series of coding and categorisations (Charmaz, 2006).

The social network data were analysed for factions and different centrality measures. Faction analysis is a conventional way to identify subgroups in a network based on how the actors interact, regardless of their formal organisational structure (Borgatti et al., 2018). It entails optimising the division of the actors into a set number of groups based on the extent to which the groups form separate clique-like structures (Borgatti et al., 2002). A final proportion correct is then calculated to assess the fit of the optimisation function (0 = no fit; 1 = perfect fit). Centrality measures are commonly used to analyse power structurally (Scott, 2004). The more an actor has many actors being highly dependent on her input, the more local control she has over resources. This is operationalised as in-degree centrality (Borgatti et al., 2018). The more an actor falls on the shortest paths between pairs of other actors, the more control she has over resource flows through the network, which is operationalised as directional betweenness centrality (Brass and Burkhardt, 1992). Finally, the more influence an actor has over other influential actors, the more structurally powerful she is (Brass and Burkhardt, 1992). This is operationalised as in-eigenvector centrality.

Results

The results of the study are presented in four main sections. The first summarises the overall findings of the historical developments of Lomma and its flood problem. Thereafter follows two sections presenting the analysis of the actors involved in mitigating flood risk and of how they organise and do so. The last section summarises modes of thinking among the respondents.

The past influencing the present

The highest points of what is today Lomma Municipality started to be visible over the sea surface around 13 200 years ago, after having been pushed down by the Scandinavian Ice Sheet. The lime-rich soils of the area turned out to be excellent when agriculture was introduced, the water was rich in fish, and the ice had deposited clay that eventually turned into a valuable resource. Although Lomma was mentioned as early as 1058, it was still in early 19th century just a village of about 20 houses along the eastern bank of the river Höje Å (Figure 1).

The brick making expanded with the Industrial Revolution and by early 20th century there were wall-to-wall brickyards where the old village had been and at the mouth of the river (Figure 1). A pier had been constructed to protect the harbour in the river, obstructing

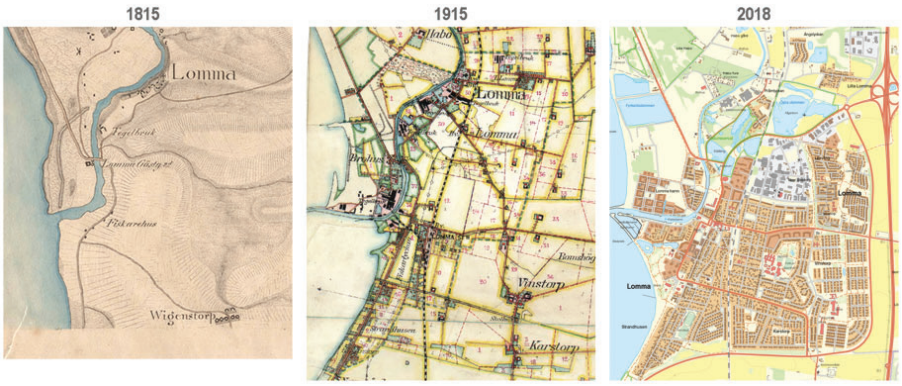

Figure 1. Maps of Lomma town from 1815 (Skånska rekognosceringskartan), 1915 (Häradsekonomiska kartan), and 2018 (Lantmäteriets karta).

natural sedimentary movements resulting in accretion to the north and erosion to the south. The town centre had moved down to just south-east of the river mouth, but still comprising mainly small fishermen's houses along the main road and larger villas along the street to the train station built half a century earlier.

Urbanisation, which had just begun in 1915, escalated in the course of the 20th century, and the town started to extend across the fertile farmland that once was the reason for settling there (Figure 1). The population grew by an order of magnitude per century, from hundreds in early 19th century to tens of thousands today. Similarly for the towns upstream, Lund had barely grown outside the ancient town wall in 1915 and Staffanstorp did not yet exist. Today, they drain large areas with their impermeable surfaces and storm water drainage systems, affecting river flow downstream. The first such drainage systems in Lomma were ad hoc and not based on any long-term planning. Although that started to change in the mid 20th century, the drainage of new areas continued to be connected to these poorly documented older systems until recently. The eroded land south of the river mouth was reclaimed and extended in mid 20th century to provide space for both urban and harbour expansion, and after the last factory across the river closed in 1977, the new millennium has seen residential areas also being built there; along the beach and river (Figure 1). These developments are linked to a radical demographic transformation of Lomma in the last half century, from a rather disadvantaged working-class town with two-third majority support for the Social democratic party, to an affluent seaside town with strong support for the Conservative party.

Although areas along the river and coast, as well as local topographical low points, have been temporarily submerged throughout the ages, floods were rare in 1815, with the village located on the higher of the two riverbanks. Floods were still rare in 1915. Even if much of the wetlands in the river's catchment area had been drained in the agricultural developments of the previous century, there was still much space within Lomma town itself to divert and retain water from an overflowing river, storm surge, as well as heavy rainfall. Floods are still relatively rare today, but flood risk has been exacerbated by a complex combination of decisions and actions throughout history and is anticipated to be further aggravated in the future.

Actors involved

There is substantial diversity among the 105 actors contributing to the governing of flood risk mitigation in Lomma Municipality (including the 35 respondents), representing both public and private spheres, and spanning from local to national levels (Table 1). All of whom being either highly educated (many MSc and even PhDs), very experienced, or both. However, it is striking to note that no actors representing any of the municipalities upstream in the catchment area are identified by the respondents, regardless of the impact upstream activities have on river flow through Lomma.

There is also great diversity among the 35 actors (the respondents) actively contributing to mitigate flood risk within the municipal administration itself (Table 2). This is in sharp contrast to before the 2007 floods, when flood risk mitigation engaged few staff working with water and sewage, tasked to manage storm water from rainfall with return periods up to ten years, and planners working on detailed development plans, which have been legally required to consider flood risk since the mid 1980s (SFS, 1987:10). This intensification of focus is particularly evident in the comprehensive plans stipulating overall land use, which do not mention flood risk at all in the comprehensive plans from 1990[1] and 2000. In contrast to dedicating a full chapter to it in 2010, and using flood risk as a key planning assumption throughout the plan. Although the increasing focus on flood risk in the detailed development plans started already the two years before the 2007 floods, in the planning of the new developments along the river and coastline, flood risk was generally addressed rather nominally in both planning and urban drainage. Moreover, most respondents who had worked at the municipal administration for long time refer to the flood in 2007 as the initiating event:

"Everything started with the floods in 2007." (Male head of department)

Social organisation and action

Patterns of interaction within the municipal administration. There are still most actors engaged in flood risk mitigation at the Technical- and Planning departments (Table 2), but the analysis displays significant interaction between the many involved parts of the administration[2]. To grasp the regime of practices, the interaction is first explored structurally with faction analysis (see Methodology) to identify more informal groups in the institutional arrangements.

Table 2. Actors per part of the municipal administration contributing actively to the governing of flood risk mitigation.

Part of administration	#
Political governance	3
Senior management	1
Technical department	11
Planning department	9
Environment and Building Department	4
Property Department	2
Financial Department	2
Administrative Department	1
Service Department	1
Staff Unit	1
TOTAL	*35*

This elicits particularly interesting results when done with nine factions[3], with remarkable congruence of tasks (Table 3). This means that the identified factions correspond to groups of actors contributing to the mitigation of flood risk in similar ways. It is then particularly interesting to consider the structural positions of each faction in relation to other factions and the network as a whole (Figure 2).

The strategic decisions and coordination faction (red) is most central in the network, with planning and building permits (yellow) and water and sanitation (dark blue) on each side. Planners are, however, much more central in the network than building permit staff, and everything in the water and sanitation unit revolves around its manager. The two parts of the municipal administration nominally engaged already before the recent problematisation of flood risk are thus still central, but now having flood risk as a priority issue and the active support and coordination of politicians, senior management, and an environmental strategist driving the work. This suggests that the main activities comprise planning and water and sewage, but with several other functions having either supporting or subsidiary roles (Figure 2), and that the mitigation of flood risk has transformed from a technical- to a political issue:

> *"Flood and climate issues are high on the agenda with us. We love our water but are located in an exposed manner, here furthest down along the river and beach." (Male politician)*

> *"I have worked a long time to get everybody involved. Some came along right away. When the politicians started to think it was important, all managers became interested and then everybody was involved shortly thereafter. [. . .] More or less interested." (Female civil servant)*

Table 3. Types of factions contributing to the governing of flood risk mitigation in Lomma Municipality (colour references in faction descriptions refer to Figure 2).

Faction description	#	Comprising actors
Strategic decisions and coordination (red)	7	Politicians, top-level managers (head of department and up), and an environmental strategist
Planning and building permits (yellow)	7	Head of the Planning Department, planners and building permit staff
Water and sanitation (dark blue)	5	Water and sanitation staff
Regress claims after floods (light blue)	2	Legal and administrative staff administering regress claims after floods that serve as input to risk reduction investments in the urban drainage system
Roads and parks (dark green)	3	Roads, traffic and parks planning, development and maintenance staff
Project implementation (light green)	3	Staff implementing projects mitigating urban flood risk or supporting such projects with specific knowledge and land purchases
Property development and GIS (brown)	3	Property development manager and staff responsible for the buildings owned by the municipality, and GIS support staff
Finance and land purchasing (pink	3	Finance manager and staff, and land purchasing staff
Risk management and environment (orange)	2	Municipal risk manager, and environmental inspector
TOTAL	*35*	

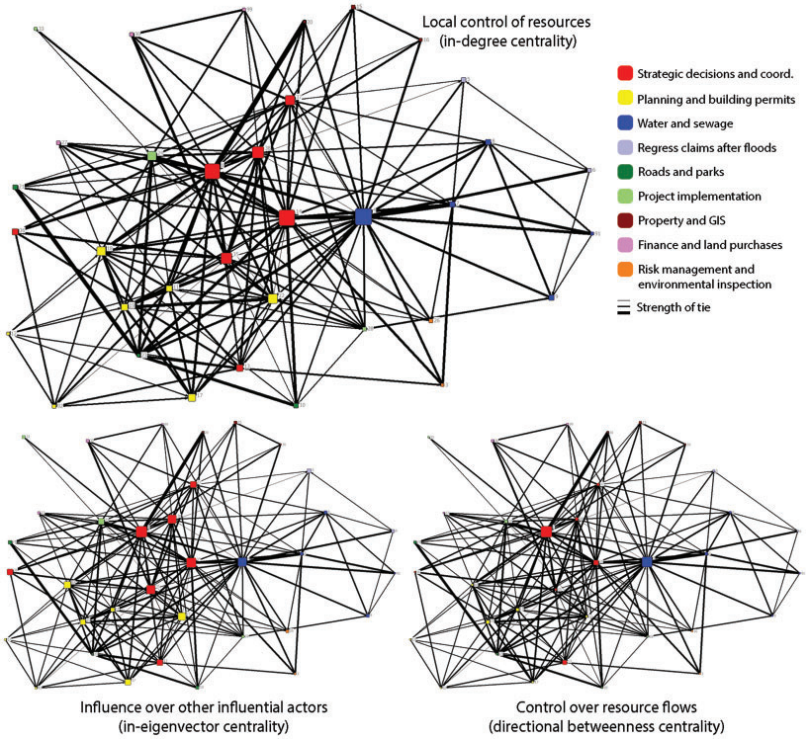

Figure 2. Network of all seven dependencies among actors actively contributing to mitigate flood risk within Lomma municipal administration, with node size representing local control over resources, influence over other influential actors, and control of resource flows. Node colour = Faction (Red = Strategic decisions and coordination; Yellow = Planning and building permits; Dark blue = Water and sanitation; Light blue = Regress claims after floods; Dark green = Roads and parks; Light green = Project implementation; Brown = Property and GIS; Pink = Finance and land purchases; Orange = Risk management and environmental inspection). Edge thickness = Sum of importance of inputs.

It is interesting to note that the Head of the Planning Department is as centrally located in the network as the heads of department in the strategic faction, but more directly engaged in technical activities that mitigate flood risk, i.e. developing the comprehensive plan each decade (Figure 2).

Although included as a key planning assumption in the current comprehensive plan, it is in the detailed development planning for specific areas that the mitigation of flood risk is addressed in practice. When analysing the current 176 detailed development plans, having entered legal effect from 1932 to just months ago, it is not only clear that flood risk is increasingly addressed since 2005, but also that it is addressed for each planning area in isolation. It is the legal requirement of the developer requesting the detailed development plan (including the municipality) to provide the necessary assessments of urban drainage and flood risk for that specific area. The area is usually delineated by land ownership, with boundaries generally without any hydrological significance, and the assessments only focusing on the planning area as such and based on the planned situation within the area and the

current situation of the areas around. This is recognised as potentially problematic by planners:

> *"Yes, it is perhaps problematic, but that is how planning must be done. How should flood risk be assessed otherwise? The law says that it is the landowner who must show that flood risk is taken into account and they pay for the necessary assessments. They cannot be forced to pay for assessments of flood risk for areas bigger than the area they own and have requested a detailed development plan for. Who should pay for it then? This is how planners in Sweden do it." (Female civil servant)*

This practice ignores not only the potential impacts of the planned development on other planning areas today, but also tomorrow. The resulting plan is a comprehensive document, spanning myriad sectors and interests, based on a complex set of planning specifications. However, analysing the detailed development plans identifies many specifications that cannot be regulated after the plan has been approved and the area developed, while the municipal administration is sole responsible for urban drainage and flood risk mitigation regardless:

> *"We who work with water & sewage are, of course, very dependent of what they [planners] do. [...] I trust them fully, but there are difficulties in the contribution of planning to [flood] mitigation in the legislation." (Female civil servant)*

Hydrological modelling is used to analyse flood risk in the municipality overall, but this demands significant resources and has only been done for fluvial floods under different assumed sea levels in 2009 and fluvial floods along an extended part of the river in 2015. However, their results are still referred to and used, even up to a decade later, regardless of the significant transformation of Lomma since then. A simple topographically based analysis of potentially inundated land as a result of sea level rise has also been done, and dunes have been engineered to protect from coastal floods.

Urban drainage systems are generally designed to handle rainfall with return periods up to ten years, following guidelines from the water & sewage trade association, with some exceptions in areas with a history of recurrent floods. New and existing urban drainage systems are designed with the assistance of consultants in both hydrological modelling and measuring. Investments in existing urban drainage system are also informed by actual floods, both observed on the surface and identified through the regress claims from households flooded by backflow from the sewage system, particularly when combined with the urban drainage system.

Social relations with external actors. When analysing the social relations with external actors (Table 1), interesting patterns emerge[4] (Figure 3). First of all, it is important to restate that there are no direct links to the municipal administrations upstream in the catchment area.

Secondly, only private companies are as important in providing input on average as actors within Lomma municipal administration itself, with statistically significant[5] lower average importance of the input from the County Administrative Board* and even lower from national authorities*** (Figure 3). This regardless of the County Administrative Board having authority to repeal plans if not showing necessary consideration to legislation or national interests, which has happened in the region when the plans have included demands on retention of water on private property. The difference between the importance of the County Administrative Board and national authorities is also statistically significant**. The importance of private companies can be explained by most of the assessments,

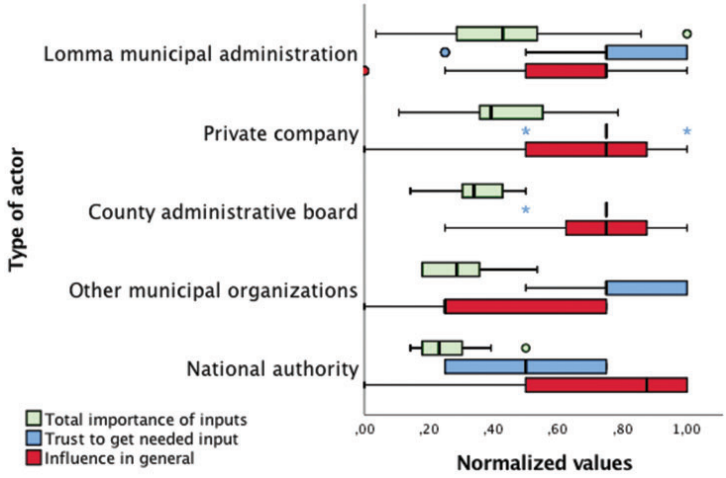

Figure 3. Boxplots with total importance of inputs, trust to get the needed input, and influence in general, of different types of actors (0 = None; 1 = Maximum).

reports, and designs mentioned above being produced by various consultants, spanning from hydrological modelling to landscaping, and they are generally seen as delivering what they have been procured to do:

> *"Hahaha! Yes, we have consultants for almost everything whatsoever. We procure many different firms for different things, but [company name] is big and capable of many things. They did a good job, I think." (Male civil servant)*

Different consultants are usually procured for different planning areas, and even for different phases of the planning of the same area. An equally broad range of staff within the municipal administration is also engaged to support the planning process and to safeguard the different municipal responsibilities, who also rely on consultants for much of their work.

Thirdly, although the very high levels of trust on average within the municipal administration is significantly higher than for both private companies*** and the County Administrative Board**, they still enjoy high levels of trust that they will provide what the municipal administration needs (Figure 3). The trust that national authorities will do the same is much lower*** (Figure 3), and the differences between national authorities and the County Administrative Board* or private companies*** are also statistically significant. However, national authorities are seen as having much influence over flood risk mitigation in Lomma municipal administration, although no differences in averages are statistically significant (Figure 3).

When considering these patterns together, two key findings emerge. First, private companies have become the most important and trusted external providers of the input needed for the governing of flood risk mitigation in Lomma. Second, although national authorities are considered very influential, what they do provide is considered of little importance and the municipal administration has low trust they will provide what is needed. This indicates

that national authorities are seen as withdrawing from their responsibilities of providing guidelines to the municipalities, which is also mentioned explicitly by several respondents:

> *"I think they are withdrawing. When we contact them and ask for guidelines, they dodge the question or refer to legislation. They seem insecure." (Female civil servant)*

It is, however, crucial to recognise the contingent nature of the boundary between the municipal administration and external actors. Ever since the first rural municipality was formed by removing the civic responsibilities from the parish in 1863, both geographical borders and administrative responsibilities have shifted in a number of local government reforms and mergers (i.e. 1900, 1952, 1963, 1971) and through legal developments. Although the current border of Lomma Municipality is practically identical with the outer borders of the four early medieval parishes that comprise it, these parishes were originally formed to provide viable congregations to already constructed churches and the borders could have been drawn in very different ways. The border of the municipality could also change dramatically in case of a new local government reform, such as in neighbouring Denmark. Moreover, the administrative responsibilities have expanded tremendously from the original duties of education and caring for the poor to the comprehensive portfolio of today, meaning that adjusted responsibilities are only a legislation away.

Modes of thinking

When contemplating what actors have most influence over the mitigation of flood risk in Lomma reputationally, the respondents express a range of perspectives (Figure 4). These perspectives are elicited from what actors they name, which combine into different modes of thinking depending on the combination of perspectives each of them includes. Almost two thirds of the actors considered influential in this context are categorised as internal, including either the municipal administration itself, some of its parts, or specific politicians or civil servants. Practically everybody includes such internal perspectives in their modes of thinking, out of which nearly a third include only internal perspectives and another third only add other administrative levels (e.g. the County Administrative Board, national

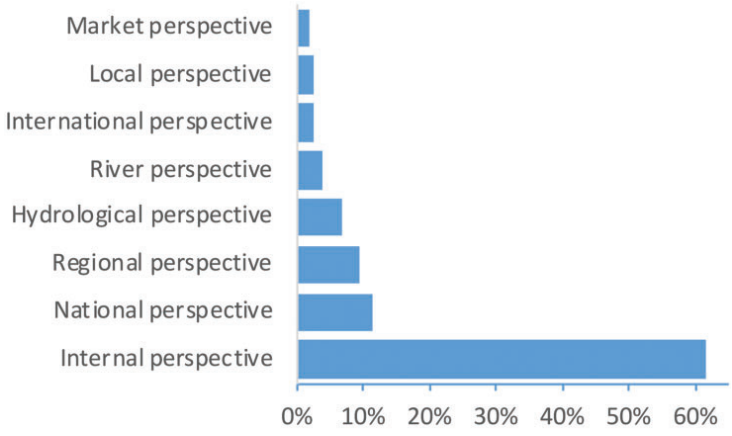

Figure 4. Distribution of perspectives in actors' accounts of influence over flood risk mitigation in Lomma.

Table 4. Prevalence of actors' modes of thinking about influence over flood risk mitigation in Lomma.

Mode of thinking	%
Include internal	94%
Pure internal	29%
Pure hierarchical	31%
Internal-global	*6%*
Internal-national	*17%*
Internal-regional	*9%*
Include hierarchical	49%
Pure national	3%
Pure hydrological	3%
Include hydrological	11%
Include local	11%
Include market	9%
Include river council	17%

authorities, the Parliament, the Government, IPCC) in purely hierarchical modes of thinking about influence (Table 4). It is important to note that these other administrative levels are mentioned as providing support or constraints for the municipality, and not as mitigating flood risk directly. Half the respondents include such hierarchical modes of thinking, while only around one in ten include local actors (citizens living in Lomma) or market actors (property developers). It is particularly interesting to note that only one in ten include any hydrological perspectives, pointing out actors influencing river flow upstream, while one in six include the River Council, which is a voluntary association of municipalities, industries, water treatment companies, and others affected by the water in Höje Å catchment area (Table 4).

These patterns of modes of thinking demonstrate the fundamental importance of the municipal border in structuring how flood risk mitigation is governed. While the environmental strategist is advocating for a hydrological mode of thinking—explicitly visible in the interview, in River Council documents and in a court case between the municipality and a golf course wanting to build/rehabilitate levees along the river upstream—all activities described in the other interviews and documents focus explicitly on Lomma municipality. Since it is fair to assume that all actors know that water flows from upstream to downstream, this must suggest the existence of a dominant rationality providing the basis for current activities by allowing for simplified definitions of particular flood issues.

Discussion

Flood risk in Lomma is the result of myriad decisions and actions over a long time period. In theory, all the way back to the first settlers millennia ago, but in practice, mainly over the last two centuries. Risk is thus not only constructed in the intersection of hazard and vulnerability, but essentially through the historical processes that affect them (Oliver-Smith, 1999). There is significant path dependency in the development of society (Mahoney, 2000), meaning that previous decisions and actions limit, or even lock-in (Payo et al., 2016), the set of possible decisions and actions at any point in time and increasingly over time; also in the institutions, procedures and practices central to governmentality (cf. Joseph and Juncos, 2019). However, that does not mean Lomma is predestined for disaster, but that future flood risk demands serious attention in the present.

Path dependency is also a more viable framework for explaining the timing of the problematisation of flood risk than any simple causal inference to the experience of an actual flood (cf. Johnson and Levin, 2009). Although the 2007 flood played a decisive role, remember that Lomma had been flooded several times before. It happened instead at a time when flood risk was already gaining attention. This emerging focus also coincided with the recruitment of the environmental strategist, who today is the most central actor in the *network governing flood risk mitigation*, which is a key technology through which actors conduct the conduct of themselves and others. It is therefore likely that timing and sequence mattered for the problematisation to occur and the governing of flood risk mitigation to become a priority (Dean, 2010).

The geographical border of the municipality is also largely determining *how* flood risk mitigation is governed. Regardless of water flowing from upstream to downstream, in a catchment area with significant anthropogenic alterations of hydrology, there are no direct links to upstream actors (Table 1) and few respondents include any hydrological considerations in their modes of thinking (Table 4). The *geographical border* is thus, notwithstanding its contingent nature over time, a central technology in governing flood risk mitigation. The apparent explanation for this is the combination of the extended tradition of local self-governance, reaching as far back as the Viking assemblies and the medieval parishes still delineating the borders of the municipality, and the recurring extension of municipal obligations. Although others point out the legal framework as hindering cross-border linkages (Johannessen and Granit, 2015), the explanation becomes richer when considering this technology as intrinsically linked with a dominant rationality—as is indicative of governmentality (Miller and Rose, 2008)—that reduces the actual complexity of flood risk in spatial terms to fit the legal and institutional environment.

The results suggest that the same reductionist rationality also shapes how the mitigation of flood risk is governed within the municipality. This is particularly evident in planning, which involves two key technologies in the form of the *comprehensive plan* and *detailed development plan* (cf. Moisio and Luukkonen, 2015). While the former follows the municipal border by definition, the latter is also spatially fixated but on the boundaries of the planning area itself. By assessing and addressing urban drainage and flood risk for each planning area in isolation, ignoring that virtually no planning areas coincide with hydrological boundaries, the process fails to grasp how measures to mitigate flood risk and other planning specifications in one area may impact flood risk in other planning areas. Both in the sense of engendering or exacerbating flood risk in already planned areas by inadvertently blocking or redirecting water, and by restricting the future land use of areas not yet planned. Although less common today, such problems have not always been restricted to neighbouring planning areas, but have appeared across the town when the drainage of new areas got connected to and overwhelmed available *urban drainage systems*, which are also key technologies for governing flood risk mitigation (Boyd et al., 2014).

The rationality reducing the actual complexity of flood risk in spatial terms is tightly linked to another rationality doing the same in temporal terms. The results show that detailed development plans and urban drainage systems are based on a snapshot of what the planning area would look like, assuming that other relevant conditions remain the same at the same time as several such conditions cannot be regulated. This rationality of *ceteris paribus* is particularly evident in the use of the results from *hydrological modelling*; another key technology and one that is time-consuming, expensive, and demanding expertise. These results are used even as many basic conditions have changed. Particularly the more comprehensive flood risk mapping of the entire town, which is still used after years of immense urban development.

These rationalities and technologies combine into a process of fragmentation of the issue of flood risk over space and time, which seems to be a common theme across the world (Hegger et al., 2016; Marks, 2019). This could partly be explained, at least in advanced liberal societies, by the pervasive fragmenting effect of neoliberalism (Bevir, 2011). Governmentality literature is rife of investigations of neoliberal reforms of the public sector precipitating radical changes in the governing of water related issues (e.g. Baviskar, 2007; Boelens et al., 2015). The resulting process of fragmentation is intrinsically linked to increasing dependence of the state on other organisations to fulfil its intentions (Bevir, 2011).

This fragmentation is in the present case associated with a process of commodification of flood risk mitigation based on the rationality that safety is the automatic aggregated result of various goods and services procured on the market, including hydrological modelling, risk maps, reports, and other key technologies. The recent problematisation of flood risk has not only mobilised many different parts of the municipal administration (Table 2). It has also amplified the need for external input, since the expanding municipal responsibility for flood risk mitigation has not been met with a corresponding increase in staff. The input from private companies is more important on average than from the other types of external actors (Figure 3), but is largely delivered by various consultants in a fragmented fashion. It is rather understandable that different consultants might be needed for different areas of expertise, but the fragmentation does not stop there. There are regularly different consultants with the same expertise engaged in neighbouring planning areas, and even in different phases of the planning process for one area. This excessive fragmentation further complicates the mitigation of flood risk, both as knowledge is lost in the gaps (Almklov and Antonsen, 2010) and as flood risk mitigation requires integration of many parts into a comprehensive whole (Becker, 2014). Although such integration is the responsibility of the professional staff of the municipal administration, much of the fragmentation is an unfortunate side effect of procurement regulations that could be addressed through more strategic application of them. However, the actors within the municipal administration trust the consultants to provide the parts they need (Figure 3) and expect to be able to source them on the market. This implies a commodification of flood risk mitigation, which is suggested by Almklov and Antonsen (2010) to be associated with fragmentation and loss of ownership and informal networks.

Commodification of public services is an inherent part of neoliberalism (Connell, 2010), which also involves the withdrawal of the state from providing them (Harvey, 2005). There is no doubt that neoliberalism has penetrated the Swedish welfare state (Harvey, 2005) and toppled the "strong state" (Lindvall and Rothstein, 2006), but the responsibility for flood risk mitigation still resides with the state; but on the municipal level. Even if the involved actors on the national level are perceived as having much influence over flood risk mitigation in Lomma, the actors in the municipal administration have little trust that they will get what they need from them (Figure 3) and only a quarter of the respondents mentions the national level at all when contemplating influential actors in general (Table 4). It is obvious that the parliament passes laws and the government implements them—represented regionally by the County Administrative Board—but the municipal administration perceives national authorities as reluctant to provide necessary guidelines on how to implement legislation. The national level is seen as withdrawing from the governing of flood risk mitigation, consistent with a neoliberal agenda, but at the same time making sure that the municipal level maintains the state responsibility through the oversight of the County Administrative Board.

This process concentrating the responsibility for mitigating flood risk to the municipal administration is not decentralisation towards polycentrism, advocated by influential voices in relation to governing complex problems (Ostrom, 1990; Pahl-Wostl et al., 2012). At least

not if their meaning of polycentrism is maintained, and not used as a mere synonym of decentralisation to local government (e.g. Johannessen et al., 2019). Polycentrism is increasingly related to governmentality (e.g. Boelens et al., 2015; Moisio and Luukkonen, 2015) and is about distributed power without the loss of coordination between actors across administrative boundaries and levels, as well as societal spheres, in relation to a spatially bounded problem (Andersson and Ostrom, 2008; Pahl-Wostl et al., 2012). The concentration of responsibility could be seen as a sign of decentralisation, but it is a clear sign of weak polycentrism (cf. Andersson and Ostrom, 2008); just as the fixation on the municipal border discussed above. It has been pointed out that governing can be more or less polycentric (Andersson and Ostrom, 2008), and it is obvious that the present case exhibits a number of such traits. However, passive or withdrawing national authorities undermine the governing of flood risk mitigation, as sufficient interaction with actors on higher administrative levels has been shown to have positive effects on governing outcomes (Angst et al., 2018). This process of responsibilisation is also occurring by blocking the mobilisation of other important actors. This is particularly evident concerning the issue of the municipal administration attempting to demand retention of water on private property, which is likely to be indispensable for climate change adaptation since it is impossible to manage all future water on the fraction of useful urban land that is public. Even after the main conclusion of the Swedish Commission on Climate and Vulnerability (2007) stipulated the need to allocate more responsibility for risk reduction to private property owners and households, the County Administrative Board blocks any such demands and a recent court ruling against a neighbouring municipality further cements this interpretation of the legislation. It is, in other words, so far not the citizens being subject to responsibilisation, as commonly found in governmentality literature (e.g. Welsh, 2014), but the municipal administration. This is clearly visible in their perspectives and modes of thinking concerning influence (Figure 4 and Table 4). It is also in the gap between the increasing responsibility for mitigating flood risk and the lack of guidelines and resources for carrying it out—in the vacuum of responsibilisation if you like—that market actors emerge to provide their services.

It is clear that flood risk mitigation is a priority issue for the municipal administration in Lomma. Even if much still revolves around planning and water and sewage, a broad range of other functions are involved (Table 3) and top-level politicians and managers are central (Figure 2). This shift is crucial for effective governing, as flood risk mitigation is not only a technical problem but a political issue (Johannessen and Hahn, 2013). There is neither any doubt that politicians are seen as very influential and have the formal decision-making power in Swedish municipalities, nor that there is a clear hierarchy of authority between management levels. However, when simultaneously considering local control of resources, influence over other influential actors, and control over resource flows in the municipal administration (Figure 2), it is clear that the environmental strategist is the most powerful actor in the governing of flood risk mitigation structurally.

Regardless of who has been driving the process, the municipal administration in Lomma has managed to mobilise an impressive amount of expertise, experience, and resolve. The critique provided in this paper has therefore little to do with the performance of individual actors. The processes of fragmentation, commodification, and responsibilisation—resulting from the rationalities and technologies of the governing of flood risk mitigation—emerge instead in the collective response to overwhelming complexity, driven by systemic constraints. Since the law of requisite variety stipulates that any system governing another larger complex system must have a degree of complexity comparable to the system it is governing (Ashby, 1957), the systemic constraints must be removed or overcome so the governing of flood risk mitigation can match the complexity of flood risk in the catchment area.

Conclusion

Combining structural and genealogical analysis provides new opportunities for increasing our understanding of the governing of flood risk mitigation in advanced liberal society, which in the present case come out as a recent contingent reaction to a path dependent problem. The regime of practices for governing flood risk mitigation involves a number of key technologies, such as legislations, guidelines, plans, drainage systems, risk maps, hydrological models. However, it also involves the municipal border and the boundaries of detailed development plans, which are less obvious but fundamental in shaping conduct. These technologies are intrinsically linked with dominant rationalities that reduce the actual complexity of flood risk in spatial and temporal terms to fit the legal and institutional environment, consistently obscuring cross-boundary and cross-time connections. This fragmentation is associated with a commodification of flood risk mitigation, in which the municipal administration expects to be able to procure modules of safety and sustainability on the market. This commodification materialises in a vacuum of responsibilisation, when obligations are imposed without commensurate resources. Regardless of the notable individual capacities of the involved actors, systemic constraints in the governmentality of flood risk have generated detrimental processes of fragmentation, commodification, and responsibilisation in the face of overwhelming complexity. These systemic constraints must be removed or overcome for the governing of flood risk mitigation to match the complexity of flood risk in the catchment area. This is crucial for facilitating sustainable development for the time ahead.

Fragmentation, commodification, and responsibilisation are core constituent processes of neoliberalisation, which is clearly shaping the governing of flood risk mitigation even in Sweden; a bastion of the strong welfare state. However, while individual citizens are increasingly responsibilised to prepare and respond in the event of an actual flood (Rådestad and Larsson, 2020), which is in accordance with the governmentality in several other affluent liberal democracies (Bergström, 2018), it is interesting to note that the responsibilisation of the prevention and mitigation of future floods falls on municipal administrations. It is impossible to ascertain without further research if this is unique to Sweden, or perhaps to the decentralised Nordic version of the welfare state, or if the displacement of responsibility for governing complex issues towards a less powerful societal level is a general feature of advanced liberal societies. Regardless of which, such broader conceptualisation of responsibilisation might be constructive for governmentality as a heuristic to further grasp the intricacies of governing complex sustainability challenges.

Acknowledgements

This study would not have been possible without the keen participation of the politicians and civil servants of Lomma municipal administration.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The study is part of the research project ‘Sustainable Urban Flood Management’, which is funded by FORMAS (2015-149).

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Notes

1. Except a reference to a memorial of the floods in 1902 as cultural heritage.
2. Re-scaled E-I index: -0.16 (Borgatti et al., 2002) signifies a negligible 16% more interaction within the 10 different organisational parts than between.
3. Final proportion correct: 0.85 (Borgatti et al., 2002) signifies a good fit of the optimisation function. Re-scaled E-I index: -0.64 (Borgatti et al., 2002) signifies 64% more interaction within factions than between.
4. The actors in the categories of universities, private citizens, and no organization type are few and with too few ties for fruitful analysis.
5. Assuming independence between categories, where * signifies $p < 0.05$; ** signifies $p < 0.01$; and *** signifies $p < 0.001$.

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Paper II

International Journal of Disaster Risk Reduction 31 (2018) 1004–1012

Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr

Dependence, trust, and influence of external actors on municipal urban flood risk mitigation: The case of Lomma Municipality, Sweden

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ARTICLE INFO

Keywords:
Flood
Risk
Mitigation
Social organization
Social network analysis
Dependence
Trust
Influence

ABSTRACT

Floods constitute a major problem that cross geopolitical, administrative, and sectoral boundaries, and must as such be jointly governed by a web of actors. The patterns of social relations among these actors are fundamental for society's capacity to mitigate flood risk. The purpose of this study is to contribute to our understanding of flood risk governance by investigating the social organization of formal actors that contribute to mitigating urban flood risk in Swedish municipalities. It applies Social Network Analysis to examine what patterns of dependence, trust, and influence of external actors emerge in the accounts of politicians and civil servants in Lomma Municipality, Sweden. The results indicate interesting patterns in type of input, as well as the role of personal relationships and different forms of authority for trust and influence. There is also a horizontal decoupling between municipalities along the river, as well as a vertical decoupling between the municipal and the national level, where withdrawing national authorities leave a void increasingly filled by private companies. These patterns of social relationships between municipal and external actors contributing to mitigate urban flood risk are important for understanding flood risk governance in society.

1. Introduction

Floods constitute a major global problem and are the most common recorded disasters around the world [1], increasing particularly in urban areas [2]. Flood risk is of great concern in Europe and threatens to undermine the sustainable development goals of the European Union [3], especially since it is expected to escalate with climate change and the other processes of change continuously redrawing the risk landscape [4]. Floods tend not to be bounded by geopolitical or administrative borders and involve various sectors of society. It is therefore not possible for one individual or organizational actor to analyse, evaluate and manage flood risk in society alone. It must instead be jointly governed by a web of actors [5] who are not independent of each other, but dependent on various resources and affected by the decisions and actions of others [4]. The patterns of social relations among these actors are therefore fundamental for society's capacity to reduce risk [6]. While the importance of social relations for risk governance has been investigated from many angles [7–11], this social organization of resources and influence has not been studied in relation to the mitigation of urban flood risk and is likely to vary with the differing models of governance across Europe. These models are relatively similar among the Nordic countries,[1] with both responsibilities and resources largely decentralized to the municipal level [12].

Swedish municipalities are relatively large and complex organizations with a broad range of responsibilities. Although all have the mandate of mitigating urban flood risk within their jurisdiction, it is interesting and important to investigate what external actors contribute and how the municipalities depend on them. Being dependent on some input from another actor introduces the importance of trust as an expectation that is based on incomplete knowledge about the likelihood of receiving the needed input, as well as incomplete control over that happening [13]. Moreover, dependence connotes a power relationship [cf. 14], and it is interesting and important to also investigate the influence external actors have on the municipalities' ability to mitigate urban flood risk.

The purpose of this study is therefore to contribute to our understanding of flood risk governance by investigating the social organization of formal actors that contribute to mitigating urban flood risk in Swedish municipalities. In an effort to reach that goal, this paper intends to answer the following research question:

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[1] Here limited to Sweden, Denmark, Finland, Norway, and Iceland, but also acknowledging the autonomous constituent country of Greenland and Faroe Islands belonging to Denmark, as well as Åland belonging to Finland.

https://doi.org/10.1016/j.ijdrr.2018.09.005
Received 14 June 2018; Received in revised form 9 September 2018; Accepted 9 September 2018
Available online 11 September 2018

What patterns of dependence, trust, and influence of external actors emerge in the accounts of municipal politicians and civil servants who contribute to urban flood risk mitigation in a Swedish municipality?

2. Theoretical framework

This section of the paper aims to do two things. It attempts to provide brief conceptual clarifications of a number of concepts that make up the core of the research question, and it introduces the theoretical perspective used in this study.

First of all, the context of this study is urban flood risk mitigation, which involves four central concepts: *urban*, *flood*, *risk*, and *mitigation*. Although there is no universally accepted definition of what is meant by *urban* [15], it is usually considered as a range on a rural–urban continuum that includes (sometimes villages) towns, cities, metropolitan areas and megacities. This study focuses on the mitigation of flood risk that affects the town of Lomma, clearly falling within this *urban* range, and does not consider flood risk affecting the countryside around the town. The next central concept that requires clarification is *flood*, and then mainly to provide background to the selection of the case of Lomma described in the methodology section. *Flood* can be simply defined as 'the temporary covering by water of land not normally covered by water' [16]. The processes behind floods are, however, complex [17] and it is important to note that they are vital for wetlands, biodiversity, certain farming practices, etc., making flood risk governance particularly challenging [4]. There are at least five main types of floods (Table 1), but any one particular flood event may be a combination of several types [4].

Risk is a contested concept with various definitions [18], and there is no room to elaborate on it here. *Risk* is thus simply defined as uncertainty about what could happen and what the consequences would be [18], focusing only on negative consequences [5]. When contemplating what could happen, how likely that is to happen, and what the consequences would be, if that happens, you are analysing risk [19]. However, answering these questions in relation to floods requires consideration of location, magnitude and spatial extent, speed of onset and duration, as well as likelihood of various potential flood events [4]. It also requires explicitly considering what is valuable and important to protect in the areas potentially flooded and how susceptible that is to be negatively affected by the impact of the water [4]. It is important to note that estimations of any of these factors are fraught with uncertainty [18]. Finally, *mitigation* is here broadly defined as comprising all proactive activities that reduce the likelihood of flood events and/or their consequences before occurring [20], but leaving out preparedness for effective response and recovery.

Secondly, Ingold and colleagues [6] argue the critical importance of the structural patterns of social relations to understand collective capacity to reduce risk. The theoretical perspective used in this study assumes that it is these patterns of social relations that together constitute social organization [21]. Social organization can, in other words, be elicited from direct empirical observation of the social interactions that constitute these social relations. It is thus important not to conflate social organization and social structure [22], which captures the importance of social institutions, norms, and behavioural expectations [23,24] that are generally considered persistent, continuous, pervasive, and maintained through repetition [25]. However, social organization is not random or implying accidental patterns, but orients to socially defined goals. Even under the forces of social structure, the ordering of action and of relations in reference to given social ends still allow room for individual choice [22]. Social organization is thus both a social process and an outcome in terms of the arrangement of social action towards particular goals – the mitigation of urban flood risk in this case. Such goal must have some element of common significance for the actors involved, although it need not be identical, or even similar, and might be opposite for some of them [21].

Table 1
Types of floods.

Type of flood	Description
Pluvial flood	caused by insufficient drainage from local topographical lows
Fluvial floods	caused by too much water in a watercourse
Coastal floods	caused by storm surge or sea level rise
Groundwater flood	caused by rising groundwater
Breaching flood	caused by water breaching natural or man-made retention barriers

This relational focus makes social network analysis a suitable theoretical perspective [26] that has been applied to a range of research problems in risk governance [6,10,27–29]. Structural analysis has long been suggested a useful approach when attempting to grasp complex social reality [30,31], but has through coevolution of thinking and technology come to encompass an immense variety of theories, techniques, and tools [32,33]. Hence, only parts are applicable to investigate the patterns of dependence, trust, and influence of external actors among municipal politicians and civil servants contributing to urban flood risk mitigation, which are elaborated on in the methodology section below.

Finally, the aspects of social relations investigated in this study entail three additional central concepts: *dependence*, *trust*, and *influence*. Many scholars point out *dependence* between actors as crucial for organizations' capacity in general [34], and for understanding risk and their capacity to mitigate risk in particular [e.g. 4,5]. It is therefore important to study dependencies of required inputs between actors. There are numerous types of input that actors contributing to urban flood risk mitigation might require to be able to perform their specific tasks, and there are many ways to categorise them. To be able to study this at all, seven types of input were elicited from literature. These include reports of activities [35], equipment and material [36], funding [37], technical information [38], rules and policy [38], advice and technical support [34], and pepping and moral support [36]. Although not including every possible input, these types of input are deemed to cover sufficient width to investigate *dependence* between actors in this context.

Being dependent on some input from another actor introduces the importance of *trust* as a basis for reducing complexity in terms of the range of action or non-action by that actor to consider [39]. It is thus of utmost importance for the cooperation [40] that is necessary for risk governance [5]. *Trust* is an incredibly complex concept with many definitions and uses across several disciplines [41]. However, it is here applied as an expectation that is based on incomplete knowledge about the likelihood of receiving the needed input, as well as incomplete control over that happening [13]. *Trust* is, in this study, therefore about the level of confidence actors have that they will get the input needed to perform their tasks from each other actor they are dependent on.

Dependence and *trust* are both related to *influence* [39,40], which denotes the capacity of one actor to have an effect on the performance of another [cf. 42]. It is obvious that being dependent on a particular input from another actor confers influence to that actor over you, but *influence* entails more than such *dependence* [cf. 39]. It entails authority, regardless if based on legal, traditional, or charismatic grounds [43], or on the competent authority of expertise [44]. It is also related to friendship [45]. *Influence* is thus in itself a fundamental part of the social relations between actors contributing to mitigating urban flood risk in the municipality. Let us now empirically investigate the patterns of *dependence*, *trust*, and *influence* of external actors as they emerge in the accounts of municipal politicians and civil servants who contribute to *urban flood risk mitigation* in Lomma Municipality, Sweden.

3. Methodology

A single-case study research design with multiple embedded units of analysis was used to address the research question [46]. Although relative similarity is likely between flood-prone Swedish towns, it is most appropriate to select an extreme case 'because they activate more actors and more basic mechanisms in the situation studied' [47]. However, considering a flood-prone Swedish town as an extreme case not only has to do with experiencing extreme flood risk. Significant flood risk is necessary, but not sufficient for selection. It also has to do with the complexity of the flood problem that the formal actors have to address. In other words, a town that is exposed to as many types of floods as possible – as described in the theoretical framework – and that is currently experiencing significant changes in terms of population growth and urbanization, exploitation of new areas, and densification of existing areas.

Lomma is a town in southern Sweden that is experiencing extraordinary changes. It is rapidly extending into new areas along both the coast and the river Höje Å, and is undergoing significant densification in terms of buildings and infrastructure in its centre. Large parts of Lomma are exposed to either coastal floods, or fluvial floods from the river, or both, due to the proximity to the sea and river, and a very flat topography. The topography and geology of Lomma also combine with intense and increasing rainfall to generate significant exposure to pluvial floods across much of the town, potentially aggravated by groundwater floods. The risk of all these types of floods are expected to increase with climate change. Moreover, these types of floods may occur simultaneously, which is anticipated to happen more often in the future, also due to climate change. This further escalates the complexity of the flood problem. Hence, Lomma provides a suitable case for the purpose of this study.

The relational focus of the study makes social network analysis a suitable methodology for studying the case [26,48]. Social network analysis is particularly appealing when not only interested in the relations among actors, but also in their patterns and implications [26]. Considering the focus on investigating the social organization of contributing formal actors, a whole network approach to social network analysis is required [48]. This means that 'all' contributing formal actors must be included. Formal actors are here defined as individuals contributing to mitigating flood risk in Lomma Municipality as part of their professional activities or as significant property owners in the catchment area of the river running through Lomma town. Answering the research question requires a distinction between internal and external actors, where the former comprises all identified actors working for Lomma Municipality and the latter everybody else (Table 2). This social network analysis focuses thus on network and group levels (e.g. density, density ratio) and on associations between ties (i.e. QAP correlation, QAP Regression), and not on node level (e.g. degree, betweenness, eigenvector centrality).

Since I did not know from the start the boundary of the social network under study in terms of who would be formal actors in this context and who would not, the respondents were selected by means of a snowballing technique [26,48]. The snowballing started with 10 respondents at Lomma Municipality who were identified as likely to contribute to the mitigation of flood risk, such as the water and sanitation manager, planners, the building and environmental manager, technical manager, risk and security manager, etc. The snowball sampling technique involved using a name-generating question concerning who each respondent depends upon for input to be able to contribute to mitigating flood risk. The snowball sampling continues in principle until no more new respondents are identified, but involves in practice boundary judgements of relevance. This means that for an identified individual to be selected as a respondent, a judgement was made about the likelihood of the person having relevant information about the mitigation of flood risk in the selected case. This judgement was kept as open as possible, but was restricted to the inclusion of (1) friends and family members who give general advice, but were not relevant to interview concerning the case; (2) staff and subcontractors who perform specific practical tasks without considering their effects on flood risk mitigation; (3) administrative managers who are only responsible for salaries and admin; and of (4) organizations, software, legislation, and guidelines that are identified, but not possible to interview. This resulted in 35 respondents within the Lomma Municipality, together identifying 105 formal actors (including themselves) who contribute to their work to mitigate urban flood risk in the municipality.

Data were collected through structured interviews using a questionnaire with structured questions about different attributes (organization, gender, age, work experience, and education) and ties to the other formal actors. The *dependence* between actors is operationalized as the importance of the seven different types of input identified above (reports of activities; equipment and material; funding; technical information; rules and policy; advice and technical support; pepping and moral support), rated on a five-point Likert scale from not at all (0) to extremely important (4). The respondents were also asked to rate the level of *trust* they have that they will be provided with the input they need from each identified other actor (on a similar Likert scale from no *trust* to full *trust*) to rate the level of *influence* these actors have over the respondents' ability to contribute to mitigate flood risk in Lomma (on a five-level scale from no *influence* to extremely big *influence*), and to describe the relationship they have (on a five-point scale with 'do not know', 'associate name with face', 'acquaintance', 'know well', and 'personal friend' [cf. 49].

Each interview took between 60 and 90 min, with a few shorter interviews with actors less engaged in flood risk mitigation. All interviews were done face-to-face regardless of the high demand for time and resources, since whole network approaches are sensitive to missing data and personal contact minimizes non-responses [48]. Face-to-face interviews also allow for clarification of questions and facilitate elicitation techniques and probing to improve respondent recall [48]. The social network data collected were then analysed on dyad, node, and network level with the assistance of the software UCINET [50], and with SPSS to compare average strengths of actual ties (Independent sample *t*-test, assuming independence in respondents' answers).

Table 2
Distribution of formal actors between categories of organizations.

Actors in the network	#	Note
Lomma Municipality	35 + 16 = 51	35 respondents plus 4 that have left the organization, 3 administrative managers not considering themselves as contributing, 8 technical staff performing practical tasks (only interviewing their team leaders), and 1 municipal call centre
Other municipal organizations	5	Höje Å Water Council, the Fire and Rescue Services, the Erosion Damage Centre, a neighbouring municipality outside the catchment area, and a municipality in another part of Sweden
County Administrative Board	6	6 civil servants
National authorities	13	4 named individuals and 9 identified with the name of the organizations
Private companies	23	Mainly consultancy firms and contractors, but also insurance companies in relation to past flood damages of households that are used as input for urban flood risk mitigation.
Universities	2	2 nearby universities
Private citizens	2	Citizens and landowners
No organization type	3	A legislation, former court rulings, and a reference group

4. Results

In an effort to analyse patterns of *dependence*, *trust* and *influence* between external and internal actors contributing to mitigating urban flood risk in Lomma Municipality, I analysed the entire network of formal actors (105 formal actors) focusing on the various ties between different external actors and the individuals actively engaged within Lomma Municipality (35 respondents). I also analysed ties within Lomma Municipality for comparison. The nodes of the network are distributed between Lomma Municipality, other municipal organizations, the County Administrative Board, national authorities, private companies, universities, private citizens, and a few without organization types (Table 2). It is interesting to note that nobody mentions Region Skåne, the regional authority responsible for healthcare, public transport, infrastructure, social planning and environmental and climate-related issues, nor any civil society organization.

The results are presented under three subheadings, focusing on the importance of input (*dependence*), *trust* to get the needed input, and overall *influence* over ability to contribute to mitigate urban flood risk. To make efficient use of space in the paper, the results are simply presented in this section to inform the discussion. The key findings are summarised in the end of each subsection.

4.1. Importance of input

The actors within Lomma Municipality actively contributing to mitigate urban flood risk depend on different inputs to various degrees. The density[2] of the networks of each type of input varies significantly. For instance, almost seven times between *equipment and material* and *reports of activities* (Table 3). These densities are the relative prevalence of each type of *dependence*, also visualized for further analysis by the size of the dots in Fig. 3 below. This means that the contributing actors within Lomma municipality are much more dependent on *reports of activities* as a collective than on *equipment and material* to do their respective parts to mitigate flood risk.

To investigate the patterns of *dependence* of external actors, I examined the density ratio between internal and external ties. The resulting internal/external density ratio is thus a relative measure of the proportion of *dependence* on other formal actors within Lomma Municipality versus external actors, making up the y-axes in Fig. 3 below. For example, although the network of input concerning *reports of activities* has slightly higher density than *technical information*, and *advice and technical support*, they are distributed similarly between internal and external relations of Lomma Municipality (Table 3) and are very strongly correlated (0.80–0.87[3]). This means that the importance of these inputs for the whole network differs, but the proportions coming from within and outside Lomma Municipality are similar. It is also interesting to note for the following discussion that the distribution of input concerning *pepping and moral support* is twice as concentrated on internal relations as *technical information* and *advice and technical support*, and 70 per cent more concentrated than *rules and policy* (Table 3), regardless of being similar in total density. Furthermore, *pepping and moral support* and *advice and technical support* are strongly correlated (0.79[3]). Although weaker in strength than previously mentioned correlations, it is interesting to note that the network of input concerning *funding* has its strongest correlations with *pepping and moral support* (0.56[3]) and *rules and policy* (0.55[3]).

To further investigate the patterns of *dependence* between external and internal actors contributing to mitigate urban flood risk in Lomma Municipality, it is interesting to analyse the network of all inputs together (Fig. 1). To do so, I added the rated importance of each input together for each pair of actors (dyad) and normalized the sum in relation to the theoretic maximum total value. This means that all nodes of the resulting network will have at least one tie and that the strength of each tie spans between 0 (no tie) and 1 (strongest possible tie).

Table 3
Density and internal/external density ratio of the types of input.

Type of input	Density	Internal/external density ratio
Reports of activities	0.069	3.3
Equipment and material	0.010	3.9
Funding	0.026	15
Technical information	0.058	3.2
Rules and policy	0.056	4.1
Advice and technical support	0.051	3.4
Pepping and moral support	0.053	7

It is then interesting to analyse the relative importance of input from different types of actors: those from within Lomma Municipality, other municipal organizations, the County Administrative Board, national authorities, private companies, universities, private citizens, and others (Fig. 2). Here it is not the density that is interesting to compare, as that is skewed by the varying number of actors in each category. Instead, the distributions of tie strengths between categories of actors were compared, and average actual tie strengths were examined for statistical significance in differences.[4] The average actual tie strength is the total normalized sum of importance of all inputs between two categories of actors divided by the actual number of ties between those categories of actors. The result of this exercise shows that the distribution of importance of input within Lomma Municipality spans the full range of the spectrum (Fig. 2), with an average slightly below the middle (0.42). The distributions of importance of input from all other categories of actors are distinctly narrower, with private companies as somewhat of an exception spanning much of the spectrum and with a similar average (0.45). Another category that sticks out as having no variance is universities, which is explained by containing only two actors being mentioned by only one respondent. As a result they were ignored in further analysis. Similarly, although with a seemingly broad distribution, the category of actors with no organization type includes only three ties to a piece of legislation, court cases, and a reference group, undermining statistical analysis. Moreover, including it in this type of analysis is not relevant as the category is without meaning in itself.

There are no statistically significant differences in averages between inputs within Lomma Municipality (0.42) and from private companies (0.45). There is no statistically significant difference from other municipal organizations (0.32), but the distribution is very different, the average lower and the median much lower, indicating that the lack of significance has to do with low number of respondents. However, the lower average importance of the input from the County Administrative Board (0.35[5]), national authorities (0.25[6]), and private citizens (0.22[7]) are statistically significant when compared to input from within Lomma Municipality and from private companies. The difference between the County Administrative Board and national authorities is also statistically significantly.[8]

To summarise, the importance of each type of input for the collective varies significantly between the seven included types (see density

[2] The density refers to the total of all values divided by the number of possible ties [50].

[3] p = 0.0002. QAP correlation [50].

[4] Independent sample *t*-test, assuming independence in respondents' answers.

[5] p = 0.039, equal variances not assumed as Levene's test for equality of variance has Sig. 0.02.

[6] p = 0.000, equal variances not assumed as Levene's test for equality of variance has Sig. 0.006.

[7] p = 0.034, equal variance assumed as Levene's test for equality of variance has Sig. 0.059.

[8] p = 0.012, equal variance assumed as Levene's test for equality of variance has Sig. 0.955.

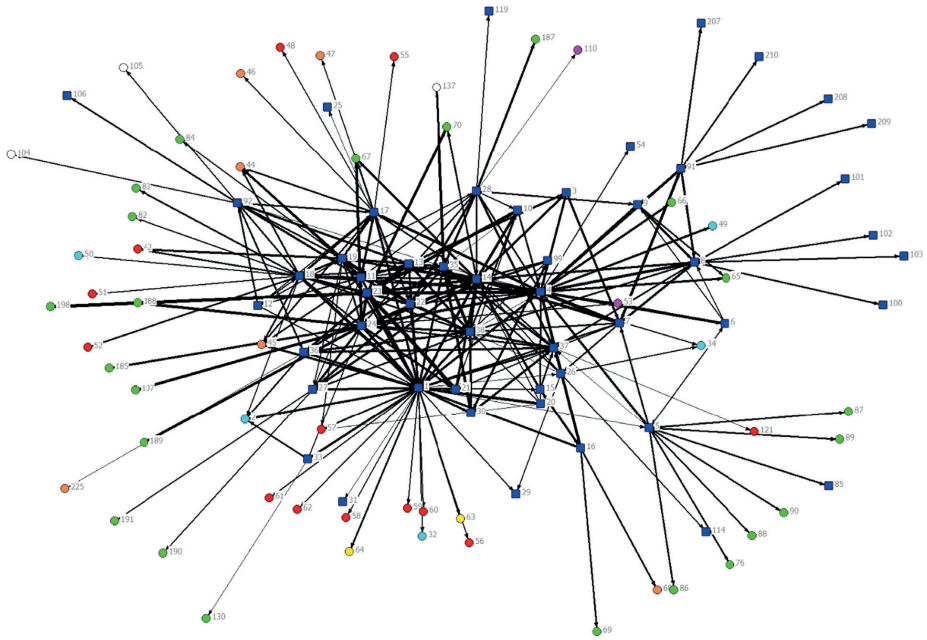

Fig. 1. Network of all dependencies of inputs (normalized sums of importance of the seven inputs) between formal actors by type of organization. Node colour = Type of organization (Blue = Municipality; Orange = County Administrative Board; Red = National Authority; Green = Private company; Yellow = University; Purple = Private citizens; None = White). Node shape = Lomma Municipality or not (Square = Lomma Municipality; Circle = Not Lomma Municipality). Edge thickness = Sum of importance of inputs (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.).

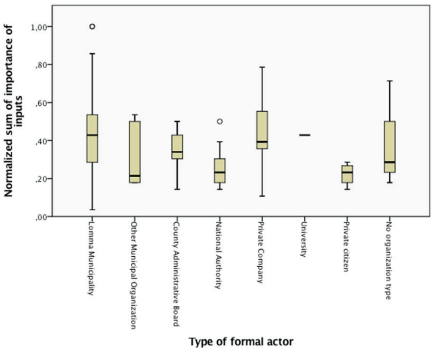

Fig. 2. Boxplots with the distribution of dependencies (normalized sums of importance of the seven inputs) to the respondents in Lomma Municipality divided after the type of formal actor on which they depend.

in Table 3). The relative prevalence of each type of input from internal and external actors varies also substantially (see density ratio in Table 3). When taking all seven types together, colleagues within Lomma municipality and private companies provide the most important input, with similar distributions and averages. The importance of input from the County Administrative Board is lower and from national authorities lower still (Fig. 2).

4.2. Trust to get the needed input

After analysing the importance of inputs to the individuals actively contributing to mitigating urban flood risk within Lomma Municipality, it is now interesting to examine the level of *trust* these actors have that they will get the input they need from the others to be able to contribute. Remembering the scale for this rating (0 = No *trust*; 1 = Little *trust*; 2 = Pretty much *trust*; 3 = Much *trust*; 4 = Full *trust*), it is interesting to find very high levels of *trust* on average within the municipality (3.27) and to other municipal organizations (3.20). The difference is not statistically significant (assuming independence in respondents' answers). The Private citizens' score was seemingly lower on average (2.50), but the difference is not statistically significant. However, in comparison to within Lomma Municipality, average *trust* is lower but still high for private companies (2.89[9]) and the County Administrative Board (2.83[10]), and much lower for national authorities (1.88[11]). National authorities also score significantly lower in comparison with the County Administrative Board[12] and private companies.[13]

[9] p = 0.001, equal variances not assumed as Levene's test for equality of variance has Sig. 0.000.

[10] p = 0.003, equal variances not assumed as Levene's test for equality of variance has Sig. 0.002.

[11] p = 0.000, equal variances assumed as Levene's test for equality of variance has Sig. 0.4.

[12] p = 0.012, equal variance assumed as Levene's test for equality of variance has Sig. 0.955.

[13] p = 0.000, equal variance not assumed as Levene's test for equality of variance has Sig. 0.001.

Trust correlates very strongly with the type of *relationship* the actors have with each other (0.93[14]), meaning that the better friends they are, the more *trust* they express. There is a strong association between *trust* (dependent variable) and the seven different inputs (independent variables), in total (R^2 =0.85[15]), with *pepping and moral support* having the strongest effect in the regression model (β = 0.45), followed by *reports of activities* (β = 0.31), *rules and policy* with (β = 0.22), *technical information* (β = 0.19), *advice and technical support* (β = 0.13), and *funding* (β = 0.13). *Equipment and material* has a relatively weak negative effect on *trust* in the regression model (β = –0.20), meaning that the more important that input is for the respondents, the lower *trust* they will have that they would get what they need to contribute to mitigating urban flood risk. This is not surprising considering the very strong correlation between *trust* and *relationship*. There is also strong association between type of *relationship* (dependent variable) and the seven different inputs (independent variables) in total (R^2 = 0.84[15]), but with differently distributed regression coefficients (β). Again, *pepping and moral support* has the strongest effect in the regression model (β = 0.49), followed by *reports of activities* (β = 0.22), but with twice the difference in relative importance between the two. *Advice and technical support* (β = 0.15) and *funding* (β = 0.13) are roughly as important in both regression models, and *equipment and material* has again a negative effect, but here only half as strong (β = –0.11). However, the most substantial differences are found for *rules and policy*, with only an eleventh of the importance compared to above (β = 0.02), and for *technical information*, with around a third of the relative importance (β = 0.06). The regression coefficients form the x-axes in Fig. 3 to inform the discussion.

It is important to note that there is a substantial difference in distribution of type of *relationships* internally within Lomma Municipality and with external actors, with statistically significant difference in average (2.42 vs 1.32[16]). This means that the respondents are more likely to know other actors within the municipality well or to be friends with them than actors outside the municipality.

To summarise, the respondents have very high levels of *trust* that they will get what they need from their colleagues within Lomma Municipality, lower but still high *trust* for private companies and the County Administrative Board, and much lower for national authorities. *Trust* correlates very strongly with level of friendship and has a strong association with the seven different inputs. There is also strong association between type of *relationship* and the seven different inputs, but with different importance of the types of input (Fig. 3).

4.3. Influence over ability to contribute to mitigating urban flood risk

Finally, it is interesting to examine the *influence* actors feel others have over their ability to contribute in general. Again, using a five-step scale (0 = No *influence*; 1 = Little *influence*; 2 = Pretty much *influence*; 3 = Much *influence*; 4 = Extreme *influence*), the average stated that there is an *influence* span from 'much *influence*' towards 'pretty much *influence*' for national authorities (3.00), county administrative boards (2.92), private companies (2.85), within the municipality (2.65), other municipal organizations (2.20). It is interesting to note that national authorities are rated high here. However, there are no significant differences in the average stated *influence* between any of these different groups (assuming independence in respondents' answers). However, there is strong association between *influence* (dependent variable) and the seven different inputs (independent variables) in total (R^2 = 0.87[15]), but with *reports of activities* having the strongest effect in the regression model (β = 0.43), followed by *rules and policy* with (β = 0.31) and *funding* (β = 0.30). *Technical information* (β = 0.16), *advice and technical support* (β = 0.08), and *pepping and moral support* (β = 0.08) have less effect, and *equipment and material* has a relatively weak negative effect on *influence* in the regression model (β = –0.16). The regression coefficients are again plotted on the corresponding x-axis in Fig. 3 to inform the discussion.

To summarise, very different from *dependence* and *trust*, the respondents state as a collective that national authorities, the County Administrative Board, and private companies have all much *influence* over their ability to contribute to mitigate urban flood risk. There is again a strong association between *influence* and the seven types of input, but with very different types of inputs being most important (Fig. 3).

Fig. 3 is made up of three diagrams, focusing on the type of *relationship* (top left), *trust* (top right), and *influence* (bottom). The y-axes represent the internal/external density ratio for each of the types of input. It is a relative measure and means that the lower a dot is located, the bigger share of the importance of that input comes from external actors. The size of the dots represents the relative prevalence of each input (density), meaning that a larger dot signifies that the contributing actors within Lomma municipality are more dependent on that input as a collective. Finally, the x-axes represent the regression coefficients for each of the three regression models above, meaning that a dot further away from the y-axis has a stronger effect on the type of *relationship*, *trust*, and *influence*, respectively.

5. Discussion

It is apparent that the municipality is highly dependent on input from various external actors to mitigate urban flood risk. This is fully in line with the principal notion of risk governance [5]. However, interesting patterns emerge with regard to what types of input are more prevalent than others. Although the *dependence* on all types of input are more concentrated internally, external actors contribute with larger shares of inputs with more technical and informational characters (solid blue dots in Fig. 3). It is also these three types of input that correlate strongest with each other, but there is a key distinction between them concerning the role of personal relationships for each. Exchanging *technical information* entails relatively little concern of personal relationships, while asking for *advice and technical support* involves somewhat more consideration of how well actors know each other. Oddly enough at first glance, the *report of activities* connotes an even stronger association with the type of *relationship* the actors have. However, getting reports of implemented activities include long-term relationships of manager/co-worker and with some more deeply involved external actors, with the result of them getting to know each other. In contrast, external actors contribute with much smaller shares to more emotional inputs. This could perhaps be expected considering common notions of collegial support and the softer sides of management within organizations [cf. 51], but it further highlights the importance of friendship in the mitigation of urban flood risk. The analysis shows that *pepping and moral support* is eight times more strongly associated with friendship than *technical information*, and that friendship is much more prevalent within Lomma Municipality than with external actors. It is then interesting that the financial input of *funding*, which is more than twice as concentrated internally than *pepping and moral support*, has among the weakest associations with type of personal *relationship*. Similarly, although being only somewhat more concentrated internally within Lomma Municipality than the technical inputs above, the normative input of *rules and policy* instructing the respondents on what to do is of least relative importance for the personal *relationship* between actors. This is a clear indication that being dependent on financial or normative input from someone is not conducive to close personal relationships.

Although being significant in itself, friendship becomes even more

[14] p = 0.0002. QAP correlation [50].

[15] p = 0.0005. Multiple regression QAP via double Dekker semi-partialling [50]. 2000 permutations.

[16] p = 0.000, equal variance not assumed as Levene's test for equality of variance has Sig. 0.000.

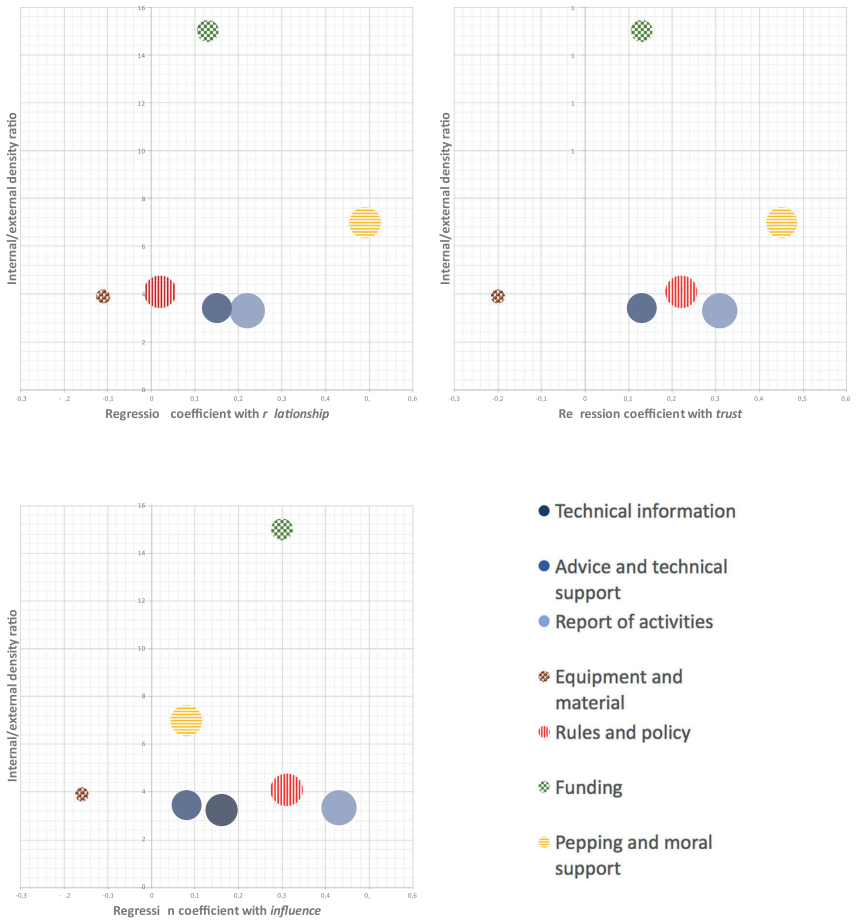

Fig. 3. Overview of the proportions of internal/external shares of different inputs and their association with types of relationships, trust, and influence. Size = Relative prevalence (density).

important in relation to the *trust* that the respondents have that they would get what they need from the actors they depend on. Friendship and *trust* have a very strong correlation, which is a common theme in established theory [40,52]. It is again the emotional input of *pepping and moral support* that has the highest relative importance for *trust* by far, but with a smaller gap to *report of activities* again on second place (Fig. 3). However, the most significant differences are the leap in relative importance by the normative input of *rules and policy* up to third place, and *technical information* surpassing both *funding*, and *advice and technical support*. It is thus not only clear that friendship is fundamental for *trust* in mitigating urban flood risk, but also that there are other factors at play that might be helpful to phrase in relation to authority. First of all, the importance of normative input corresponds closely to Weber's [43] legal authority, which is based on the acceptance of the rules, regulations, and other institutions granting authority to particular actors. It is fundamental for *trust* in modern society [39]. Similarly, the importance of technical input for *trust* relates closely to what Wrong [44] refers to as competent authority, which is based on the *trust* in expert knowledge, which is another fundamental consequence of modernity [52].

It is also interesting to note that the emotional input so important for the type of personal *relationship* and *trust* between actors is of little importance for the overall *influence* over their ability to contribute to mitigate urban flood risk (Fig. 3). Normative input is again important, which is reasonable considering that *rules and policy* are intended to determine or guide activities in general. More interestingly, financial input is suddenly important, after having more marginal effects on type of personal *relationship* and *trust*. Providing *funding* is, in other words, associated with *influence*, which is another common theme in literature [37] that seems applicable to the social organization of actors contributing to mitigate urban flood risk. Both normative and financial inputs have in a sense a directional character from specific positions of authority, exerting *influence* over others in the network. However, *report of activities* has here even greater effect on *influence* and is much more democratically distributed. If there is a direction, it is from co-worker to manager, or from service provider to client, which most often goes in

the opposite direction of *funding* and to lesser extent *rules and policy*. This type of authority vested in the actual work of the many doers is not captured well in established typologies [e.g. 43,44]. The importance of their work has been acknowledged before [e.g. 4,5], but this study illuminates the great *influence* doers exert back on their managers, clients, or other decision-makers and funders. This resonates well with governmentality perspectives on power, where power is not only exercised hierarchically – from some powerful 'top' and 'down' – but between everybody conducting the conduct of each other [53,54]. I believe this is key to understand risk governance. Especially since *influence* is among the most prevalent from external actors.

External actors contribute with somewhat smaller shares of technical, but more tangible inputs; i.e. *equipment and material*. This input is the least prevalent in the study and has weak negative associations to type of *relationship*, *trust*, and *influence* that are difficult to grasp fully. This means that the more important the input of *equipment and material* is, the less well the respondents know each other, *trust* that they will get the overall inputs they need, and the smaller the overall *influence* the other actor has. This is explained by the tendency of respondents not to know the actors they depend on for such input. and to have less *trust* that they will get what they need the more important the input is. This is so far somewhat reasonable and could be an actual pattern of social relations. It is more difficult to understand the negative association with *influence*, which would mean that the more important input of *equipment and material* is, the less *influence* the providing actor has on the ability of the respondent to contribute to mitigate urban flood risk. Considering the much smaller prevalence of *dependence* on *equipment and material* and its weaker correlation to other variables, it is deemed prudent not to make too much of this last result.

All different types of external actors wield substantial *influence* over urban flood risk mitigation in Lomma Municipality. It seems to be the strongest for national authorities, but there are no statistically significant differences between them concerning *influence*. It is then very interesting that national authorities provide significantly less important overall input than the county administrative board, which in turn provides significantly less important input than private companies. However, the difference is even more striking when looking at the *trust* the municipality has that they will get what they need from these different external actors, with both private companies and the county administrative board enjoying relatively high and much more *trust* than national authorities. These are clear indications of a vertical decoupling between the municipality and the national level, in which the municipality experiences a lack of comprehensive and consistent direction and guidance on how to mitigate escalating urban flood risk. Direction and guidance can only come from the national level to reduce the pressure for local or regional actors to continuously reinvent the wheel. It is also interesting to note that private companies are the most important and trusted providers of input, at the same time as Sweden is traditionally considered as having a strong state that shoulders the responsibility of its citizens' safety [55]. The municipal level is still carrying this responsibility, but perhaps these results are symptoms of the ongoing deterioration of the strong state [56] and the current reshaping of the policy agenda for societal safety [55]. This policy agenda has Anglo-American roots and has been suggested as being neoliberal [57], which makes the result of this study particularly interesting and important. Especially considering that private companies are only engaged in detached bits and pieces, without the possibility of grasping the overall problem that is necessary for mitigating flood risk. This is closely related to the commoditization of societal safety in which crucial inputs to risk governance are increasingly treated as discrete products that can be procured on a market [58]. Private companies deliver such crucial input and the municipality have high trust that they will deliver what is ordered. The question that cannot be addressed by the present study is if these discrete pieces are aggregated in a way that results in safety.

It is also interesting to look at what external actors are not mentioned at all. While claiming to have a role in climate change adaptation in the county, Region Skåne is simply not mentioned at all and appears to be irrelevant for Lomma Municipality when mitigating urban flood risk. That is not to say that Region Skåne is excluded from mitigating current and future flood risk, as they are actively involved in securing and adapting the healthcare system and other sectors for which they are responsible. Another notable feature is the complete absence of civil society organizations, in a country consistently ranked highest in Europe concerning public membership in civil society groups and networks [59,60]. Regardless of whether individual Swedes are extraordinarily organized [61], they are not organized to engage in the mitigation of urban flood risk in Lomma. A mobilizing civil society is a common response to diminishing engagement of national authorities in other countries [62,63], but it appears that citizens experience the maintained responsibility of the municipal level, with the support of private companies, as sufficient so far. Even worse, it may mean that the strong civil society in Sweden is also being weakened. Finally, no respondents mentioned anybody directly engaged in flood risk or water resource management at the municipalities upstream, whose decisions and actions definitely impact urban flood risk downstream in Lomma. There are a few links to the coordinator at Höje Å Water Council, which indirectly includes representatives of the upstream municipalities, but the question is if that is enough to bridge such a horizontal decoupling across the hydrological system of the catchment area.

6. Conclusion

So, what patterns of *dependence*, *trust*, and *influence* of external actors emerge in the accounts of municipal politicians and civil servants contributing to urban flood risk mitigation in Lomma Municipality, Sweden? First of all, it is evident that input from external actors is vital for the municipality. It is also clear that external actors are most important in providing input of technical and informational character, somewhat less important in providing normative input, while much less important in providing emotional input and hardly involved at all in providing financial input. The personal relationships between actors are crucial for *trust*, alongside competent authority and legal authority, which are also fundamental for understanding social organization in this context. However, the *influence* that actors have on each other when contributing to mitigating urban floor risk is not only associated with authority coming from the top down, largely based on controlling normative and financial input, but also with the authority of the many doers, regulating their actions and reporting, which is more democratically distributed and including external actors to relatively large degree.

While all the different types of external actors wield substantial *influence* over urban flood risk mitigation in Lomma Municipality, there are striking differences in the importance of the provided input and the level of *trust* within the municipality that they will provide what is needed. Most notably, there is a vertical decoupling from the national level, with national authorities providing less important input than other types of actors, and with much less *trust* that they will provide what the municipality needs from them. Private companies are instead the most important providers of input and they are more trusted that they would provide what is needed. The municipal level is still maintaining state responsibilities, but the diminished role of the national level must be addressed for effective mitigation of urban flood risk in the future. Especially in a changing climate. The contribution of private companies would still be crucial, but the municipalities need comprehensive and consistent direction and guidance to address current and future challenges. Moreover, there is a horizontal decoupling to the municipalities upstream in the Höje Å catchment area, which also has to be addressed for effective urban flood risk mitigation.

These patterns of social relationships between internal and external actors contributing to mitigate urban flood risk are important for understanding flood risk governance in society. There are obviously contextual differences that limit the generalizability of these results.

However, it is fair to assume that the findings are applicable to similar Swedish municipalities in terms of size and complexity of flood risk, and at least informative for other municipalities in Sweden. The findings are also interesting for comparison to municipalities in the other Nordic countries, which are anticipated to have similar experiences.

Acknowledgements

This study would not have been possible without the keen participation of the politicians and civil servants of Lomma Municipality. The study is part of the research project 'Sustainable Urban Flood Management', which is funded by FORMAS, Sweden (2015-149). I would also like to thank the anonymous reviewers of the manuscript for their invaluable comments and suggestions.

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Paper III

Tightly coupled policies and loosely coupled networks in the governing of flood risk mitigation in municipal administrations

INTRODUCTION

Flood risk is of great global concern (Grobicki et al. 2015). Although many of the most vulnerable people live in developing countries (Dilley et al. 2005), flood risk is threatening to undermine sustainable development also in the most affluent advanced liberal democracies (Priest et al. 2016); especially since flood risk is expected to escalate with climate change (IPCC 2012). This has spurred intense scientific interest in the systems governing flood risk across administrative levels (e.g. Hegger et al. 2014, Thaler and Levin-Keitel 2016, Alexander et al. 2016, Cumiskey et al. 2019, Johannessen et al. 2019, Becker 2020a). However, *floods* are complex phenomena not bounded by administrative borders, levels or sectors (Niemczynowicz 1999) and any specific flood event can be the result of a combination of pluvial, fluvial, coastal, and groundwater processes (Becker 2014). *Risk*, on the other hand, is a contested concept that can be defined as uncertainty about what could happen and what the consequences would be (Aven and Renn 2009). The complexity and transboundary nature of flood risk require it to be governed by collaborative networks of actors (Folke et al. 2005, Renn 2008) and the patterns of social relations among these actors have been suggested as fundamental for their collective capacity to mitigate risk (Ingold et al. 2010, Becker 2018). Flood risk has also been suggested a "wicked problem" involving multiple actors with conflicting interests and ambiguity in both problem and solution (Alford and Head 2017) and thus demanding interaction between different actors attempting to address it (Guerrin et al. 2014, Cumiskey et al. 2019). It is in such circumstances that collaborative governance has been suggested particularly important (Ansell and Gash 2008, Bodin et al. 2020).

The fit between the biophysical basis of complex challenges and the social organization of actors attempting to address them has been suggested particularly important for collaborative governance (Folke et al. 2007). Many studies of the governing of water-related issues, therefore, argue for the benefits of focusing on the catchment-level, also referred to as the basin-level (e.g. Niemczynowicz 1999, Borowski et al. 2008, Pahl-Wostl et al. 2012, Lebel et al. 2013, Widmer et al. 2019). However, early thinking about institutional fit was not only concerned with biophysical and organizational compatibility, but also explicitly with the fit of legal frameworks regulating activities (Young and Underdal 1997, Folke et al. 2007). Similar arguments for the importance of connecting and coordinating activities in the implementation of different policies governing flood risk have been framed in terms of policy coherence (Benson and Lorenzoni 2017), integration (Cumiskey et al. 2019, Metz et al. 2020), and overcoming fragmentation (Gilissen et al. 2016). However, these studies generally focus on different organizational actors working in the same or different policy areas and contributing to the same or different flood risk management strategies (e.g. mitigation, preparedness, response), while the inner workings of these organizations have received less attention in this context.

While there are various types of organizations involved in governing water-related issues in a catchment area, municipal administrations have been suggested to have particularly important and challenging roles (Mancilla García et al. 2019). This is especially noticeable in the systems governing flood risk in the Nordic region, with both responsibilities and resources largely decentralized to the municipal level (Harjanne et al. 2016). Considering the typically broad portfolio of water-related responsibilities of municipal administrations (Mancilla García et al. 2019), it is also important to grasp how individual actors interact when engaging in activities to implement different policies within them. This becomes particularly consequential when the

different policies demand interaction between actors implementing them, which can be referred to as the policies being tightly coupled (cf. Fusarelli 2002, compare with Bodin and Nohrstedt 2016 on tightly coupled tasks). For instance, policies on dam or levee construction may demand input from actors implementing policies for environmental protection, and policies on urban planning may demand input from actors implementing policies on storm water drainage.

This paper is limited to studying the *mitigation* of flood risk, which is here defined as comprising all proactive activities that reduce the likelihood of floods and/or their consequences before occurring (Coppola 2011). It is worth noting that this broad definition of flood risk mitigation also includes what sometimes are referred to as flood defence and prevention (Hegger et al. 2014). It does, however, not include activities preparing for effective response or recovery in case of an actual flood, and should not to be confused with how the same term is used in relation to reducing sources or enhancing sinks of greenhouse gases in relation to climate change (IPCC 2014).

Swedish municipal administrations are relatively large and complex organizations, with a multifaceted range of responsibilities related to mitigating flood risk (Becker 2020a) that appeared in legislation in the mid-1980s (SFS 1987:10; SFS 1986:1102; Prop. 1985/86:150 Bil. 3). The Swedish legal framework confers sovereign right to municipal administrations to adopt land use plans (SFS 2010:900), explicitly pointing out considerations for flood risk (Ch.2, Sect.5), and they have the responsibility to remove surface water from settled areas (SFS 2006:412). The legal framework stipulates that municipal administrations must have an action programme to mitigate risk (SFS 2003:778), and regularly assess risk and vulnerability within their jurisdiction (SFS 2006:544). The formal guidelines for such municipal action programmes and risk and vulnerability analyses both highlight flood risk explicitly (MSB 2011a, 2011b), and the latter states that a main purpose of risk and vulnerability analysis is to provide input to land use planning (MSB 2011a). The Swedish legal framework is thus concentrating the responsibility for governing the mitigation of flood risk to the municipal administration through tightly coupled policies concerning *water & sewage*, *planning*, and *risk & vulnerability*, which demand coordination between the actors implementing them within it (Peters 2013). The Swedish system for governing flood risk has been intensely studied (e.g. Johannessen and Granit 2015, Ek et al. 2016, Becker 2018) and provides a suitable context for also studying the interaction among individual actors contributing to the implementation of tightly coupled policies governing flood risk mitigation within municipal administrations.

Empirical studies of collaborative governance generally focus either on the macro-level institutions per se (e.g. Pahl-Wostl et al. 2012, Guerrin et al. 2014, Alexander et al. 2016), or on the meso-level interaction between organizations (e.g. Bergsten et al. 2014, Guerrero et al. 2015, Widmer et al. 2019), without corresponding attention to the micro-level interactions between the individual actors constituting the organizations and reproducing the institutions through their recurrent actions (Becker 2020b). An explicit focus on the interaction among individual actors contributing to the governing of flood risk mitigation within municipal administrations would thus complement these studies. However, studying individuals in organizations has been an important scientific focus for at least a century (e.g. Taylor 1919, Weber 1978). Regardless how common the early scientific notion of organizations as instruments for rational goal-oriented action still is in society, it has attracted extensive critique for decades (Meyer and Rowan 1977, DiMaggio and Powell 1983). Organizations are not only structured and functioning for rational goal-oriented efficiency. They are also structured and functioning by institutional rules, which can be regulative (e.g. legislation, policy), normative (e.g. norms, expectations) or cultural-cognitive (e.g. schema, frames) (Scott 2014). This

approach is commonly referred to as new institutionalism (DiMaggio and Powell 1991) and has become influential in organizational analysis (Scott 2014). It has also been suggested a crucial complement for the study of social-ecological interactions (Hotimsky et al. 2006). New institutionalism has proven a useful perspective to explain why networks of actors that comprise logically interdependent parts may end up loosely coupled, or even decoupled (Weick 1976, Meyer and Rowan 1977, DiMaggio and Powell 1983, Scott 2014). It constitutes thus a particularly suitable theoretical perspective for this study. Although it has contributed to our understanding of institutions on macro-, meso-, and micro-level, the purpose of this paper demands particular engagement with micro-oriented approaches (Meyer and Rowan 1977, North 1990, van de Ven and Garud 1994, Zucker and Schilke 2019).

The purpose of this paper is thus to contribute to the understanding of how flood risk is governed in large and complex municipal administrations, by studying how actors interact within them when implementing tightly coupled policies and applying a new institutionalist lens to analyse any emerging patterns. To meet that purpose, this paper intends to answer the following research question: *How are Swedish municipal administrations organizing internally to implement legislation governing flood risk mitigation?* This is intended as a Foucauldian "how question" (cf. Foucault 1991). It is thus not only a descriptive question concerning how individual actors interact in this context and how that impacts flood risk mitigation, but also an explanatory question of how they have come to interact in that way.

METHODS

The research adopts a comparative case study approach (Yin 2003). Three municipalities of varying size, as well as levels of flood risk, were selected within the same catchment area. The catchment area was selected using the logic of the extreme case, since cases with bigger challenges "often reveal more information because they activate more actors and more basic mechanisms in the situation studied" (Flyvbjerg 2006 p. 229). However, for a catchment area to be considered extreme has less to do with extreme magnitudes of flood risk and more with the complexity of the flood problem. Höje Å catchment area in southern Sweden comprises mainly Lomma, Lund and Staffanstorp municipalities, which are all currently experiencing significant changes in terms of population growth and urbanization, exploitation of new areas, and densification of existing areas. It involves combinations of fluvial, pluvial, coastal, and groundwater floods, with significant impacts of human activity on hydrology. Höje Å catchment area was thus selected, with the three municipal administrations of Lomma, Lund, and Staffanstorp constituting the cases for comparison.

The comparative case study integrates structural and interpretive analysis (White 1997), since the roles of actors contributing to flood risk mitigation are defined both by their social relations and by the institutional context they are embedded into (DiMaggio 1992). Social network analysis has proved useful to unravel underlying processes (Robins et al. 2012), while qualitative research is useful to unveil their reasons and meaning (Bernard 2006). Social network analysis and qualitative research were thus applied to study the networks of actors within each municipal administration contributing to the implementation of the legislation governing flood risk mitigation.

Since the boundaries of these networks were unknown from the outset, the participants were selected by means of snowballing (Borgatti et al. 2018). The snowballing started with 10 participants within each municipal administration identified as likely to contribute to the mitigation of flood risk—i.e. representatives to Höje Å River Council and civil servants working with planning, water and sewage, land and exploitation, and environmental issues—

using a name-generating question concerning who each participant depends upon for input to be able to contribute to mitigating flood risk. It continued in principle until no more new participants were identified, but involved in practice boundary judgements of relevance (Becker 2018). This resulted in 143 participants contributing actively to mitigating flood risk: 35 within Lomma municipal administration, 88 within Lund municipal administration and VA SYD (the regional water and sewage organization Lund is part of), and 20 participants in Staffanstorp municipal administration. In addition to themselves, the participants identify 86 actors (16, 59, and 11) on whom they depend for some input, but who are not contributing actively or cannot be interviewed; i.e. people who have died, left the organization, not considering themselves contributing, or performing purely technical tasks (e.g. maintaining a pump, flushing a pipe, etc). This category also includes one instance per municipal administration of a participant referring to groups instead of an individual; i.e. a municipal call centre, VA SYD, and a group of civil servants on a workshop. Two individuals working with planning in Lund, and not excluded by any boundary judgement, refused to participate. This corresponds to a response rate of 99%. Moreover, one of these individuals was only identified as providing input to one participant, and the other to three participants, indicating that none of them was central, and one of them even peripheral, to the governing of flood risk mitigation. The effect of their absence on the validity of the research is thus assumed to be negligible. The interviews were conducted between January 2017 and October 2018.

Studying how individual actors interact within municipal administrations when implementing tightly coupled policies requires operationalizing complex social relations into something that can be empirically observed. Regardless of how the social relations are formed, they denote some kind of dependence after being established (Luhmann 1979). Although there are numerous kinds of dependencies and many ways to operationalize them, Becker (2018) suggests a framework of seven types that was deemed suitable for the purpose of this paper since they comprise a broad range of exchanges between actors that have been suggested important (Table 1).

Input	*Reference*
Reports of activities	(Rowley 1997)
Equipment and material	(Hoang and Antoncic 2003)
Funding	(Oliver 1991)
Technical information	(Leifeld and Schneider 2012)
Rules and policy	(Leifeld and Schneider 2012)
Advice and technical support	(Hillman et al. 2009)
Pepping and moral support	(Hoang and Antoncic 2003)

Table 1. Seven types of input constituting the studied resource flows between actors (Becker 2018).

The social network data were collected through structured questions posed to the participants during the interviews. The dependence between actors was operationalized as the importance of the seven types of input (Table 1), rated on a five-point Likert scale from not at all (0) to extremely important (4) for their contribution to flood risk mitigation. The importance of the seven different inputs were then aggregated and normalized (divided by the maximum possible sum of 28) to produce an aggregate scale between zero (no importance) and one (maximum importance) that was used in the analysis as the strength of the relation between actors (tie strength). Qualitative data were collected through the informal dialogues that ensued when answering the structured questions and the overall conversation about flood risk mitigation, and recorded through notes. Each interview took between 60 and 90 minutes, with a few shorter interviews with actors less engaged in flood risk mitigation. All interviews were done face-to-face to minimize non-responses and to allow for clarifications and probing (Borgatti et al. 2018). The social network data were analysed with the assistance of the software UCINET

(Borgatti et al. 2002) and the qualitative data were analysed using a series of coding and categorisations (Charmaz 2006).

The social network data were analysed exploratorily through visualizations and descriptive statistics, and by using three different centrality measures to investigate the contribution each actor makes to the overall structure of the networks (Borgatti et al. 2018). The exploratory analysis was partly done on an aggregate level of groups of actors mainly engaging in activities implementing the three main policy areas governing flood risk mitigation—*water & sewage*, *planning*, and *risk & vulnerability* (see introduction)—as *other civil servants* engaging in different activities, or as *politicians & senior management*. These groups are referred to as types of actors and were also vital for the analysis of the patterns of interaction between individual actors. Centrality measures are commonly used to analyse power structurally (Scott 2004), but have here particular meanings. This is because the studied relations between actors comprise different inputs for actors to be able to contribute to flood risk mitigation. These inputs can thus be seen as resources flowing in the networks, and controlling these resources confers influence to actors in the network (Brass and Burkhardt 1992). In-degree centrality was used to capture local control over resources by summarizing for each actor the total direct dependence of all actors on the inputs from that actor (Borgatti et al. 2018). Directional betweenness centrality was used to operationalize control over resource flows through the networks, since it captures the extent each actor falls on the shortest paths between pairs of other actors (Brass and Burkhardt 1992). Finally, in-eigenvector centrality was used to operationalize the influence an actor has over other influential actors in the network (Brass and Burkhardt 1992), by not only considering how dependent they are of the actor's input but also how dependent other actors are on them.

RESULTS

The first part of the results section presents the aggregate interactions between types of actors engaging in different activities, focusing mainly on the three main policy areas governing flood risk mitigation. This is followed by a second part focusing on patterns of interaction between individual actors. The final part of the results section analyses the outcomes of the interactions in terms of fulfilment of the intentions of the legal framework.

Interaction between types of actors

The most striking features of the networks of actors are (1) their relative structural similarity in the presence of interactions on the aggregate level between *planning*, *water & sewage*, *politicians & senior management*, and *other civil servants*, and (2) seeming dissimilarity in the interactions with actors engaged in *risk & vulnerability* (Figure 1). This means that while the former four types of actors are similarly tied to each other across the networks, the latter type of actors engaging in risk & vulnerability is either decoupled or loosely coupled with the rest of the network.

The results show that the actors engaging in activities to implement *risk & vulnerability* policies in Staffanstorp are not seen as providing any input needed for any of the other types of actors; thus, not being identified by them and included in the network (Figure 1). *Risk & vulnerability* actors only interact with the category *other civil servants* in Lund, while also interacting with *water & sewage* and getting input from *planning* and from *politicians & senior management* in Lomma (Figure 1). However, when analysing the relative importance of the interaction between *planning*, *water & sewage*, and *risk & vulnerability*, the three networks exhibit closer resemblance (Table 2).

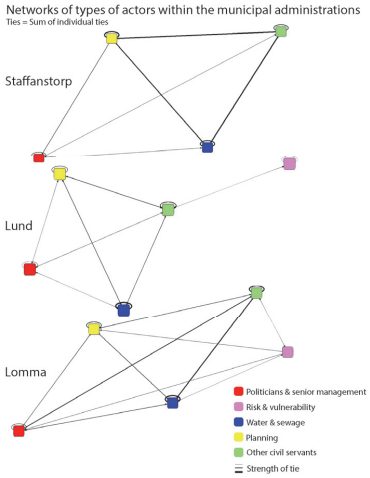

Figure 1. Networks of types of actors mitigating flood risk within the three studied municipal administrations. Note that node sizes are set, while tie thicknesses represent the sum of individual ties and are relative within each network and cannot be compared between networks.

Receiver	*Provider*	*Staffanstorp*	*Lund*	*Lomma*
Planning	**Water & sewage**	44%	47%	28%
Water & sewage	**Planning**	38%	32%	33%
Planning	**Risk & vulnerability**	-	0%	0%
Water & sewage	**Risk & vulnerability**	-	0%	3%
Risk & vulnerability	**Planning**	-	0%	8%
Risk & vulnerability	**Water & sewage**	-	0%	44%

Table 2. Proportion of total importance of input from other types of actors.

Actors engaged in *planning* and in *water & sewage* interact substantially when contributing to the governing of flood risk mitigation in all three municipal administrations, with substantial proportions of the total importance of inputs from the other types of actors flowing between them (Table 2). This is in sharp contrast to the inputs from actors engaged in *risk & vulnerability*, which are non-existent, except to *water & sewage* in Lomma where it is of very little relative importance (Table 2). It is also only in Lomma that the actor engaged in *risk & vulnerability* activities receives important input from actors engaged in the other two policy areas, and then only a substantial proportion from *water & sewage* (Table 2). However, qualitative interview data indicate that actors engaged in *risk & vulnerability* activities are not seen as contributing to the mitigation of flood risk in the municipal administrations. For instance: "He is not even on the playing field concerning floods" (Female civil servant about her risk & vulnerability counterpart).

Patterns of interaction between individual actors

In addition to the aggregate analysis, it is also informative to study patterns of interaction on individual level. Actors engaged in *planning* and *water & sewage* are closely interacting and centrally located in the networks of all three municipal administrations (Figure 2-4). This is also picked up in qualitative data. For example:

> *"Flood and urban drainage are important issues in planning and we have always [water & sewage expert] on board, who manages them." (Female civil servant, Staffanstorp)*

"We who work with water & sewage are, of course, very dependent of what they [planners] do. [...] I trust them fully, but there are difficulties in the contribution of planning to [flood] mitigation in the legislation." (Female civil servant, Lomma)

There are also actors engaged in *water & sewage* mainly interacting with each other (Figure 2-4), which is expected of the more technical line management part of their organizations. It is mainly actors engaged in *water & sewage* who have most local control of resources being exchanged in the networks, operationalized as in-degree centrality (Figure 2), most control over resource flows through the networks, operationalized as directional betweenness centrality (Figure 3), and most influence over other influential actors, operationalized as in-eigenvector centrality (Figure 4). This is also reflected in the first selected quote below. Except for an actor engaged in *planning* with most control over resource flows in Lund, as reflected in the second quote, and an actor among *other civil servants* in Lomma.

"I am not sure if I can help you with this study, since I am not working with floods. I guess you have talked to [water & sewage expert], on the Technical Unit, who takes care of such questions." (Female planner, Staffanstorp)

"Among us planners, we can always go to [planner's name] as she is a bit like the spider in the web concerning these issues, with contacts to a lot of people" (Female civil servant, Lund)

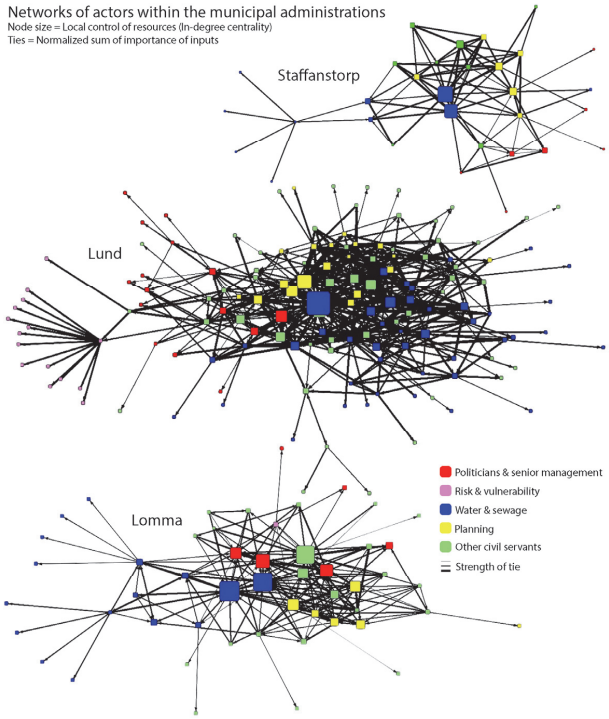

Figure 2. Local control of resources in networks of actors mitigating flood risk within the three studied municipal administrations. Node size = Local control of resources (in-degree centrality). Tie thickness = normalized sum of importance of inputs. Note that node sizes and tie thicknesses are relative within each network and cannot be compared between networks.

In Lomma, the most structurally centred actor is instead an environmental strategist, who is identified as providing important input to numerous actors engaging in a wide range of activities (Figure 2), having much control over resource flows (Figure 3) and most influence over other influential actors (Figure 4). This latter point is also explicitly mentioned by several participants during the interviews:

> *"She has the ear of the chairman of the municipal executive board". (Male politician, Lomma)*
>
> *"The politicians trust her". (Female civil servant. Lomma)*

The centrality of the environmental strategist in Lomma might be connected to the more central positions of *politicians & senior management* there than in Lund, and their much more central positions than in Staffanstorp, where such actors are peripheral (Figure 2-4). It is also interesting to note the structural positions of *other civil servants*, which are generally least centrally located in Staffanstorp, more central in Lomma, and most central in Lund. The proportion and diversity of *other civil servants* are also lower in Staffanstorp, with much fewer categories of actors involved in mitigating flood risk (Table 3). Lund and Lomma are more similar in these regards, with slightly higher proportion of *other civil servants* involved in Lomma and slightly more categories of actors involved in Lund (Table 3). The substantially more mobilized municipal administrations in Lomma and Lund are commonly attributed to the tenacious work of the environmental strategist in the former and to the project "Lund's Water" in the latter. For instance:

> *"I have worked a long time to get everybody involved. Some came along right away. When the politicians started to think it was important, all managers became interested and then everybody was involved shortly thereafter. […] More or less interested." (Female civil servant, Lomma)*
>
> *"Five years ago, we didn't see this as our responsibility. Now, it is a top priority and we work closely together with other departments to see where the money we have would be put best to use to solve the problem" (Male civil servant, Lund).*

Municipal admin.	*Proportion*	*Categories*
Staffanstorp	30%	4 = Roads, land & exploitation, environment, project management
Lund	37%	12 = Park & nature, children & education, roads & traffic, legal, strategic development, surveying, housing, building permits, waste management, land & exploitation, environmental protection, environmental strategy
Lomma	41%	11 = Building permits, finance, property management, roads, parks, GIS, land & exploitation, environmental strategy, project management, surveying, service centre

Table 3. Proportion and categories of *other civil servants*, not primarily engaging in *planning*, *water & sewage*, or *risk & vulnerability* activities.

There are differences between the municipal administrations concerning the structural positions of actors engaged in *risk & vulnerability* activities (Figures 2-4) that are more essential for the purpose of this paper. Although identified in the aggregate analysis above (Figure 1), analysing patterns of interaction between individual actors provides additional input to grasp these differences; at least for Lund and Lomma, where *risk & vulnerability* actors are involved to some extent. There is a number of actors engaged in *risk & vulnerability* activities in Lund, but only two provide input to two *other civil servants* (Figures 2-4). This is particularly interesting as the bulk of these actors are actually focal points working for different departments or other municipal organizations. These focal points are intended to be the liaisons between their departments and *risk & vulnerability* activities, but are never once mentioned as providing input

to anybody involved in flood risk mitigation. The only links to actors involved in *planning* or *water & sewage* are indirect through *other civil servants*, who are relatively unimportant locally (Figure 2) and with little influence over other influential actors (Figure 4). Very few participants indicate any awareness or concern about this lack of integration of actors engaging in implementing the tightly coupled policies, with one particularly notable exception:

> *"This is an interesting study since it is obvious that we are divided in a way that hinders the management of complex challenges, but how should we otherwise be organized? With 'The Boss of It All' [reference to Danish director von Trier's comedy film 'Direktøren for det hele']?" (Male senior manager, Lund)*

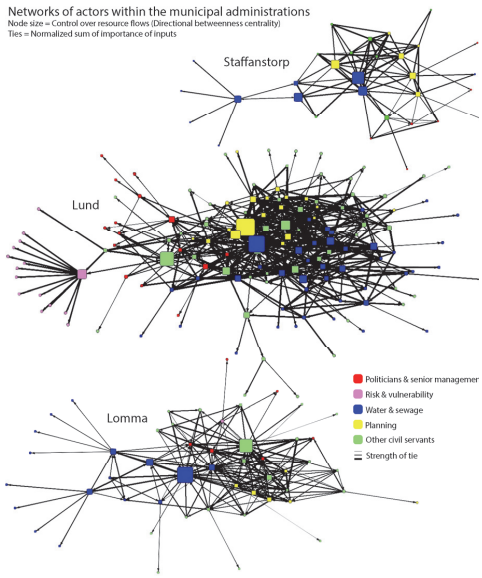

Figure 3. Control over resource flows in networks of actors mitigating flood risk within the three studied municipal administrations. Node size = Control over resource flows (directional betweenness centrality). Tie thickness = normalized sum of importance of inputs.

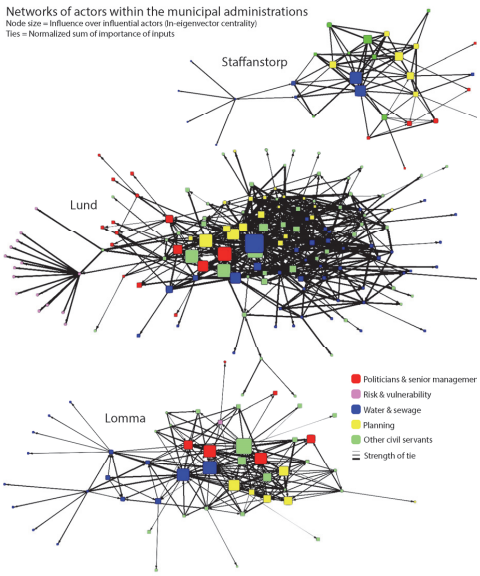

Figure 4. Influence over influential actor in networks mitigating flood risk within the three studied municipal administrations. Node size = Influence over influential actors (in-eigenvector centrality). Tie thickness = normalized sum of importance of inputs.

Note that node sizes and tie thicknesses are relative within each network and cannot be compared between networks.

In Lomma, on the other hand, there is one actor engaged in *risk & vulnerability* activities, who provides somewhat important input directly to one actor and receives rather important input from another actor engaged in *water & sewage*, and receives unimportant input from one actor engaged in *planning*.

Outcomes in terms of policy intentions

Although the three municipal administrations differ in the level of interaction between actors engaged in *risk & vulnerability* and in *planning* or *water & sewage*, from none in Staffanstorp, only indirectly in Lund, and also directly in Lomma, the outcomes are similar in terms of failure to fulfil the integrative intentions of the legal framework. The results of the qualitative parts of the interviews are unambiguous. Neither land use planning, nor urban drainage and storm water management, are informed at all by risk and vulnerability analysis in any of the municipal administrations, and neither risk and vulnerability analysis nor the municipal action

programmes consider the impacts of *planning* or *water & sewage* on flood risk. Some participants provide explanations for this, which are particularly interesting for the purpose of this paper:

> *"Yes, it is perhaps problematic, but that is how planning must be done. How should flood risk be assessed otherwise? The law says that it is the landowner who must show that flood risk is taken into account and they pay for the necessary assessments. They cannot be forced to pay for assessments of flood risk for areas bigger than the area they own and have requested a detailed development plan for. Who should pay for it then? This is how planners in Sweden do it." (Female civil servant, Lomma)*

> *"No, but this is how it is done in Sweden. All municipalities must regularly do a risk and vulnerability analysis and submit it. We have worked hard to build a good system for it here in Lund and we have now representatives involved in all departments. There is still work to do, but I think we are on the right way and we get the job done." (Male civil servant, Lund)*

In stark contrast to this, *planning* and *water & sewage* are influencing each other heavily, as detailed development plans are never approved without explicit consideration of urban drainage and storm water management, and no urban drainage and storm water management system is ever designed without considering land use. For instance:

> *"Floods are a priority in the building of new areas, but it is taken care of in the projects. Water and sewage expertise is always involved in the planning to make sure the drainage system for the new area is correct." (Female civil servant, Staffanstorp)*

> *"Water has always been considered, but when floods became a higher priority we had to try new ways of working together. Also now, with the project "Lund's Water". We find a way that works, and stick to it. This is how we do it." (Male civil servant, Lund)*

DISCUSSION

The results reveal interesting patterns of how Swedish municipal administrations organize for the governing of flood risk mitigation. Regardless of differences in size and flood exposure, the three municipal administrations share many structural features. This is particularly striking in their formal organization, with nearly identical functions officially defined albeit aggregated and named slightly differently upwards in the administrative hierarchies. This is, however, not surprising, but rather expected considering the rich literature on the institutionalist notion of isomorphism (Meyer and Rowan 1977, DiMaggio and Powell 1983, Scott 2014), which is "the result of processes that make organizations more similar without necessarily making them more efficient" (DiMaggio and Powell 1983 p. 147). The results are also showing relative isomorphism in the interaction between actors engaged in *planning*, *water & sewage*, and *risk & vulnerability*, while the positions of *politicians & senior management*, and of *other civil servants*, varies substantially between the three municipal administrations. Most notably the differences in structural positions of *politicians & senior management*, who are most peripheral in Staffanstorp, more central in Lund, and most central in Lomma, as well as in the diversity and centrality of *other civil servants*, who are much less diverse and central in Staffanstorp than in Lomma and Lund (Figures 2-4 and Table 3). These differences are interesting to discuss in themselves (Petridou et al. 2019), but this paper focuses primarily on the organizing to implement the legislations for *planning*, *water & sewage*, and *risk & vulnerability*, which are essential for the mitigation of flood risk and tightly coupled to each other.

It is then particularly interesting to note a recurrent pattern of relative integration between actors implementing the two former, while the actors implementing the latter are loosely coupled or even decoupled from them. Although there are differences in the extent of structural decoupling among the municipal administrations—from no interaction between actors engaged in activities implementing policies for *risk & vulnerability* and for the other two policy areas in Staffanstorp, only indirect interaction in Lund, to also minor direct interaction in Lomma—the qualitative results clearly suggest similarity in terms of not using any input across this divide. This pattern of concurrent integration and separation is referred to as *cinderellic fragmentation*, which is not accidental or merely structural, but a consequence of parallel processes of institutionalization.

Cinderellic fragmentation

It is clear that the actors engaged in *planning* and in *water & sewage* are interacting relatively intensely with each other when contributing to the governing of flood risk mitigation in all three municipal administrations. It is equally clear that the actors engaged in *risk & vulnerability* are hardly interacting with any of them, if at all. This is commonly referred to as fragmentation (Feiock and Scholz 2010) and has been suggested a common feature in the governing of flood risk on institutional (macro) and organizational (meso) levels (e.g. Gilissen et al. 2016, Cumiskey et al. 2019, Metz et al. 2020). However, the micro-level collaborative networks governing the mitigation of flood risk within the municipal administrations are neither fully integrated in terms of interactions between actors implementing the three main and tightly coupled legislations, nor entirely fragmented (Figures 2-4 and Table 2). It is not possible to meaningfully describe the level of integration or fragmentation on a scale between these two extremes either, as parts of the networks exhibit close interaction at the same time as other parts are loosely coupled or even decoupled. This pattern of relative integration between two types of actors that are more or less completely separated from a third type of actor alludes to the fairy tale of Cinderella and her two stepsisters. Although "Cinderella" is included in the Oxford English Dictionary (2014), meaning "a person or thing that is undeservedly neglected or ignored", the analogy is here more intricate and relational. It is more relational in the sense of cinderellic fragmentation emerging in the transactions among all actors (cf. Emirbayer 1997) and not caused by particular scheming "stepsisters", and it is more intricate in the sense of the processes behind this kind of fragmentation, which are discussed in the next section.

The results reveal that actors engaged in *risk & vulnerability* are not neglected or ignored more by actors engaged in *planning* or *water & sewage* than they neglect or ignore these actors themselves. They are simply working on their own to comply with the requirements of the legislation they are tasked to implement, with the main indicators of compliance being the production and submission of a municipal action programme (SFS 2003:778) and risk and vulnerability analysis (SFS 2006:544). While all three municipal administrations submit these outputs, nobody uses them to inform *planning* or *water & sewage* as intended in policy. This concurs fully with previous research (Lin and Abrahamsson 2015) and appears to be a general feature of Swedish municipal administrations. However, the actors engaged in *planning* or *water & sewage* are also focusing on meeting the requirements of the legislations for their respective policy areas, but instead with intense interaction with each other since both compliance and current practices demand collaboration.

This *cinderellic fragmentation*, with concurrent integration and separation within the same collaborative networks of actors, generates a "problem of fit" between the legal framework and the collaborative networks implementing it. Such problems of fit have been shown to potentially undermine effective problem-solving in a wide range of contexts (Bodin and Nohrstedt 2016, Bergsten et al. 2019). Moreover, the pattern of *cinderellic fragmentation* is not

a coincidence. It is the result of parallel processes of institutionalization that are separated in both their foundation and orientation.

Directional separation of institutionalization

The legal framework started to explicitly demand considerations of flood risk in *planning* and *water & sewage* in the mid-1980s (SFS 1987:10; SFS 1986:1102; Prop. 1985/86:150 Bil. 3) and risk and vulnerability analysis in the mid-2000s (SFS 2006:544). However, the mere temporal difference, with actors implementing the two former having more than twice as long history together than with the actors implementing the latter, might not be a main reason for *cinderellic fragmentation*. This is particularly unlikely since flood risk mitigation became a prioritized issue in the studied cases as late as 2007, when all three policy areas were in place. Bodin and colleagues (2019) demonstrate the importance of pre-existing relations for structuring collaborative networks of individual actors, but theoretical perspectives of new institutionalism suggest that qualitative time-related factors may be more informative than purely quantitative differences in the age of the three policy areas. Stinchcombe (2000) was the first to propose the importance of initial social conditions on the development of the structure of an organization over time, and others point out the significance of a few decisive events on national- (Scott 2014) or even global level (Drori et al. 2006). It is clear that past social conditions and significant floods elsewhere in Sweden and Europe have played decisive roles in shaping the legal framework, as well as the more recent string of floods closer to home in making flood risk mitigation a priority. However, such determinant and structural top-down explanations of institutionalization fail to elucidate the pattern of *cinderellic fragmentation*, which requires keener attention to the agency of the involved actors.

Instead of looking for explanation solely in a few macro-level conditions and events, van de Ven and Garud (1994) suggest to pay attention to the many micro-level events in which actors faced with a new situation coinvent ways to deal with it. They argue that after a period of events with behavioural variation, as actors test and adjust activities as they go along, some patterns of activities start to be selected more and more often than others (rule-making events) until they dominate and become the convention (rule-following events). This resonates strikingly well with the empirical material. The institutionalization of flood risk mitigation is neither detached from the past, nor unfolding in a vacuum. The practices of actors engaging in ensuring sufficient urban drainage for more everyday rainfall, which have included both *planning* and *water & sewage* for decades, have been structuring the practices of flood risk mitigation by providing initial patterns of activities. The actors involved from the start are then coinventing updated practices together, with significant costs in terms of time, energy, and resources. North (1990) calls this “large setup costs”, and provides an explanation based on “increasing returns” for why systemic flaws in the current practices of mitigating flood risk are not addressed even when they are obvious to involved actors. This explanation is emphasizing the role of incentives and argues that flawed practices continue because further work in the same direction is still rewarded, while the costs of changing to an alternative increase over time (Scott 2014). This is particularly common in contexts where feedback is fuzzy and evaluations subjective (North 1990), such as in the mitigation of flood risk in the municipal administrations. Status quo is then maintained through a combination of actors being reluctant to consider alternatives after having invested time and energy to learn the current practices (learning effects), the contribution of each actor being facilitated by others following the same practices (coordination effects), and new actors being motivated to adopt the current practices as they appear commonly accepted (adaptive expectations) (North 1990). This would also explain why actors engaging in *risk & vulnerability* are not entering, invited or allowed into the more intensely interacting part of the network of actors engaging in *planning* and *water & sewage*, even when the policies

are tightly coupled, as organizational decoupling is more likely when there are high costs associated with closer integration (Scott 2014 p. 187).

While actors engaged in *planning* and *water & sewage* were already interacting to address water-related issues before the relatively recent problematization of flood risk mitigation, and continued to invest in modified but congruent practices, actors engaged in *risk & vulnerability* appeared first after the legislation was passed and found themselves having to produce the first municipal action programmes and risk and vulnerability analyses almost immediately. These actors thus had to do it more or less completely on their own, with very limited involvement and interest of other actors within the municipal administrations (Lin and Abrahamsson 2015), but with results that complied with the legislation to the liking of politicians and managers. These early activities and positive feedback in relation to the new demands have clear implications for the institutionalization of practices, since they constitute rule-making events that set its initial direction (cf. van de Ven and Garud 1994). This direction is then likely to prevail due to the path dependency resulting from North's (1990) learning effects, coordination effects, and adaptive expectations, introduced above. The activities of the actors engaged in *risk & vulnerability* are also funded by earmarked funding from the national level, which further cements their decoupled activities in relation to the actors engaged in *planning* and *water & sewage*. The result comprises practices in *risk & vulnerability* geared towards ceremonial compliance (cf. Meyer and Rowan 1977), more or less completely devoid of their original purpose (cf. Lin and Abrahamsson 2015).

In addition to incentives in relation to "increasing returns", the results suggest that explanations of the *cinderellic fragmentation* of actors implementing the three tightly coupled policies can also be found in increasing commitment to professional norms and identities and in increasing objectification of flood risk mitigation, indicated by *how* the participants express themselves in the interviews. Selznick (1992 p. 232) suggests that it is not only through incentives that institutions are holding actors hostage to their own history, but through their normative order that is both constituting and being constituted by the actions of contributing actors over time. This is clear in the empirical material, with participants expressing in different ways that *this is the way we do it* and giving references to the common practices of their different professional groups (cf. Scott 2014). Although closely related to coordination effects (North 1990), such normative expectations are invaluable as they "reduce the need for constant negotiation of expectations and behavioural contracts" (Handmer and Dovers 2007 p. 30), but can clearly also bind actors to flawed practices. The empirical material is also rife with examples of participants expressing that *this is how it is done*, which is a usual indicator of more cultural-cognitive elements of institutionalization (Berger and Luckmann 1966 p. 77, Scott 2014 p. 148). Here it is not about incentives or identity, but about the objectification of shared ideas about central aspects of flood risk mitigation. Such objectification involves the development and diffusion of some degree of consensus among actors concerning the meaning and value of the ideas, where the diffusion shifts from mere imitation to being increasingly normative with less and less room for alternative views (Tolbert and Zucker 1996). These shared ideas thus thickens and hardens when diffused; not only for the newly incorporated actors, but also for the actors already subscribing to the particular understanding (Berger and Luckmann 1966 p. 76).

To summarize, while pre-existing relations are important for structuring collaborative networks of individual actors (Bodin et al. 2019), the pattern of *cinderellic fragmentation* of flood risk mitigation can be explained by attention to mechanisms behind its institutionalization related to incentives, identities, and ideas. It is indeed common in most empirical studies of institutionalization to find varying combinations of elements, and it is when they align that their

combined force is most formidable (Scott 2014 pp. 70–71). The observed pattern of concurrent integration and separation of actors engaging in *planning* and *water & sewage*, on the one hand, and in *risk & vulnerability*, on the other, may thus best be explained in terms of parallel processes of institutionalization with emphases on different regulative, normative, and cultural-cognitive elements. Although present policy for *risk & vulnerability* explicitly demands interaction with the other two tightly coupled policy areas, it is possible to submit the main indicators of compliance without genuine interaction with them. When that is repeatedly done over the years, with little or no interest of busy actors engaged in *planning* and *water & sewage* and positive feedback from politicians and managers, the decoupled practices get institutionalized with normative and cultural-cognitive backings. This decoupling is also institutionalized in the practices of actors engaging in *planning* and *water & sewage,* who set out to address flood risk mitigation together due to pre-existing relations, without needing to include actors engaged in *risk & vulnerability*. It is again normative and cultural-cognitive elements that trump the regulative elements in the legal framework, but this time they demand close interaction between actors engaging in *planning* and *water & sewage*, while practices in *risk & vulnerability* are allowed to be decoupled. The resulting pattern of *cinderellic fragmentation* of flood risk mitigation is thus in line with Scott's seminal finding that practices are more likely to be decoupled in an organization when confronted with external regulatory requirements, than with normative or cognitive-cultural demands for integration (Scott 2014 p. 187).

CONCLUSION

So, how are Swedish municipal administrations organizing to implement legislation governing flood risk mitigation? While the Swedish legal framework consists of tightly coupled policies demanding coordination between the actors implementing them, there is a recurrent pattern of relative integration between actors engaging in activities to implement policies for *planning* and *water & sewage* and substantial separation between them and actors implementing policy for *risk & vulnerability*. This *cinderellic fragmentation* generates a "problem of fit" between the legal framework and the collaborative networks implementing it, which undermines the effectiveness of flood risk mitigation in municipal administrations by decoupling activities that are intended in policy to inform each other. The concept of cinderellic fragmentation may be useful for studies of policy networks and collaborative governance in general, since it captures patterns of interaction that are not possible to meaningfully describe on a more conventional scale between fully integrated and entirely fragmented, as parts of the networks may exhibit close interaction at the same time as other parts are loosely coupled or even decoupled. Moreover, cinderellic fragmentation is not accidental but a consequence of a *directional separation of institutionalization*, where the more bottom-up and problem-oriented institutionalization of practices concerning flood risk mitigation in *planning* and *water & sewage* and the more top-down and compliance-oriented institutionalization of practices in *risk & vulnerability* pull the network of actors apart. The most important contribution to the available literature on policy coherence, policy integration and overcoming fragmentation in collaborative governance is, however, the mechanisms of the institutionalization demonstrated in this paper. While these mechanisms of increasing returns, commitments, and objectification are all recurrent themes in new institutionalism, this paper demonstrates how they may all operate simultaneously but to various degrees in different practices across any collaborative governance network. This has important implications for the governing of flood risk mitigation, and perhaps even for collaborative governance in general, as it not only suggests a particular kind of fragmentation that may undermine governance, but also the mechanisms explaining such fragmentation. Although it is crucial to identify detrimental fragmentation in itself, it is by increasing the understanding of the underlying processes that the paper has the greatest

potential to support efforts to find leverage points towards closer integration in collaborative governance.

Social network analysis has proven immensely useful for investigating a range of issues and contexts of collaborative governance, out of which this paper only cites a few important contributions. It is, however, important to remember that most such studies focus on the institutional level (macro) or on the interaction between organizations (meso), and may miss important micro-level relations and processes that are invisible to such approaches. While combining quantitative and qualitative methods is increasingly common today, most conventional studies of collective governance are only collecting data from individual participants as representatives of organizations (e.g. municipal administrations, departments, divisions, project teams), who are asked if their organizations interact or not. This approach disregards the social relations within organizations that proved to be crucial to grasp governance in the present study. Moreover, it simplifies the social relations between organizations, regardless of level, to the extent that the data becomes thoroughly misleading. For instance, by ignoring the internal structural position of the actors linking two organizations. These arguments find solid theoretical backing from diverse sources. Ahrne (1994 p. 28) asserts that "organizations cannot speak or move; they have no legs to walk with, and no eyes to see with. When organizations do something it is always individuals who act". These actors do not act for themselves, but on behalf of their organizations in inter-organizational relations (Johansson 2008). Studying inter-organizational relations, therefore, presupposes studying interacting individual actors who represent their organizations. However, as Callon and Latour (1981) suggest, individual actors do not represent their organizations equally, and may be unequally successful in translating the interests, desires, and forces of other actors with whom they form alliances or argue. A systematic description of inter-organizational relations relies, therefore, not on paying attention to only one arbitrarily selected pair of individual actors who happen to interact across some boundary, but to all such pairs. Adopting the social relation between individual actors as the fundamental unit of analysis opens up to study the micro-level relations and processes behind the phenomena of interest, and constitutes thus a crucial complement to more conventional meso- or macro-level studies of collaborative governance.

It is important to note that collecting data on the social relations between individual actors quickly becomes immensely time-consuming for the often large and difficult to delimit networks of actors contributing to the governance of complex issues. This is a disadvantage of the approach advocated here, as it may push studies to either become reductionist in the sense of only studying an arbitrary part of a much larger network of actors, or to settle for a low response rate that undermines validity since whole network approaches are exceptionally sensitive to missing data. However, its potential contributions to our understanding of collective governing outweighs its resource intensity; not only for studies of interaction within organizations, as showcased in this paper, but also for unpicking the complexities of the interaction between organizations that conventional macro- or meso-level studies may miss or even gloss over to the detriment of their theoretical contributions. Further research is thus needed into the micro-level interaction behind the meso- and macro-level phenomena of collective governing that contemporary empirical studies commonly focus on.

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Paper IV

COGITATIO

Politics and Governance (ISSN: 2183–2463)
2020, Volume 8, Issue 4, Pages 281–293
DOI: 10.17645/pag.v8i4.3059

Article

The Problem of Fit in Flood Risk Governance: Regulative, Normative, and Cultural-Cognitive Deliberations

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Submitted: 26 March 2020 | Accepted: 27 May 2020 | Published: 10 December 2020

Abstract
Flood risk is a growing global concern that is not only affecting developing countries, but also the sustainable development of the most affluent liberal democracies. This has attracted attention to the systems governing flood risk across administrative levels, which vary between countries, but are relatively similar in the Nordic region, with both responsibilities and resources largely decentralized to the municipal level. However, floods tend not to be bounded by conventional borders but demand attention to the catchment area as a whole. Influential voices have long argued the importance of fit between the biophysical basis of an issue and the institutional arrangements of actors engaging in its governance. The article investigates such institutional fit in flood risk governance, based on a case study of flood risk mitigation in the Höje Å catchment area in Southern Sweden. Analyzing a unique dataset comprising 217 interviews with all individual formal actors actively engaged in flood risk mitigation in the catchment area illuminates a 'problem of fit' between the hydrological system behind flood risk and the institutional arrangements of its governance. This 'problem of fit' is not only visible along the borders of the municipalities composing the catchment area, but also of the spatial planning areas within them. The article deliberates on regulative, normative, and cultural-cognitive elements that align to lock flood risk governance into a regime of practices that, if not addressed, continues to undermine society's ability to anticipate and adapt to the expected escalation of flood risk in a changing climate.

Keywords
flood risk; governance; governmentalization; institutional fit; institutionalism; mitigation; problem of fit; Sweden

Issue
This article is part of the issue "The Politics of Disaster Governance" edited by Dorothea Hilhorst (Erasmus University Rotterdam, The Netherlands), Kees Boersma (Vrije Universiteit Amsterdam, The Netherlands) and Emmanuel Raju (University of Copenhagen, Denmark).

1. Introduction

Flood risk is a great and growing global concern (Alfieri et al., 2017; Grobicki, Macleod, & Pischke, 2015) that is not only affecting developing countries, but threatens to undermine sustainable development also in the most affluent advanced liberal democracies (Priest et al., 2016). This has spurred intense scientific interest in the systems governing flood risk across administrative levels (Bergsma, 2019; Johannessen et al., 2019; Thaler & Levin-Keitel, 2016). Flood risk is exacerbated by climate change (Becker, 2014), whose message spreads to all corners of the world, constituting, as well as being constituted by, local institutional dynamics that shape both processes and outcomes (Artur & Hilhorst, 2017). These systems thus vary between countries, but are relatively similar in the Nordic region, with both responsibilities and resources largely decentralized to the municipal level (Harjanne et al., 2016).

Floods tend not to be bounded by geopolitical, administrative, or organizational borders, but demand attention to the catchment area as a whole (Niemczynowicz, 1999, p. 12). Flood risk must thus be jointly governed by networks of actors (Becker, 2018;

Renn, 2008). The patterns of social relations among these actors are fundamental for society's capacity to reduce risk (Ingold, Balsinger, & Hirschi, 2010) and influential voices have long argued the importance of fit between the biophysical basis of an issue and the institutional arrangements of actors engaging in its governance (Folke, Lowell Pritchard, Berkes, Colding, & Svedin, 2007; Young & Underdal, 1997). Such problems of fit have been shown to potentially undermine effective problem-solving in a wide range of contexts (e.g., Bergsten et al., 2019; Bodin & Nohrstedt, 2016), including flood risk governance (e.g., Bergsma, 2019; Krieger, 2013; Lebel, Nikitina, Pahl-Wostl, & Knieper, 2013). However, this literature is overwhelmingly focused on the institutional level as such (macro), or on the interaction between organizations (meso), with little or no attention to the level of the interacting individuals who constitute the organizations and reproduce the institutions (micro). Moreover, the micro-level studies that do exist in the context of flood risk governance are largely focusing on the reactive response to floods, often using social media data (e.g., Kim & Hastak, 2018), and not to the same extent on the proactive mitigation of flood risk.

The purpose of this article is therefore to investigate the institutional fit between the hydrology of a catchment area and the regime of practices of individual actors governing flood risk mitigation in Sweden. The article intends to meet that purpose by answering the following research question: How is the institutional fit of the governing of flood risk mitigation in Höje Å catchment area in Sweden?

2. Theoretical Framework

Floods are complex phenomena and any specific flood can be the result of a combination of pluvial, fluvial, coastal, and groundwater processes (Becker, 2018). Although risk is a contested concept, it is here defined as uncertainty about what could happen and what the consequences would be (Aven & Renn, 2009). There is nowadays widespread agreement that flood risk emerges in the intersection of hazard and vulnerability (Di Baldassarre et al., 2018; Grahn & Nyberg, 2017; Wisner, Blaikie, Cannon, & Davis, 2004), which is where the attention must be placed to make any sense of uncertainty and consequences in relation to floods. However, it is important to note that there is nothing objective about risk, since any notion of it is based on perceptions, is culturally mediated, and can be socially amplified (Renn, 2008). Flood risk mitigation is here defined as comprising all proactive activities that reduce the likelihood of floods and/or their consequences before occurring (Coppola, 2011), by addressing either the flood hazard, the vulnerability to the impact of floods, or both (Wisner et al., 2004).

Floods are not bounded by conventional borders (Becker, 2018). The only boundaries known to water are hydrological since it can only flow downstream. The essential entity for understanding and governing flood risk is therefore the catchment area (Niemczynowicz, 1999, p. 12), which is, simply put, an area within which all rainfall eventually ends up in the same place (Davie, 2008). While the importance of the catchment perspective is clearly pointed out in the EU Floods Directive (EU, 2007) and in Swedish legislation (Swedish Parliament, 2009), it is rarely applied in practice (Johannessen & Granit, 2015; Norén, Hedelin, Nyberg, & Bishop, 2016).

Risk governance has been approached from many different perspectives (e.g., Hood, Rothstein, & Baldwin, 2001; Renn, 2008). In contrast to traditional risk management, it emphasizes situations with many actors, multiple and often conflicting values, and no single authority to make binding decisions (Renn, 2008). It examines "the complex web of actors, rules, conventions, processes and mechanisms" (Renn, 2008, p. 9). Studying the governing of flood risk mitigation entails therefore attention to the patterns of social relations among involved actors (Becker, 2018; Ingold et al., 2010). Since the roles of actors are defined both by their social relations and by the institutional context they are embedded into (DiMaggio, 1992), studying the governing of flood risk mitigation also entails attention to the regulative, normative and cultural-cognitive elements making up these institutions (Scott, 2014). Such a new institutionalism perspective has become incredibly influential in organizational analysis (Scott, 2014) and has been suggested an important complement in the study of social-ecological interactions (Hotimsky, Cobb, & Bond, 2006).

Social relations are not only formed because actors are dependent upon each other, but also when actors convince each other that their problems or objectives are shared or linked, and can be addressed together (Miller & Rose, 2008). Regardless of how they are formed, they denote some kind of dependence after being established (Luhmann, 1979). One way of identifying the involved actors is thus to start with actors known to contribute actively to mitigating flood risk and trace who they are dependent on input from to do it. Becker (2018) suggests a framework of seven types of input that is deemed sufficient for the purpose of this study: reports of activities, equipment and material, funding, technical information, rules and policy, advice and technical support, and pepping and moral support.

Emirbayer (1997) suggests that a relational perspective is indispensable for linking micro-, meso-, and macro-levels, as it allows for reconceptualizing distinct sui generis levels of analysis on a continuum between interacting individuals and society. However, there are different empirical approaches to this relationality: Structural approaches that represent various social relations formally to be analyzed using graphical or mathematical methods (Berkowitz, 1982; Wellman, 1988), and interpretative approaches that study their meaning and the context they are embedded into (Goffman, 1982; Joas, 1987). Although this division has often been defined by disagreement (Emirbayer & Goodwin, 1994), it is

only through their combination that the relational perspective can become whole (Crossley, 2010; Fuhse & Mützel, 2011).

Social network analysis has been suggested the most developed and widely used structural approach (Emirbayer, 1997, p. 298), facilitating linking different levels of analysis (Crossley, 2010; Granovetter, 1973). It has no inherent or preferred level of analysis apart from the degree of abstraction currently applied (Nadel, 1957, pp. 97–124), with the only restriction being the fundamental unit of analysis of the particular study. In this case, the social relation between individual actors. The interpretative approach utilized in this article also focuses on connecting these levels by building from bottom-up (Fine, 1993); inquiring into the actions and interactions of individual actors. This investigation of the institutional fit of the governing of flood risk mitigation thus integrates social network analysis and qualitative analysis.

Social network analysis comprises of a broad range of analytical instruments, out of which two different centrality measures are particularly useful for the purpose of this article; in-degree centrality and directional betweenness centrality (Borgatti, Everett, & Johnson, 2018). The more an actor has many actors highly dependent on her input, the more local control she has over resources—here operationalized as in-degree centrality—while the more an actor falls on the shortest paths between pairs of other actors, the more control she has over resource flows through the network—here operationalized as directional betweenness centrality (see Brass & Burkhardt, 1992). These two measures are useful when studying institutional fit, as they indicate how important an actor is both locally in the network (degree) and as a broker connecting different parts of the network (betweenness).

3. Methodology

A single-case study research design with multiple embedded units of analysis was used to address the research question, focusing on one catchment area comprising several municipalities, many organizations, and numerous individual actors contributing to flood risk mitigation. To grasp the complexity of flood risk, the case study also includes the rest of the municipality where the selected river meets the sea that is exposed to other types of floods. Social network analysis and qualitative research were applied, as the former has proved useful to unravel underlying processes (Robins, Lewis, & Wang, 2012) while the latter is useful to unveil their reasons and meaning (Bernard, 2006).

The case study was selected using the logic of the extreme case. To be considered extreme has less to do with extreme magnitudes of flood risk and more with the complexity of the flood problem. Höje Å is a river catchment area in Southern Sweden that fits that description, being exposed to as all types of floods and comprising three dynamically developing municipalities with significant changes in terms of population growth and urbanization, exploitation of new areas, and densification of existing areas (Figure 1). The catchment area covers 316 km^2 and has a population of around 150,000 inhabitants. Intense human activity has over the last two centuries altered the hydrological connectivity considerably (Figure 1), resulting in upstream activities having significant effects on downstream river flow.

Data was collected using interviews, with a structured part to collect quantitative data for the social network analysis and an unstructured part to collect more qualitative data for the interpretative analysis. Since many actors contributing to mitigating flood risk were unknown from the outset, the respondents were

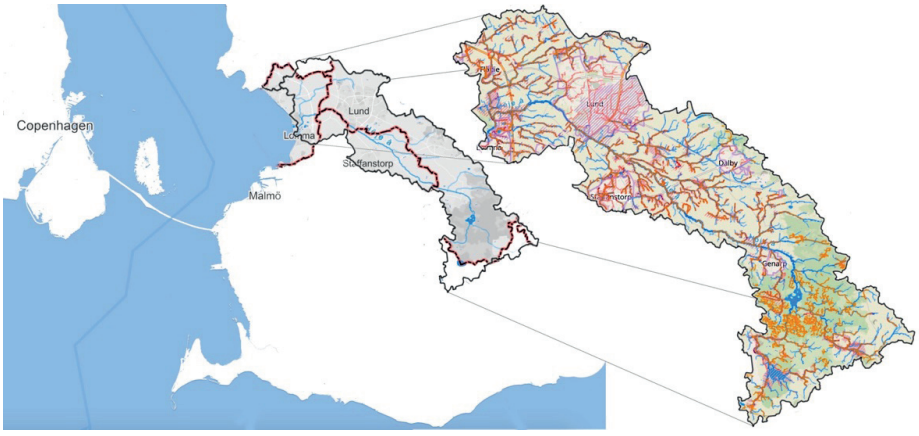

Figure 1. Location of the case study and sketch of the hydrological connectivity of Höje Å catchment area. Developed from www.vattenatlas.se.

selected by means of snowballing (Borgatti et al., 2018). The snowballing started with 10 respondents within each municipal administration identified as likely to contribute to the mitigation of flood risk, using a name-generating question concerning who each respondent depends upon for input to be able to contribute to mitigating flood risk. It continued until no more new respondents were identified. This resulted in 217 respondents contributing actively to flood risk mitigation in the case study, interviewed between January 2017 and October 2018. The respondents also identified 256 other actors on whom they depend for some input, but who are not contributing actively or cannot be interviewed; i.e., deceased, quitted job, not considering themselves contributing, or performing purely technical tasks (e.g., maintaining a pump, flushing a pipe, running a software). This category also includes a few instances of respondents referring to groups instead of an individual (e.g., a municipal call center, an organization). See Table 1 for an overview of the types of actors these 217 actively contributing actors and 256 supporting actors are, and what types of organizations they represent.

The social network data was collected through structured interviews using a questionnaire with questions about different attributes (organization, gender, age, work experience, and education) and ties to the other actors identified by each respondent. The dependence between actors was operationalized as the importance of the seven different types of input listed above, rated on a five-point Likert scale from not at all (0) to extremely important (4). The importance of the different inputs was then aggregated and normalized (divided by the maximum possible sum of 28) to produce a scale between zero (no importance) and one (maximum importance). The participants were also asked to rate the level of trust they have that they will be provided with the input they need from each identified actor, the level of influence these actors have over their ability to contribute to mitigate flood risk, and the type of relationship they have, but these results are not used in this article. Qualitative data was collected through an open qualitative question during the interviews, asking the respondents who, what organization, part of which organization, or type of actor in the entire universe they consider having the most influ-

Table 1. Overview of the types of organizations and actors involved in governing flood risk mitigation.

Organization	Types of actors
Staffanstorp municipal administration	Politicians, senior managers, civil servants (water and sewage, planning, roads, land and exploitation, environment, project management)
Lund municipal administration	Politicians, senior managers, civil servants (planning, risk and vulnerability, park and nature, children and education, roads and traffic, legal, strategic development, surveying, housing, building permits, waste management, land and exploitation, environmental protection, environmental strategy)
Lomma municipal administration	Politicians, senior managers, civil servants (water and sewage, planning, risk and vulnerability, building permits, finance, property management, roads, parks, GIS, land and exploitation, environmental strategy, project management, surveying, service center)
VA SYD	Senior managers, civil servants (water and sewage)
Other municipal organizations	Civil servants (representatives of the Fire and Rescue Services, the Erosion Damage Centre, a neighboring municipality outside the catchment area, and a municipality in another part of Sweden)
County Administrative Board	Senior managers, civil servants (planning, climate, environment, water, fishing and recovery, GIS)
National authorities	Politician, civil servants (planning, agriculture, climate and hydrology, risk and vulnerability, environment, geology, oceans and water, surveying, traffic, enterprise and innovation, government office)
Universities	Researchers (representatives of Lund University and Swedish University of Agricultural Sciences)
Consultants	Consultants (representatives of more than 30 companies spanning various fields)
Other companies	Various contractors, construction companies, insurance companies, etc.
Landowners	Large landowners
Citizens	Particular groups of citizens mentioned as providing important input
Others	Others

ence over the mitigation of flood risk in the catchment area. The question was probed until the respondents could not list more (no rank), or a maximum of five had been listed. Qualitative data was also collected through the informal interviews ensuing from the conversations around the formal interview parts.

Each interview took between 60 and 90 minutes, with a few shorter interviews with actors less engaged in flood risk mitigation. All interviews but six were done face-to-face to minimize non-responses and to allow for clarifications and probing (Borgatti et al., 2018) as well as the informal interviews. The remaining interviews had to be done over the phone for logistical reasons and were all with peripheral actors (individual consultants or representatives of national authorities). The social network data was analyzed with the assistance of the software UCINET (Borgatti, Everett, & Freeman, 2002) and the qualitative data was analyzed using a series of coding and categorizations (Charmaz, 2006).

4. Results

Regardless of how water flows in the landscape, the Swedish legal framework concentrates the responsibility for flood risk mitigation on municipal administrations. Even if the results demonstrate that a broad range of actors are involved in the governing of flood risk mitigation in the studied case (Table 1), the network centers on the three municipal administrations (Figures 2 and 3). The legal framework confers sovereign right to municipal administrations to adopt land use plans (Swedish Parliament, 2010), explicitly pointing out considerations for flood risk (Swedish Parliament, 2010, Chapter 2, Section 5). It allocates to them the responsibility for removing surface water from settled areas (Swedish Parliament, 2006a). The legal framework further stipulates that municipal administrations must have an 'action program' to mitigate risk (Swedish Parliament, 2003) and regularly assess risk and vulnerability within their jurisdiction (Swedish Parliament, 2006b). The formal guidelines for municipal action programs and risk and vulnerability analyses both highlight flood risk explicitly (MSB, 2011a, 2011b). Although the legal framework started to explicitly demand considerations of flood risk already in the mid-1980s (Swedish Government, 1985; Swedish Parliament, 1986, 1987), it was not until the floods of 2007 that flood risk started to become a priority issue in the catchment area: "Everything started with the floods in 2007" (male head of department). It is, however, important to note that water and sewage is outsourced by Lund municipal administration to VA SYD—a regional organization owned by a number of

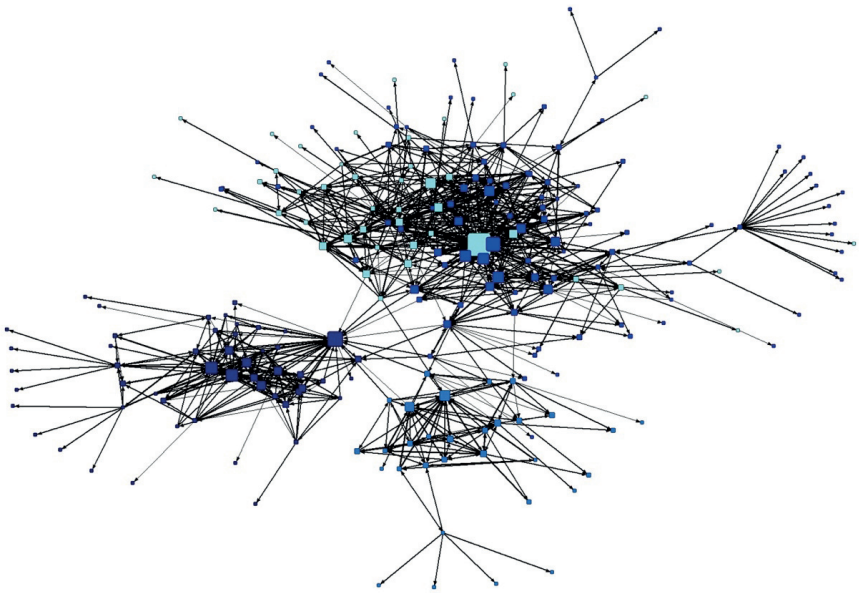

Figure 2. The three municipal administrations and local importance of actors. Notes: Node size = local control of resources (in-degree centrality). Line thickness = tie strength (total normalized input). Node color = Lomma municipal administration (dark blue), Lund municipal administration (middle blue), Staffanstorp municipal administration (light blue), VA SYD (turquoise).

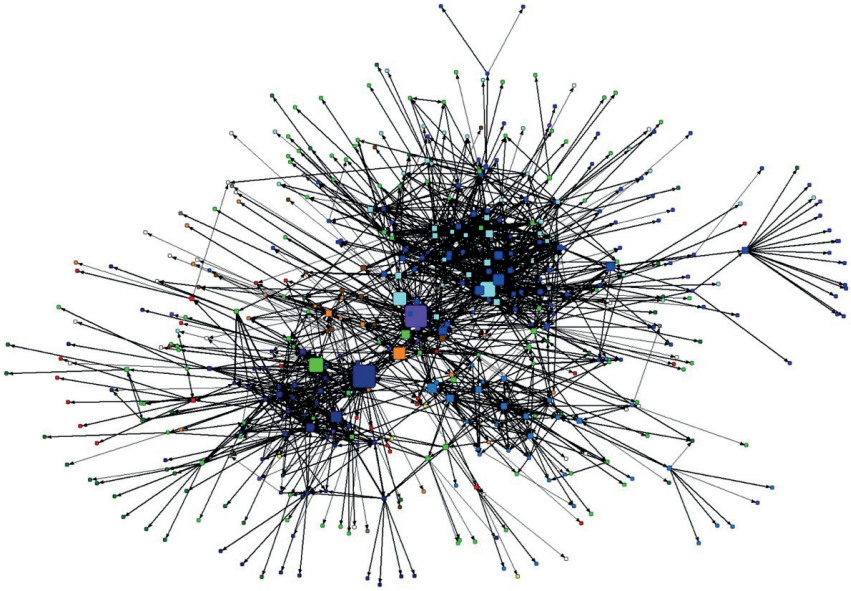

Figure 3. Control over resource flows connecting the total network of actors. Notes: Node size = control over resource flows (directional betweenness centrality). Line thickness = tie strength (total normalized input). Node color = Lomma municipal administration (dark blue), Lund municipal administration (middle blue), Staffanstorp municipal administration (light blue), other municipal organizations (purple), VA SYD (turquoise), County Administrative Board (orange), national authorities (red), universities (yellow), consultants (light green), other companies (dark green), landowners (brown), citizens (grey), others (white).

municipalities—and actors from both organizations are needed for comparison with the other two municipal administrations (Figure 2).

4.1. A Problem of Fit between Municipalities

Concentrating responsibility for mitigating flood risk to municipal administrations would not necessarily lead to a problem of fit on the catchment level, provided sufficient coordination between municipalities. However, the direct interaction between the municipal administrations suggests the opposite (Figure 2). The relatively little interaction largely involves actors representing the municipal administrations on Höje Å River Council, which is a voluntary association of municipalities, industries, water treatment companies, and others affected by the water in the catchment area. While several of these representatives have prominent appointments in the bureaucratic hierarchies of each municipality, they are relatively marginal in the networks of actors mitigating flood risk within them. It is only in Lomma where a representative is structurally important for the activities within the municipal administration (Figure 2). However, no actor in Lomma municipal administration declares to receive any input from the municipal administrations upstream, indicating negligible direct coordination concerning flood risk mitigation between the three municipal administrations.

When analyzing the entire network of actors, there are indirect interactions between the municipal administrations through actors representing other organizations linking them to various degrees. Most notably a central actor of the River Council (purple in Figure 3). While the River Council is intended to have a coordinating role in water related issues in the catchment area, it is a voluntary association without decision-making power and little influence over the three municipal administrations. It is as such mainly a platform for dialogue, even if its driven staff has managed to attract funding to implement a number of standalone projects along the river concerning both water quantity and quality. Among the representatives of the municipal administrations on the River Council, it is only the representative from Lomma who is important enough within her municipal administration locally to assume that any input from the River Council significantly influences flood risk mitigation there (Figures 2 and 3). In addition to the representatives of the municipal administrations to the River Council,

there are only two other actors in Lomma and three in Staffanstorp receiving input from the River Council, while there are 16 in Lund and 8 at VA SYD. This stark difference is explained by the staff of the River Council not only technically being employees of Lund municipal administration, but their office also being hosted in its main building. Actors in Lund thus see them as colleagues to ask water related questions, as evident in several interviews, for example: "When I have some water-related issue related to a detailed development plan I am working on, I usually walk over and talk to [name]. He knows a lot and takes his time to share his opinion" (male civil servant). There is also one actor representing the County Administrative Board with somewhat of a brokering position (orange in Figure 3), but only providing input to four actors in Lomma and one in Staffanstorp. The weak coordinating role of the Country Administrative Board is also evident in the qualitative part of the interviews, where none of the respondents mentions anything about coordination in relation to the regional authority.

The results of the open qualitative question about influence over the mitigation of flood risk in the catchment area are informative for grasping this problem of fit, indicating the prevalence of different modes of thinking about flood risk mitigation among the involved actors. The results demonstrate that a municipal perspective is completely dominant, with almost all participants including municipal actors in their modes of thinking about the most influential actors; in contrast to only one in five including actors influencing upstream hydrology (Figure 4). Almost half include either only municipal actors—indicating pure municipal modes of thinking—or also actors on other administrative levels—indicating hierarchical modes of thinking. This is in sharp contrast to only one actor voicing an equally pure hydrological mode of thinking. The hydrological perspective is more often mixed with municipal or hierarchical modes of thinking, with local modes of thinking stressing the importance of citizens and property owners, or with several other perspectives composing mixed modes of thinking without a discernible core (Figure 4).

These diverse modes of thinking about flood risk mitigation are also clearly visible in the results from the qualitative part of the interviews, with different actors voicing different and often conflicting views on both issues and solutions. Although municipal or hierarchical modes of thinking are dominant also among actors in Lomma municipal administration downstream, the most influential actors there grasp the hydrological basis of the problem and see increased retention of water upstream as a fundamental part of the solution. For instance: "It is neither possible or fair for us to fix future floods in Lomma by ourselves. The solution must include substantial retention of water upstream" (female civil servant). This is in sharp contrast to the modes of thinking about flood risk mitigation voiced by most upstream actors, who see the solution as more effective drainage of water from their areas. For instance:

> The politicians got caught completely off guard by the flood in 2007. Before they didn't do anything. Then they multiplied the investment budget for water and sewage, and we continue to improve [the drainage system] as we go.…We have also invested in large pumps to speed up the removal of water from our system to allow for efficient drainage [of Staffanstorp] even under intense rainfall. (Male civil servant)

> Flooded fields are problematic for agriculture. Most of the agricultural drainage we had for our fields were getting too old and not working properly. We recently renovated several of the most problematic areas, so we hope that they will have the right capacity to drain the fields quickly in the future. (Male landowner)

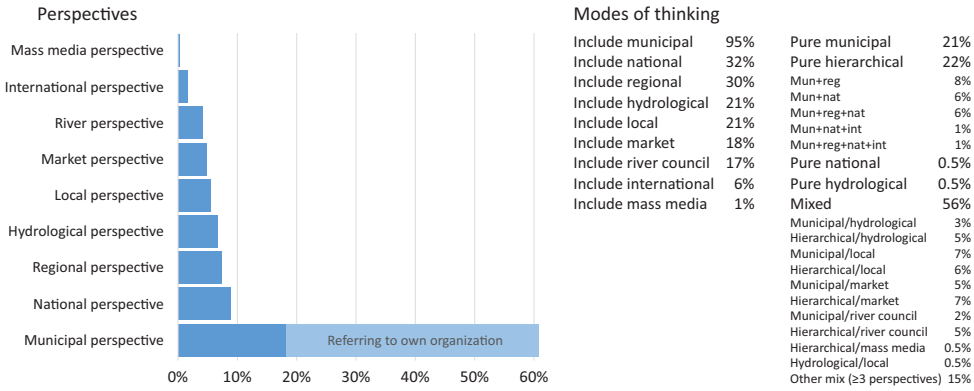

Figure 4. Elicited distribution of perspectives and associated modes of thinking in actors' accounts of influence over flood risk mitigation in the selected case.

It is important to note that the present study does not provide any data for evaluating which course of action to take; between increasing upstream retention of floodwater to reduce flood risk downstream and increasing upstream drainage capacity to reduce flood risk locally. What is important here is that these two opinions are both locally rational, but contradictory in the governing of flood risk mitigation.

4.2. A Problem of Fit within Municipalities

Water is not only flowing from upstream to downstream across municipal borders but along sub-catchments in the landscape in general. Although included as a planning assumption in the comprehensive plans for all three municipalities, it is in the detailed development planning for specific areas that the mitigation of flood risk is addressed in practice (Figure 5). However, the issue here is that flood risk is addressed for each planning area in isolation:

> Floods are a priority in the building of new areas, but it is taken care of in the projects. Water and sewage expertise is always involved in the planning to make sure the drainage system for the new area is correct. (Female civil servant)

> Water has always been considered, but when floods became a higher priority we had to try new ways of working together. Also now, with the project 'Lund's Water.' We find a way that works, and stick to it. This is how we do it. (Male civil servant)

The developer requesting the detailed development plan (including the municipality) is legally required to provide the necessary assessments of flood risk for that specific area. The borders of the area therefore usually follow land ownership, without any hydrological significance, and the assessments only focus on the planning area as such and based on the planned situation within the area and the current situation of the areas around. This practice ignores not only the potential impacts of the planned development on other planning areas today, but also tomorrow. This is recognized as potentially problematic by some planners:

> Yes, it is perhaps problematic, but that is how planning must be done. How should flood risk be assessed otherwise? The law says that it is the landowner who must show that flood risk is taken into account and they pay for the necessary assessments. They cannot be forced to pay for assessments of flood risk for areas bigger than the area they own and have requested a detailed development plan for. Who should pay for it then? This is how planners in Sweden do it. (Female civil servant).

The resulting plan is a comprehensive document, spanning myriad sectors and interests, based on a complex set of planning specifications. However, many such specifications cannot be regulated after the plan has been approved and the area developed, while the municipal administration is solely responsible for urban drainage and flood risk mitigation regardless: "We who work with water and sewage are, of course, very dependent of what

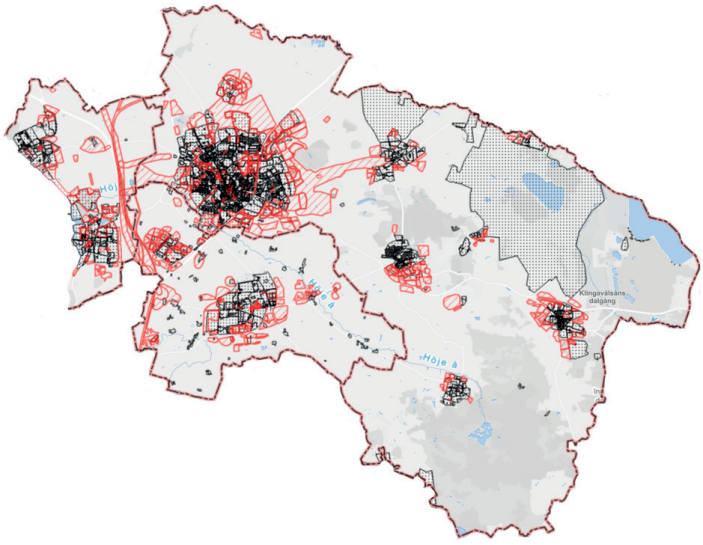

Figure 5. Planning areas in the three municipalities. Developed from www.vattenatlas.se.

they [planners] do….I trust them fully, but there are difficulties in the contribution of planning to [flood] mitigation in the legislation" (female civil servant).

5. Discussion

The results suggest an evident problem of fit between the hydrology of the catchment area and the regime of practices of individual actors governing flood risk mitigation within it. Even when it is obvious that water flows downwards in the landscape, across whatever borders, there is a problem of fit both between the municipalities constituting Höje Å catchment area and within each municipality itself. This problem of fit emerges in the 'governmentalization' of flood risk mitigation; in the particular processes of institutionalization that turn flood risk mitigation into something requiring governing on a societal level. It is a result of regulative, normative, and cultural-cognitive demands under overwhelming complexity.

The institutionalization of flood risk mitigation is neither detached from the past, nor unfolding in a vacuum. Understanding the decoupling between organizations within an organizational field, as well as between different planning areas of each organization, entails paying attention to the many micro-level events in which actors faced with a new situation co-invent ways to deal with it. When flood risk mitigation started to attract increasing attention after the floods in 2007, which were not catastrophic on any international scale but enough to call attention to the issue, it was the actors ensuring sufficient urban drainage for more everyday rainfall who got involved first. The already established practices of these actors, mainly focusing on water and sewage or planning within each of the three municipalities, provided initial patterns of activities from which the regime of practices of flood risk mitigation evolved. As the legal requirements for urban drainage of these two policy areas (Swedish Parliament, 2006a, 2010) had been regarded as met by piecemeal attention to it ever since flood risk was first considered in the Swedish legal framework in the mid-1980s (Swedish Government, 1985; Swedish Parliament, 1987), the same decoupled practices were initially applied and rather rapidly becoming the established practice also for flood risk mitigation. Hence, resulting in mere ceremonial compliance (cf. Meyer & Rowan, 1977). This corresponds well to Van de Ven and Garud's (1994) suggestion that after a period of events with actors testing and adjusting activities as they go along, particular patterns of activities begin to be selected more and more often (rule-making events) until they dominate and become the convention (rule-following events). It is then of particular importance to understand why these decoupled practices are continuously reproduced, even when increasingly evident for certain actors that such practices are fundamentally flawed when governing flood risk mitigation. North's (1990) explanation resonates particularly well with the results, emphasizing increasing costs of changing to an alternative practice over time, while further work in the same direction is still rewarded. Such problems of 'increasing returns' are particularly common when feedback is fuzzy and evaluations subjective (North, 1990), such as in the mitigation of flood risk, and organizational decoupling more likely when there are high costs associated with closer integration (Scott, 2014, p. 187). Status quo is then maintained through a combination of actors being reluctant to consider alternatives after having invested time and energy to learn the current practices (learning effects), the contribution of each actor being facilitated by others following the same practices (coordination effects), and new actors being motivated to adopt the current practices as they appear commonly accepted (adaptive expectations; North, 1990).

However, it is not only through incentives that institutions are holding actors hostage to their own history, but also through their normative order that is both constituting and being constituted by actors over time (Selznick, 1992, p. 232). This is clear in the empirical material, with respondents expressing in different ways that 'this is the way we do it' and giving references to the common practices of their different professional groups (cf. Scott, 2014). Although closely related to coordination effects (North, 1990), such normative expectations are invaluable as they "reduce the need for constant negotiation of expectations and behavioural contracts" (Handmer & Dovers, 2007, p. 30), but can clearly also bind actors to flawed practices. The empirical material is also rife with examples of respondents expressing that 'this is how it is done,' which is a usual indicator of more cultural-cognitive elements of institutionalization (Berger & Luckmann, 1966, p. 77; Scott, 2014, p. 148). Here it is not about incentives or identity, but about the objectification of shared ideas about central aspects of flood risk mitigation. This also includes the taken for granted; most clearly visible in the pervasive but tacit influence of the municipal borders, which are still largely delineated by the medieval parishes originally formed to provide viable congregations to already constructed churches and could have been drawn in very different ways. Such objectification involves the development and diffusion of some degree of consensus among actors concerning the meaning and value of the ideas, where the diffusion shifts from mere imitation to being increasingly normative with less and less room for alternative views (Tolbert & Zucker, 1996). These shared ideas thus "thicken" and "harden" when diffused (Berger & Luckmann, 1966, p. 76); not only for the newly incorporated actors, but also for the actors already subscribing to the particular understanding.

The problem of fit in flood risk mitigation is the combined result of regulative, normative, and cultural-cognitive elements, and it has been shown that it is when such different elements align that their combined force is most formidable (cf. Scott, 2014, pp. 70–71). However, the 'governmentalization' of flood risk mitigation is not determined by the processes of institution-

alization in isolation. It is also influenced by the complexity of the environment they are operating in. While many organizational theorists have focused mainly on the institutional environment as such (see Scott, 2014, pp. 196–198), the complexity of the issue requiring governing is also important (Berardo & Scholz, 2010). It is when the complexity of the issue of flood risk mitigation, in terms of both hydrology and institutional environment, overwhelms actors involved in governing it, that decoupling provides a means to reduce the issue into parts that can be addressed one by one to comply with detailed legal requirements. However, such rationalization undermines effective governing of flood risk mitigation, since the law of requisite variety stipulates that any system governing another larger complex system must have a degree of complexity comparable to the system it is governing (Ashby, 1957).

Finally, it is important to note that the identified problem of fit would not necessarily have been visible in more conventional studies of institutional fit focusing on the institutional level as such (macro) or on the interaction between organizations (meso). Although immensely time-consuming, individual level (micro) studies are thus likely to be needed to provide perspectives necessary for increased understanding of the complexities of risk governance in general.

6. Conclusions

There is a distinct problem of fit between the hydrology of Höje Å catchment area and the regime of practices of individual actors governing flood risk mitigation in it, which is likely to be a common feature across Sweden due to the shared institutional environment but might have been invisible to more conventional macro- or meso-level studies. This problem of fit emerges in the 'governmentalization' of flood risk mitigation, with actors responding to and reproducing new institutional demands in a context of overwhelming complexity. It can be explained by attention to incentives, identities, and ideas that align to effectively decouple the regime of practices of flood risk mitigation both between and within municipalities. Although there are different ways to interpret the legal framework for flood risk mitigation, it is being implemented with the focus on compliance to details and not on its overall purpose. However, the resulting decoupled practices are not only cemented through the continual application of the emphasized regulative requirements, but also through normative and cultural-cognitive backings emerging in their repetition and making them influential, indisputable, or even invisible to the involved actors.

Acknowledgments

This study would not have been possible without the keen participation of the politicians, civil servants and other professionals contributing to mitigating flood risk in the studied case. The study is part of the research project 'Sustainable Urban Flood Management,' which was funded by FORMAS (942-2015-149).

Conflict of Interests

The author declares no conflict of interests.

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