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The Rise of Civil Society in Governing Flood Resilience

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The Rise of Civil Society in Governing Flood Resilience

Steven Ashley Forrest

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university of
 groningen

The rise of civil society in governing flood resilience

PhD thesis

to obtain the degree of PhD at the
 University of Groningen
 on the authority of the
 Rector Magnificus Prof. C. Wijmenga
 and in accordance with
 the decision by the College of Deans.

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Chapter 5

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CHAPTER 1

Introduction

1.1. Introduction

1.1.1. Background

Flooding is an increasingly urgent societal problem that affects urban areas worldwide. Flood events can cause severe disruption to key services, damage infrastructure, and have significant impacts on citizens. These impacts include damage to homes and businesses, physical health problems from contaminated floodwaters, mental health problems such as post-traumatic stress disorder, and even fatalities. Furthermore, climate change, continued population growth, and urbanisation are expected to lead to an increase in flood events and flood risk exposure in the future (Alfieri et al., 2015; EASAC, 2018; EEA, 2012; Hegger et al., 2016; IPCC, 2014; Ligtvoet et al., 2018; Miller & Hutchins, 2017; O'Donnell & Thorne, 2020).

This predicted increase in flood risk necessitates a reflection over how best to manage flooding for the present and in the future. Traditional flood risk management (FRM) approaches concentrate on engineering solutions to control flood risk, but these have technical limits and may be unsustainable in coping with the long-term impacts of climate change. More recently, the FRM landscape is shifting towards a greater emphasis on limiting flood consequences and pursuing flood resilience strategies. This suggests a greater role for urban planning in using spatial measures to accept water on land and reduce flood risk as well as for reducing consequences from flooding.

These changes in managing flooding are part of an acknowledgment that flooding cannot always be prevented. There is also recognition that the state cannot manage flooding alone and that non-state actors have to take a greater role in FRM. Authorities have been actively encouraging a greater citizen role in order to improve decision-making, increase legitimacy of FRM choices, decrease FRM costs, and for citizens to take actions on their own private properties (Mees et al., 2016; Trell & Van Geet, 2019). There is also an emergence of a growing number of active citizens volunteering their time, through various community groups and citizen collectives (referred to in this thesis as 'civil society'), to play a greater role in FRM. This PhD thesis focuses on the growing role and contributions of civil society in a FRM landscape that is increasingly pursuing flood resilience strategies.

To better understand the rise of civil society in governing local flood resilience, this PhD thesis explores two important and ongoing shifts visible in FRM: 1) the change in governance arrangements for FRM with an increasing role for civil society, and 2) the 'resilience turn' in FRM. This PhD thesis focuses on England and the Netherlands, where these two shifts are particularly visible and relevant, as both countries are exploring new approaches to manage flood risk and are encouraging civil society to take a more active role in local FRM. Furthermore, flooding is an increasingly pressing risk for both countries as they have both recently

experienced flood events and their flood risk is predicted to increase in the future (Environment Agency, 2019; PBL, 2015).

1.1.2. Shift 1: An increasing role for civil society

The first shift concerns the change in governance arrangements for FRM with non-state actors taking an increasing role and undertaking FRM responsibilities that traditionally rested with public authorities (Johnson & Priest, 2008; Mees et al., 2016; Meijerink & Dicke, 2008; Nye, Tapsell & Twigger-Ross, 2011). In the context of both England and the Netherlands, there are ongoing discussions about the shift from the state to civil society in FRM (Mees et al., 2016; Mees et al., 2019; Seebauer et al., 2018). The shift is especially evident at the local level where citizens are organising themselves and working together in community groups, citizen collectives and citizen initiatives to deal with the increasing risk of flooding.

In England, the local level is important in disaster management and FRM with multi-agency 'local resilience forums' being required as part of the Civil Contingencies Act (2004) and the introduction of 'Lead Local Flood Authorities' as part of the Flood and Water Management Act (2010). Currently, the "local level is seen as a *decisive factor* in the English flood risk management system" due to the devolution of power and responsibility in FRM to local stakeholders, including community flood groups (Begg, Walker & Kuhlicke, 2015; Thaler & Levin-Keitel, 2016: 299, emphasis added). Flood groups are an example of the more prominent role of civil society in local FRM in England. Recent flood experiences and support from the national and local government as well as the National Flood Forum charity have contributed to a growing role for civil society with the number of flood groups growing from "just over 50" in 2004 to 221 in 2015 and 300 in 2020 (Defra, 2004:99; Forrest, Trell & Woltjer, 2017; National Flood Forum, 2020). However, flood groups are a relatively new phenomenon and it is unclear how they can contribute to local FRM as well as how they fit into the current local FRM landscape in England.

The Netherlands has a different set of experiences with flooding and civil society involvement in FRM. Historically, the local level has had a strong role in FRM in the Netherlands through the formation and operation of 'water boards' (democratically-elected local groups created to take action to improve flood safety) by local landowners in the 13th century (Havekes et al., 2017; Tol & Langen, 2000). These water boards were later formalised, clustered and their numbers reduced from 2,650 in 1950 to the current 21 regional water boards that are part of the government (Havekes et al., 2017). At the present time, FRM is perceived as a predominantly state responsibility with a constitutional obligation for the government to keep their citizens' feet dry (Wehn et al., 2015). Coastal and river flooding are problematic for the Netherlands, but there is growing concern about the increasing risk of rainfall flooding in Dutch cities (H2o, 2016; PBL, 2015). This increasing risk of rainfall flooding has contributed to a greater focus on the role of

citizens in managing flood risk at the local level. For example, the Dutch Delta Plan on Spatial Adaptation encourages a more prominent role for citizens in managing this increasing risk from pluvial flooding. There are also indications of citizens starting to take an active role and contributing to local pluvial FRM in the Netherlands (e.g. Climate Cafes in Arnhem), but the exact nature of these roles and contributions is unclear as is how public authorities should best respond and position themselves in local FRM.

The growing civil society involvement in FRM necessitates a stronger focus not only on their roles, contributions and capacities, but also on the division of responsibility with authorities and the changing role of authorities in FRM. In both countries, there is an ongoing shift in the division of responsibilities for FRM between civil society and the public authorities traditionally responsible. Civil society actors are undertaking more FRM tasks and actions, such as clearing watercourses and monitoring river levels, some of which were originally the responsibility of public authorities. This changing division of responsibilities ignites discussions of whether this is a sign of a 'retreating government' and cost-cutting (e.g. Begg, 2018) or whether it is beneficial for citizens and enables a 'growing stewardship' of citizens (Schelfaut, 2011). Both of these possibilities have implications for the existing role of traditional authorities who need to respond to the emerging role of civil society.

Therefore, the first research aim of this PhD thesis is to understand the emerging role of civil society in local FRM and the implications for both authorities and civil society in terms of the division of roles and responsibilities in governing local FRM.

1.1.3. Shift 2: The resilience turn in FRM

The second shift concerns the paradigm shift towards 'resilience' in FRM. The term 'resilience' has become increasingly prominent in policy discourse within urban planning, disaster risk management, and climate change adaptation (Trell et al., 2017). At an international level, the United Nations (UN) targets "strengthening resilience" in pursuing Sustainable Development Goals 11 and 13¹ and the UN Office for Disaster Risk Reduction (UNDRR) has embraced resilience for disasters through the Hyogo Framework for Action (2005-2015) and the Sendai Framework for Disaster Risk Reduction (2015-2030). International initiatives such as the Rockefeller Foundation's '100 Resilient Cities' and 'Asian Cities Climate Change Resilience Network' networks, the UNDRR's 'Making Cities Resilient' campaign, and the Zurich Flood Resilience Program are also encouraging the pursuit of resilience in the face of disaster shocks (100 Resilient Cities, 2019; The Rockefeller Foundation, 2014; UNDRR, 2019; Zurich Insurance Group, 2018).

¹ Goal 11: Make cities inclusive, safe, resilient and sustainable; Goal 13: Take urgent action to combat climate change and its impacts

In FRM, resilience has been broadly interpreted as focusing on reducing flood consequences and accepting that not all flooding can be stopped (Liao, 2012; Restemeyer, Woltjer & Van den Brink, 2015). This interpretation moves away from ‘resistance’-based perspectives in FRM focusing on ‘keeping water out’ and relying on large engineering solutions towards ‘living with floods’ and more holistic, ‘resilience’-based perspectives in FRM, which includes a diversification of FRM approaches (Hegger et al., 2016; Liao, 2012; Nye et al., 2011; Restemeyer et al., 2015; Scott, 2013a). England and the Netherlands can be considered as world-leaders in FRM and their FRM strategies refer to different characteristics of resilience ranging from resisting floods and maintaining key services (e.g. England’s ‘National Flood Resilience Review’ (2016)), to adapting the existing system to create additional water storage capacity (e.g. The Netherlands’ ‘Room for the River’ (2006), ‘Water Policy for the 20th Century’ (2000), ‘Multi-Level Safety Approach’ (2008) and the ‘Delta Plan for Spatial Adaptation’ (2018); England’s ‘Making Space for Water’ (2005)), as well as building back better after floods (e.g. England’s ‘Draft National Flood and Coastal Erosion Risk Management Strategy for England’ (2019)). However, the concept of resilience has been described as vague and ambiguous in the academic literature (Coaffee et al., 2018; De Bruijne, 2004; Parker, 2020) and, even in these FRM strategies, there are different approaches to interpreting the concept of ‘resilience’ in the context of flooding.

Therefore, the second research aim of this PhD thesis is to explore what resilience means in the context of local flooding.

These two shifts (discussed above) are interlinked: civil society is taking a greater role in FRM and their contributions are potentially shaping and influencing the shift towards resilience in FRM. However, the interlinkages and potential dependencies between these shifts are currently unclear.

Therefore, the second research aim of this PhD thesis also explores how civil society can influence flood resilience in practice.

1.1.4. Fairness and equality

The interlinkages between the emerging role of civil society and the related shift to flood resilience can lead to potential problems regarding fairness and equality. Flooding is inherently unfair due to the differences in flood risk exposure, but the FRM response to flood risk can also create or exacerbate issues of fairness and equality (Penning-Rowsell & Pardoe, 2012; Thaler & Hartmann, 2016). The growing role for citizens in FRM raises issues of fairness in terms of representation as well as in the capacity of all citizens to equally ‘live with flood risk’ (O’Hare & White, 2018). There are also differences in the social characteristics of urban spaces (i.e. the socio-spatial) that affect citizens’ ability to live with floods relating to the physical environment, their individual socio-economic background, and the social connectedness within places (e.g.

England & Knox, 2016; O'Hare & White, 2018; Sayers, Penning-Rowsell & Horritt, 2018; Walker & Burningham, 2011).

Therefore, the third research aim of this PhD thesis is to investigate the potential issues of fairness and socio-spatial inequalities that may arise due to the increasing role of civil society and the 'resilience turn' in FRM.

1.1.5. Summary

To summarise, this PhD thesis aims to explore two important, ongoing, and interlinked shifts in FRM: the emerging role of civil society and the related shift towards flood resilience. In doing so, the PhD thesis will focus on how citizens are taking action to influence the local FRM landscape. Furthermore, the PhD thesis will analyse the concept of resilience and explore how it is and should be interpreted in the context of flooding. The PhD thesis will investigate how civil society can influence flood resilience in practice, as well as analyse the potential issues of fairness and equality that can arise. By doing this, this thesis will be able to explain the emerging role of civil society in governing local flood resilience in England and the Netherlands. The main research aims are:

1. Understanding the emerging role of civil society in local FRM and the implications for both authorities and civil society in terms of the division of roles and responsibilities in governing local FRM
2. Interpreting the concept of 'resilience' for FRM and exploring how civil society can influence 'flood resilience' in practice
3. Critically investigating issues of fairness and socio-spatial inequalities that may potentially arise as a result of the emerging civil society role and the paradigm shift towards flood resilience in local FRM

These three research aims guide and structure the PhD thesis and are introduced in more detail in the following sections (1.2, 1.3 and 1.4). A total of four research questions will be posed in the sections below in order to address these research aims. The research context and the approach used in this thesis, including the methods, are described in Section 1.5. Lastly, a detailed connection between the research questions and the chapters of this thesis is outlined in Section 1.6.

1.2. Research Aim 1: Changing FRM governance arrangements

The first important and ongoing shift in FRM that this thesis focuses on is the changing governance arrangements and the growing role for citizens in FRM. Traditionally, the design, implementation and maintenance of FRM approaches has been predominantly a responsibility of public authorities and there has been a dominance of top-down, command-and-control

approaches to water management in European countries (Pahl-Wostl, 2009). However, there has more recently been a ‘social shift’ in FRM from being ‘government’ dominated to a ‘governance’ approach that opens up FRM to a broader range of stakeholders (Mees et al., 2019; Meijerink & Dicke, 2008; Nye et al., 2011). There has also been a change in governance arrangements as FRM approaches have become more focused on spatial planning. These spatial planning solutions for FRM (e.g. urban greening and SUDS) are often at the ‘local’ level as flood risk exposure, especially for pluvial flooding, is closely connected to urban structure and land use. This increasing focus on urban structure and land use has led to a greater FRM role for planners who look at a range of spatial claims, such as environmental quality and economic activity, in connection to FRM (Wiering & Immink, 2006). The increasing relevance of spatial planning solutions has also led to a greater role for citizens as non-state actors that manage privately-owned land.

National programmes in England (i.e. ‘Big Society’) and the Netherlands (i.e. the ‘Participation Society’) are already encouraging citizens to volunteer their time and efforts to play a more active role in society (Verhoeven & Tonkens, 2013). These programmes can be seen to reflect a wider European context of changing relationships between the state and citizens with a growing emphasis on involving citizens in delivering services that the public sector has traditionally been responsible for (Verhoeven & Tonkens, 2013). This change extends to FRM and there is already evidence of a growing role being played by citizens and civil society in contributing to FRM (Geaves & Penning-Rowsell, 2015; McEwen et al., 2018; Nye et al., 2011; Seebauer et al., 2018; Thaler & Priest, 2014; Twigger-Ross et al., 2016). These contributions include flood mitigation (Geaves & Penning-Rowsell, 2015), providing local knowledge (O’Brien et al., 2014; McEwen & Jones, 2012), increasing flood risk awareness (McEwen et al., 2018), and lobbying the government for additional funding (Thaler & Priest, 2014).

State roles and responsibilities are changing in England and the Netherlands as a result of non-state actors taking a more prominent role in FRM. In England, the introduction of flood insurance led to an increase in the role of non-state actors (i.e. the insurance industry) and the partial transfer of flood recovery responsibilities from the state to individual citizens. The development of flood risk warning systems is another example of the transfer of responsibility, for knowing about flood risk and taking preparatory actions, from the state to the individual in England. There has also been an increasing ‘responsibilisation’ of citizens and civil society in FRM in England through the post-flood emergence of flood groups (e.g. FLAG Flooding on the Levels Action Group in Somerset) and the appearance of ‘spontaneous volunteers’ during flood events (Harris et al., 2017; O’Brien, 2014; Twigger-Ross et al., 2016). However, although flood groups are becoming increasingly numerous in England, to date not much is known about them: how they are set up, governed and, most importantly, how they are influencing FRM.

In the Netherlands, there have also been changes in the roles for citizens and public authorities in FRM. Historically, water boards were setup and managed by local landowners in order to protect against high water levels and keep land dry, but these have since become regional authorities that are part of the government (Havekes et al., 2017). At present, citizens are able to influence water board activities and their approaches to FRM by standing as elected water board officials and by voting in water board elections every four years (Havekes et al., 2017). In these elections, there are various citizens groups that put forward candidates to represent their interests in the water board, for example the 'Water Natuurlijk' group aims for more environmentally-friendly water management. Despite this role for citizens in the democratic elections of water boards, FRM is predominantly a state responsibility in the Netherlands. In connection to this, citizen flood risk awareness in the Netherlands is low with a strong reliance on the state due to the constitutional expectation of the government to provide flood safety (Terpstra & Gutterling, 2008; Wehn et al., 2015). There have been attempts to increase citizen involvement in local FRM in the Netherlands (Dai, Wörner & Van Rijswijk, 2018; Mees et al., 2016; Wehn et al., 2015) and there is growing attention surrounding the interactions between newly emerging civil society actors and existing public authorities in climate change adaptation (see Edelenbos et al., 2017).

The emergence of civil society actors and the associated citizen responsabilisation in FRM (Begg, 2018; O'Hare & White, 2018) has implications for authorities (as suggested by Mees et al., 2019), who have to redefine their role in light of a more active citizenry and rethink how they interact with these emerging civil society actors. In some cases, these interactions within FRM have been identified as being top-down and authority-driven, such as citizen consultations and citizen science observatories (Wehn et al., 2015). They can also be co-produced by authorities together with citizens (Mees et al., 2019) or bottom-up, community-based initiatives developed by citizens themselves for example, spontaneous volunteers and flood groups (Harris et al., 2017; Geaves & Penning-Rowsell, 2015; Twigger-Ross et al., 2016). The emergence of civil society actors in FRM has implications for public authorities in the way that they interact with citizens through authority-driven or co-produced initiatives as well as the way that interactions are started by bottom-up, community-based initiatives.

These interactions, between civil society actors and public authorities, can lead to changes in the distribution of tasks and responsibilities between government and citizens. The academic literature identifies underlying concerns with the growing FRM role of citizens and a tension between understanding the changing division as a 'retreating government' (Begg, 2015; Begg, 2018) or a growing 'stewardship of citizens' (Schelfault et al., 2011). The growing role of civil society actors in FRM potentially leads to a subtle transfer of responsibility from government

and a consequential ‘responsibilisation’ of citizens to ‘live with floods’ (Butler & Pigeon, 2011; O’Hare & White, 2018).

Therefore, it is important to not only understand the emerging roles of citizens in local FRM and how citizens are organised to contribute to local FRM, but also what this shift in roles means for local FRM. Therefore, this PhD thesis poses two related research questions:

RSQ 1: What are the roles and contributions of civil society actors in local FRM and how are these actors organised?

RSQ 2: How are public authorities interacting with these emerging civil society actors and how are these authorities redefining their own roles and governance approaches to local FRM?

The thesis engages with these research questions in chapters 2 and 4. Chapter 2 explores the roles and contributions of flood groups to FRM in England. The chapter analyses the governance arrangements of flood groups including their formation, governance and interactions with public authorities. Chapter 4 explores the different roles and contributions of citizen initiatives in FRM in the Netherlands. The chapter analyses the ways that public authorities position themselves in the changing FRM landscape and interact with the different citizen roles and contributions whilst also trying to define a new role for themselves in the changing FRM landscape.

1.3. Research Aim 2: The resilience turn in FRM

The second important and ongoing shift in FRM is the turn towards flood resilience and the narrative of ‘living with floods’. In many countries over the last few decades, the policy discourse on FRM has been moving from a focus on large-scale engineering-based systems based upon flood risk ‘certainty’ towards a more holistic flood resilience approach acknowledging that floods cannot always be prevented, but their impacts can be reduced (Meijerink & Dicke, 2008; Schelfaut et al., 2011; Scott, 2013a). This is part of the ongoing paradigm shift from “hard engineering” and ‘keeping water out’ to reducing flood consequences and ‘living with floods’ (Meijerink & Dicke, 2008:500; Scott, 2013a). Reasons for this include the “disastrous consequences” associated with dike failures, the increasing influence of environmental scientists in flood management policy, and the growing recognition that planners and policymakers cannot prevent every flood (Liao, 2012; Meijerink & Dicke, 2008:500).

Despite the growing use of the ‘resilience’ term in FRM, there are different theoretical interpretations of resilience (Hegger et al., 2016; Liao, 2012; Twigger-Ross et al., 2014). In the literature, the concept has been broadly understood as reducing the consequences of floods and

has been interpreted through three difference perspectives: engineering, ecological, and evolutionary (Disse et al., 2020; Liao, 2012; McClymont et al., 2019; White & O'Hare, 2014; Zevenbergen, Gerosonius & Radhakrishnan, 2020). Engineering perspectives of resilience focus on the ability to bounce back to 'normal' and 'business as usual' with a focus on reducing the disaster consequences and the speed of recovery to the pre-disaster state (Liao, 2012; Twigger-Ross et al., 2014; Zevenbergen et al., 2020). Ecological perspectives are more process-based and understand resilience as bouncing forwards as well as necessitating incremental adaptations to the status quo (Zevenbergen et al., 2020). Whereas these two perspectives envisage a stable state being reached after a disaster event, the evolutionary perspective is more dynamic and rejects the idea of reaching a stable state. Instead, it is focused on continuous change with importance placed on adaptive capacity as well as reorganising and restructuring the status quo (McClymont et al., 2019; Walker et al., 2004; Zevenbergen et al., 2020). There are thus tensions regarding whether the resilience concept aims for stability or dynamism as well as whether the concept entails strengthening the status quo (i.e. to resist change and speedily return to normal) or accepting the inevitability of change and embracing it (Alexander, 2013; Disse et al., 2020; Dovers & Handmer, 1992; O'Hare & White 2013). Elements of stability and dynamism have been combined in some resilience interpretations that include robustness, adaptability, and transformability attributes (e.g. Hegger et al., 2016; Restemeyer et al., 2015). However, other resilience interpretations have only focused on one perspective or interpret the characteristics differently (McClymont et al., 2019).

The breadth of possible theoretical interpretations of resilience has led to confusion in practice (De Bruijne, Boin & Van Eeten, 2010) and an "overwhelming tendency" for practitioners to focus on maintaining the status quo as opposed to embracing change (White & O'Hare, 2014). At its core, flood resilience emphasises strategies for reducing flood consequences and 'living with floods' (Disse et al., 2020), but the exact way to achieve these aims is dependent on how resilience is interpreted for FRM and in the context of the changing governance arrangements in FRM. Therefore, the resilience concept needs further exploration into its theoretical and practical interpretation in FRM in order to bridge theory and practice.

Both England and the Netherlands are undergoing a paradigm shift from solely flood hazard control to more holistic flood risk management and flood resilience approaches. In England, there has been a shift from relying only on engineering approaches towards 'soft approaches' that are increasingly becoming more spatially-oriented with recent government policy advocating 'Making Space for Water' (2005) and for adapting existing urban spaces to be better able to cope with flooding. The 2015/16 Winter Floods led to officials recognising the need for a greater emphasis on resilience as a means to cope with future "unknown extremes" in weather (BBC, 2015):

"I think we will need to have that complete rethink and I think we will need to move from not just providing better defences... but also looking at increasing resilience"

- David Rooke, Environment Agency Deputy Chief Executive (BBC, 2015)

There are other recent examples of resilience being incorporated into England's FRM thinking and response to the risk of flooding. The UK Government's '25 Year Environment Plan' aims to reduce flood risk through working with nature and ensuring new developments are flood resilient (HM Government, 2018). New FRM policy for England is also embracing the 'resilience' term and aims for "a nation resilient to flooding" (Environment Agency, 2019:3). Furthermore, following the 2020 floods, the UK Government Secretary of State for Environment, Flood and Rural Affairs acknowledged that not all flood events can be prevented and commented on their focus on minimising flood consequences (i.e. 'living with floods' and flood resilience):

"...The steps we've taken have meant the impact of those [extreme] weather events has affected fewer properties... We'll never be able to protect every single household just because of the nature of climate change and the fact that these weather events are becoming more extreme" - George Eustice, UK Government Secretary of State for Environment, Flood and Rural Affairs (The Guardian, 2020)

The Netherlands has historically undertaken large engineering projects in response to extreme flood events, such as the Afsluitdijk and the Delta Works, in order to provide flood protection for the low-lying country. However, there have been changes towards more holistic FRM approaches and flood resilience in recent times. For example, national government policy approaches include the Integrated Water Management perspective introduced in 1989 (Davoudi, Crawford & Mehmood, 2009), and the policy document on 'A Different Approach to Water' in 2000 that advocated retaining and not just draining water (Woltjer & Al., 2007). Furthermore, the 'Room for the River' programme (2006), 'Water Policy for the 20th Century' document (2000), and 'Multi-Level Safety Approach' (2008) are examples of a change in FRM policy towards more holistic FRM approaches. More recently, the Delta Plan on Spatial Adaptation ('Ruimtelijke Adaptie') aims to make the Netherlands both climate-proof and water-resilient (Delta Programme Commissioner, 2019):

Ministerie van Infrastructuur
en Waterstaat

"We need to quickly step up our efforts and re-design our streets, gardens, cities, and rural areas. This is the only way for us to properly prepare for the impact that more extreme weather conditions will have on our environment. Take, for example, the

torrential rains that have flooded entire residential neighbourhoods because local greenery is insufficient to cope with such volumes in a natural way”

- Cora van Nieuwenhuizen-Wijbenga, Minister of Infrastructure and Water Management (Government of the Netherlands, 2020)

This thesis explores theoretical interpretations of ‘flood resilience’ in order to support attempts to reduce ambiguity and vagueness surrounding the concept. Furthermore, this thesis also explores the potential roles and contributions of civil society actors in local flood resilience practice in order to support efforts to bridge the gap between theory and practice. Consequently, the third research question that the thesis engages with is:

RSQ 3: How can resilience be interpreted in the context of flooding and how do civil society actors, and their capacities, influence flood resilience in practice?

The thesis engages with this research question in chapters 2 and 3. Chapter 2 interprets resilience in the context of flooding through the lens of ‘community resilience to flooding’. This lens focuses on how flood groups can potentially influence different community capitals that consequentially influence community resilience to flooding. Chapter 3 explores theoretical interpretations of resilience and develops a framework to explore civil society contributions to flood resilience before, during and after flooding in the local area.

1.4. Research Aim 3: Fairness and equality

When undertaking research into disasters, it is important to recognise that disaster situations occur when natural hazards expose the underlying vulnerabilities and weaknesses of social systems (Kelman, 2020; Tierney, 2014; Wisner et al., 2004). Flood disasters are not solely a product of the natural flood hazard: they arise due to decisions and preferences that have led to structural differences in flood risk exposure. For example, choices regarding urban design and planning can influence flood risk exposure with green spaces reducing flood risk by acting as temporary water storage areas, but paved areas increasing flood risk by allowing water accumulation. The building of flood defences and funding of FRM measures are also based on decisions that can be unfair. For example, decisions on allocating funding for FRM projects in England can rely on the costs and the potential damage prevented or benefits gained. This means however that areas that have relatively high property values may have a greater amount of potential financial damage (i.e. making the FRM project costs seem more acceptable) than areas with lower property values. Overall, flood risk can be described as “inherently unfair” (Johnson, Penning-Rowsell & Parker, 2007:387) with unequal distributions of exposure, capacities and support.

The acknowledgement of this inherent unfairness and the inequalities connected to flooding and FRM provides the inspiration for this thesis to identify and investigate potential inequalities that can emerge from the two shifts in FRM. The rise of civil society actors in FRM at the local level can potentially perpetuate existing social inequalities in decision-making and allocation of resources. For example, research into community planning has found that more able and perhaps affluent citizens are able to better mobilise resources and social connections to have a greater influence on planning decisions than other groups of citizens, in essence maintaining and extending their privileged status and perpetuating social inequalities (e.g. Aldrich & Crook, 2008; Rydin, 2016). This example suggests that there are implications regarding representation, abilities, resources and decision-making in community planning that may be relevant in the context of a growing role for civil society actors in FRM.

Furthermore, there is an often unquestioned assumption that becoming more resilient is positive and needed for society to better manage flooding (Davoudi, 2012; White & O'Hare, 2014). The goal of 'becoming resilient' is often heralded as an idealised outcome or endpoint for resilience policy, while less attention is paid to critical questions about resilience for whom, to what end, and who gets to decide (Davoudi, 2012; Lebel et al., 2006). In policymaking, there is often a tendency to aim for flood resilience as a static, 'back to normal' interpretation of resilience that is "past-oriented" and results in the preservation and reconstruction of pre-flood vulnerabilities (Coaffee et al., 2018:407; Twigger-Ross et al., 2014; White & O'Hare, 2014). This interpretation can not only lead to maladaptation in the face of flood risk, but also be a way to normalise and depoliticise disaster events (McEvoy, Fünfgeld & Bosomworth, 2013; Scott, 2013b). Therefore, following this interpretation and aiming to 'return to normal' after a flood can lead to the maintenance of spatial inequalities relating to flood risk exposure in the urban environment.

Living with floods and the narrative of 'surviving and thriving' are emphasised within flood resilience literature, but such discussions often ignore the varying socio-spatial vulnerabilities (i.e. flood risk exposure) and capacities of citizens. This requirement for citizens to 'survive and thrive' is problematic as it ignores the variation in societal characteristics of urban spaces (i.e. the socio-spatial) in how citizens are able to endure floods and manage their own flood risk. Citizens can have differing vulnerabilities and capacities to cope with flood events and to recover after floods as well as their capacity to take FRM actions that help prepare them for future floods and thus pursue flood resilience (O'Hare & White, 2018). Ignoring this socio-spatial variation, in terms of the citizens who can 'live with floods' and those who cannot, may mean that there is inadequate support for the diverse range of citizens at risk from flooding – in essence entrenching and exacerbating existing socio-spatial inequalities. Therefore, there is a need to further investigate the implications of varying flood risk exposure and capacities on citizens who

are being expected to engage in the shift to ‘flood resilience’ and have the ability to ‘live with floods’.

The above suggests a need for critical exploration of the potential influence that emerging civil society actors can have on fairness and socio-spatial inequalities in local flood resilience and the potential forms of socio-spatial inequalities that can arise as a result of ‘flood resilience’ policies in practice. Consequently, the fourth research question that the thesis engages with is:

RSQ 4: What potential issues of fairness and socio-spatial inequalities arise when civil society actors play a greater role in local FRM and when pursuing flood resilience in practice?

The thesis engages with this research question in chapters 2, 3 and 5. Chapters 2 and 3 identify potential inequalities that arise when civil society actors play a greater role in local FRM and flood resilience. Chapter 5 focuses on critically analysing socio-spatial inequalities that arise when pursuing flood resilience in practice. This chapter explores how the turn to flood resilience and the narrative of ‘living with floods’ means that variations in citizens’ abilities to both endure flooding and to manage their own flood risk can potentially lead to socio-spatial inequalities.

1.5. Research context and approach

1.5.1. Flood risk and flooding in England and the Netherlands

England and the Netherlands are both at high flood risk and have recent experiences with different forms of flooding. England has approximately 5.2 million homes and businesses at risk of flooding and has been affected by several severe flood events in 1998, 2000, 2004, 2007, 2009, 2012, 2013/14, 2015/16, 2019 and early 2020 (Environment Agency, 2019; Finlay, 2020; UK Government, 2016). These flood events occurred across England and were in the form of rainfall, river, coastal and groundwater flooding. The 2007 flood events were described as Britain’s “biggest peacetime emergency since World War II” (Pitt, 2008:vii) and the 2015/16 winter floods in the Upper Calder Valley and northern parts of England were “one of the most extreme and severe hydrological events of the last century” (CEH, 2016:n.p.). More recently, the Storms Ciara, Dennis and Jorge led to the “wettest February on record for UK, England, Wales and Northern Ireland, and the second wettest...for Scotland” in 2020 with heavy rainfall leading to rivers overflowing and surface water flooding across England, including in the Upper Calder Valley again (Finlay, 2020; Met Office, 2020). Whilst there are different causes of urban flooding, rainfall has been identified as the “major driver of future urban flood risk” in England (O’Donnell & Thorne, 2020:19). Overall, flooding is considered an urgent societal problem and this PhD thesis focuses on fluvial and pluvial urban flooding in England.

The Netherlands has a long history of flood risk and approximately 59% of its land area at risk of flooding with 26% below sea level, 29% at risk of fluvial flooding and 4% located outside of protective dyke rings (PBL, 2010). The country has experienced localised flooding in the mid-1990s along the River Meuse and River Waal that led to evacuations and concerns about changing flood risk (UK Government, 2016; Hoog Water, 2020). In recent times, there has been a greater recognition of the growing risk of pluvial flooding in Dutch cities (e.g. Arnhem, Amsterdam, Utrecht and Rotterdam) and urban areas (Dai et al., 2018; Brockhoff, Koop & Snel, 2019; H2o, 2016; PBL, 2015; Van Riel, 2011). Arnhem has been affected by repeated flooding with high-profile flooding events in 2011, 2014, and 2016, with the city being labelled as “the wettest place in the Netherlands” during the 2014 floods (Trell & Van Geet, 2019:376). It is expected that overall pluvial flood damages in the Netherlands may rise to 200 million euros per year according to some climate scenarios and that there will be further flooding in Arnhem (NOS, 2016; Trell & Van Geet, 2019). Urban flooding caused by heavy rainfall is a growing societal problem for Dutch cities and therefore the PhD thesis focuses on pluvial flooding in the Netherlands.

1.5.2. Research Approach

This PhD thesis used an exploratory case study approach to investigate the four research questions. The approach enables researchers to explore a phenomenon where not much is previously known and bring new variables to light (O’Leary, 2014; Yin, 2003), as this thesis aims to do. The PhD thesis selected the Upper Calder Valley (England) and Arnhem (The Netherlands) based on their previous flood experiences, future flood risk, and evidence of the presence of active citizens.

In England, the research focused on ‘flood groups’, which are a rising civil society actor in local FRM. The exploratory case study approach was used to investigate the phenomenon of flood groups and explore the wider flood group governance context. Not much is known about these flood groups and a snowballing technique was used to make contact with them. The research identified the ‘The National Flood Forum’ (NFF) charity as a gatekeeper and the NFF sent out emails with text describing the research and a request to complete a survey developed by the researcher. The flood group responses were analysed and combined with recommendations from semi-structured interviews with national level policymakers to identify six flood groups for further in-depth qualitative research. The data collection for this part of the thesis research was completed in May 2015.

In December 2015, severe floods struck across England and the Upper Calder Valley was particularly affected. Three of the six selected flood groups were located in the Upper Calder Valley. Therefore, it was decided to undertake further research into these three flood groups and conduct additional data collection. This enabled the thesis to bring new insights to light

regarding the nature of civil society in FRM by collecting data before, during and after a flood event.

The research identified urban areas at risk of future flooding in the Netherlands with experiences of recent flooding as well as evidence of a rising civil society role in local FRM. This was done through desk-based literature searches, a review of media reports and policy documents, attending the Delta Congress in 2017, and through expert interviews. The country has not recently experienced coastal or fluvial flooding, but there are growing concerns about the risk of pluvial flooding in Dutch cities (Brockhoff et al., 2019; Dai et al., 2018; H2o, 2016; PBL, 2015; Van Riel, 2011). An analysis of newspaper articles (in Dutch) was undertaken to identify signs of citizen involvement in urban pluvial FRM. This led to the Dutch city of Arnhem being selected as an appropriate case to explore the research questions due to recent high-profile pluvial floods in 2011, 2014 and 2016 as well as local media reports of civil society actors becoming increasingly involved in local FRM.

1.5.3. Methods: Data collection and analysis

The thesis used multiple complementary methods to collect data (see Table 1.1). More detailed explanations of how each method is applied, including who was interviewed and why, are discussed in each thesis chapter.

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Interviews				
- Semi-structured	X	X	X	X
- Walking		X		
Site Visits				
- Observations	X	X	X	X
Surveys	X			
Analysis of data retrieved from:				
- Policy Documents	X	X	X	X
- Media Reports		X	X	X
- Local Websites		X	X	
- Official Surveys				X
- Social Media		X	X	

Table 1.1: Overview of data collection methods used in each chapter. (Source: Author)

Semi-structured interviews were used to help answer all four research questions as they allowed the interviewer to gain a deeper understanding of the context and the actions of interviewees, as well as their governance arrangements. The benefits of the interview approach are that the interactive approach enables the interviewer to use open-ended questions to explore an issue

(Yin, 2003) as well as opening up the opportunity to probe the interviewee responses and ask follow-up questions. For this PhD thesis, this ability to ask follow-up questions is an appropriate way to collect qualitative data on the emerging role of civil society actors as not much is known on this topic due to civil society involvement in FRM being relatively new, informal and often not officially documented. Furthermore, interviews enable different perspectives on the same issue to be explored and compared. More focused interviews were then used to learn more about the issues raised from the documents, media reports, and initial exploratory questions (Yin, 2003). These latter interviews were shorter in time duration and followed more specific interview protocols. However, a drawback was that it is an intensive data collection method that required the interviewee to give up their time to be interviewed and civil society actors may already be inundated with requests and not have sufficient time. These semi-structured interviews were undertaken following a process of informed consent and anonymisation of the data. There were also considerations of the researcher's position and its potential influence on the data collected.

Walking interviews were also employed (see Trell & Van Hoven, 2010) whereby interviewees showed places that had been affected by flooding whilst the interview was undertaken. Interviewees were provided with printed local maps during the interviews and were encouraged to annotate them with their flood experiences and their actions to deal with floods. These interviews helped interviewees to better express their knowledge in more visual ways that also allowed them to use known physical cues to trigger memories (e.g. walking in specific locations or looking at local maps). In addition to walking interviews, visits to the case locations allowed the researcher to make direct observations of the sites. Physical flood memories (e.g. printed booklets, local maps, informative leaflets, post-flood poems and tea towels) were also collected during direct site visits and given by interviewees. These were recorded and used to gain a richer understanding of the cases.

Policy documents were gathered using desk-based internet searches and recommendations from experts and interviewees. Media reports were identified using Lexis Nexis (an online newspaper database). Policy documents and media reports were used to answer all four research questions as they contained both official information from the authorities and information of more unofficial and informal actions undertaken by these emerging civil society actors. These policy documents and media reports were predominantly in Dutch (especially at the local level) and therefore the key search terms were also in Dutch. The interview data, policy documents and media reports were coded using ATLAS.ti. The exact approach to coding is specified in each of the chapters. Furthermore, social media data from Facebook was also used in addition to live streams from newspaper sites such as The Guardian and local news-sites. Social media was an important source of data to help understand the actions of these informal and small initiatives during the flood events and to answer research questions 1 and 2.

Surveying of flood groups was undertaken through the Qualtrics software (Chapter 2) to explore the range of flood group activities being undertaken as well as how the flood groups were organised (research question 1) and interact with public authorities (research question 2). Survey data collected by the Municipality of Arnhem and other organisations such as the Dutch Statistics Office (Centraal Bureau voor de Statistiek) were also analysed. This secondary data allowed an exploration into the socio-spatial variation of different neighbourhoods in Arnhem: it facilitated the analysis of differences and potential inequality between the neighbourhoods in order to help answer research question 4. It enabled a better understanding of the different contexts and was used in combination with qualitative data from semi-structured interviews and the policy document analysis.

1.6. Thesis Outline

The thesis aims to explore the two important and ongoing shifts in FRM: the emerging role of civil society and the shift towards flood resilience and 'living with flood risk' in England and the Netherlands. The research aims and associated research questions outlined above are addressed in the following chapters (see Table 1.2):

Chapter 2: 'Flood Groups in England: Governance arrangements and contribution to flood resilience'

This chapter focuses on the growing role of flood groups within the FRM landscape of England. The chapter describes the characteristics and emergence of several flood groups in England and develops a framework to explore their potential influence on community resilience to flooding. The governance arrangements of these flood groups and their interactions/collaborations with established public authorities are also investigated in this chapter. The findings indicate that flood groups in England can potentially contribute to community resilience to flooding, especially in terms of enhancing social and natural/built environment capitals. At the same time, the chapter reveals issues regarding the representativeness of the 'community' in flood groups, of potential exclusion, and of marginalisation.

Chapter 3: 'Civil society contributions to local level flood resilience: Before, during and after the 2015 Boxing Day floods in the Upper Calder Valley'

This chapter focuses on the potential contributions of civil society actors to local flood resilience before, during and after a flood event in England. This chapter reflects on flood resilience in theory and conceptualises flood resilience across three phases inherent to flood disasters: pre-flood, during the flood and post-flood. The chapter identifies the importance of time and place when analysing civil society contributions to local level flood resilience. Exposure and a sense of community strongly influenced civil society contributions to flood resilience in the Upper Calder

Valley. Furthermore, issues of representation and varying place-based capacities are also identified as relevant for flood resilience-based policies.

Chapter 4: 'Emerging citizen contributions, roles and interactions with public authorities in Dutch pluvial flood risk management'

This chapter focuses on the emerging role and contributions of citizens to pluvial FRM in the Netherlands. This chapter develops a framework to understand civil society contributions to FRM, also based upon the findings from Chapters 2 and 3, through physical resources and actions, knowledge, and advocacy activities in addition to showcasing and experimenting. This emerging citizen role has implications on the division of roles and responsibilities between public authorities and citizen actors (as forms of civil society). The chapter reveals that this emerging role in FRM is being shaped by traditional authority-led interactions, creative and dialogical approaches to citizen engagement, as well as citizen-initiated contributions that then interact with authorities. Furthermore, the issue of willingness and ability to contribute was also identified as influencing this emerging citizen role.

Chapter 5: 'Socio-spatial inequalities in flood resilience: Rainfall flooding in the city of Arnhem'

This chapter critically analyses socio-spatial inequalities associated with the shift towards flood resilience in FRM and pays particular attention to the notion of 'living with floods' and its implications for citizens. The chapter focuses on the varying socio-spatial vulnerabilities and capacities of citizens to 'live with floods' in the Dutch city of Arnhem. Three forms of socio-spatial inequalities in flood resilience are identified in Arnhem: existing inequalities exacerbated by the shift, 'hidden' inequalities in vulnerability that are now relevant due to rainfall flood risk, and new inequalities in capacity to fulfil the responsibilities arising from the shift to 'living with floods'. The chapter contributes to wider discussions in the shift towards flood resilience in FRM and helps planners to consider the interactions between vulnerability and capacity in their city neighbourhoods when allocating public resources.

Chapter 6: Conclusions

This chapter draws the previous chapters together to focus on the research aims identified by this thesis and to answer the associated research questions. In addition to presenting the thesis findings, this chapter also provides recommendations for policymakers and planners as well as suggesting future research avenues.

Research Aim 1: Understanding the emerging role of civil society in local FRM and the implications for both authorities and civil society in terms of the division of roles and responsibilities in governing local FRM		
Research Questions	Chapters	
RSQ 1: What are the roles and contributions of civil society actors in local FRM and how are these actors organised?	Chapter 2 focuses on flood groups in England. These civil society actors are becoming more prominent in local FRM in England.	Chapter 4 focuses on the emerging role of citizens and their increasing contributions to local pluvial FRM in the Netherlands. The chapter analyses the interactions between public authorities and emerging citizen group and collectives, as civil society actors. There is an exploration of the ways that public authorities position themselves in this changing FRM landscape and interact with the different citizen roles and contributions whilst also trying to define a new role for themselves in the changing FRM landscape.
RSQ 2: How are public authorities interacting with these emerging civil society actors and how are these authorities redefining their own roles and governance approaches to local FRM?	The chapter explores their governance arrangements including their formation, governance and interactions with public authorities.	
Research Aim 2: Interpreting the concept of 'resilience' for FRM and exploring how civil society can influence 'flood resilience' in practice		
Research Question	Chapters	
RSQ 3: How can resilience be interpreted in the context of flooding and how do civil society actors, and their capacities, influence flood resilience in practice?	Chapter 2 analyses flood resilience through the lens of 'community resilience to flooding' and focuses on the influence of flood groups in England. These civil society actors influence 'community capacity', which comprises four capitals: social, natural/ built environment, human, and economic.	Chapter 3 develops a framework to exploring civil society contributions to flood resilience before, during and after flooding. In addition to before, during and after flooding, the chapter also explores ongoing changes that civil society actors influence. This chapter focuses on interpreting and operationalising flood resilience theory to apply to an empirical case. The focus is on civil society actors in the Upper Calder Valley in England.
Research Aim 3: Critically investigating issues of fairness and socio-spatial inequalities that may potentially arise as a result of the emerging civil society role and the paradigm shift towards flood resilience in local FRM		
Research Question	Chapters	
RSQ 4: What potential issues of fairness and socio-spatial inequalities arise when civil society actors play a greater role in local FRM and when pursuing flood resilience in practice?	Chapters 2 and 3 identify issues of potential marginalisation and representation in contributions to community resilience to flooding and to local flood resilience.	Chapter 5 critically analyses socio-spatial inequalities associated with the shift towards flood resilience in FRM and pays particular attention to the notion of 'living with flood risk'. This chapter focuses on the socio-spatial variation of how citizens endure flooding and manage their own flood risk with an emphasis on identifying and exploring these inequalities that appear in operationalising flood resilience.

Table 1.2: Overview of the Research Aims, Research Questions and the relevant chapters (Source: Author)

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CHAPTER 2

Flood Groups in England: Governance arrangements and contribution to flood resilience

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Abstract

The influence and role of civil society actors has in the past decade become increasingly prominent in the 'flood risk management landscape' in several European countries, especially in England. The increasing number of 'flood groups', civil society actors that facilitate community involvement in local flood risk management, in England is an illustration of such development. However, although their role and numbers are increasing, to date not much is known about these flood groups: how they are set up, governed and, most importantly, how they are influencing community resilience to flooding. This chapter contributes to the understanding of the potential role of flood groups in influencing flood resilience at the local level in England. In order to do that, it examines the governance arrangements and activities of six flood groups in England. Flood resilience is analysed through the lens of community resilience to flooding and through examining the influence of flood groups on 'community capacity', which comprises four capitals: social, natural/built environment, human, and economic. The findings indicate that flood groups in England can potentially contribute to community resilience to flooding, especially in terms of enhancing social and natural/built environment capitals. At the same time, the chapter reveals issues regarding the representativeness of the 'community' in flood groups, of potential exclusion, and of marginalisation. These issues need to be addressed when aiming to better understand the role of flood groups in making places more resilient to flooding.

Keywords

Flood Resilience; Community Resilience to Flooding; Civil Society; Flood Groups; England

2.1. Introduction

Flooding is a very real and present threat in European countries, which experienced 215 coastal, river and flash flood events from 2004 to 2014 causing 1,021 deaths (Guha-Sapir, Below & Hoyois, 2015). This has affected over 5.8 million people and resulted in over €45 billion in damages (Guha-Sapir et al., 2015). Climate change is also expected to lead to an increase in the frequency and intensity of future flooding and flood related damage in Europe (Alfieri et al., 2015; EEA, 2012).

In light of the above, it is clear that flooding is an issue that requires immediate attention, especially in countries that have recently suffered severe flooding and are expected to face worse floods in the future, such as England (EA, 2009). Flooding has become a more prominent issue in England since severe floods in Boscastle (2004), Carlisle (2005), Hull (2007), Cumbria (2009) and the more recent 'Winter floods' (2013/2014 and 2015). The impact of these recent flood events has raised the profile of flooding and led to a greater scrutiny of the work of flood authorities and the funding allocated to flood risk management by the government (Thorne, 2014; Priestley & Allen, 2016). Research into these recent flood events has challenged existing beliefs about flood risk management in England, including the current national governance systems for floods and the use of "large-scale flood defences as the most effective intervention approach" (White, 2013:107).

At the same time there has been an ongoing paradigm shift in flood risk management from resistance and 'keeping water out' towards 'living with water' and the idea of increasing flood resilience through "more strategic, holistic and long-term" approaches (Scott, 2013:103). This shift towards flood resilience is evident in England through the Making Space for Water strategy (Defra, 2005), which emphasises an attempt to live with water (Johnson & Priest, 2008; Meijerink & Dicke, 2008). In disaster management literature, resilience is traditionally understood as the ability of social systems to absorb/resist shocks without losing their ability to function and then to recover and 'bounce-back', although more recent interpretations are increasingly including the ability of social systems to adapt and transform (i.e. 'bounce-forward') (Davoudi, 2012; Masterson et al., 2014; Restemeyer, Woltjer & Van den Brink, 2015; Tierney, 2014). Thus, while the resistance approach focuses on flood hazard control measures, the resilience approach also acknowledges the possibility of a flood to occur and the need to address that possibility through policy measures throughout different levels of government.

Alongside the transition in flood risk management from resistance to resilience is a change in the roles and responsibilities between the state, market and civil society. There is a greater emphasis on increasing public participation and local input in flood risk management in order to transform members of the public into "active risk managers" who take a greater role in solving

flooding issues and contributing to flood resilience (Kuhlicke & Steinführer, 2013:115; Johnson & Priest, 2008). In England this emphasis is highlighted in documents such as the Making Space for Water strategy (Defra, 2005), the Pitt Review (Pitt, 2008), and the Water and Flood Risk Management Act (UK Government, 2010). Importantly, recent national efforts to increase community level resilience to flooding in England include the Flood Resilience Community Pathfinder Scheme 2013-2015 by the UK Department for Environment, Food and Rural Affairs (Defra) (Twigger-Ross et al., 2014). This scheme emphasised civil society's role in flood resilience and specifically supported interventions to increase community resilience to flooding (ibid). It also functioned as a driver for the creation of flood groups (ibid). The evidence suggests that due to climate change the communities will indeed need to "become better prepared and more resilient to flood events" in the future (O'Brien et al., 2014:8). This is seen in 'resilience-building' grey literature in the UK, which repeatedly advocates increasing levels of self-reliance in communities (Davoudi, 2012). These increases in self-reliance can be perceived as constructive as officials are supporting "stewardship of lay people" (Schelfaut et al., 2011:831) and this could enable communities to become better prepared and more flood resilient. However, the focus on self-reliance can be accompanied by a corresponding decline in the role of the government (Davoudi, 2012) with responsibilities passed on to community and voluntary (flood) groups. Therefore, the increasing focus on resilience within flood risk management practice/policy-making necessitates a better understanding about the capacities of communities on a local level.

As illustrated above, some attention has been given to involving the community in flood risk management. However, the role that civil society can play within flood resilience and the actual capacities of a community to take on such a role are not well documented (Van der Vaart et al., 2015). In order to contribute to the understanding of the role of civil society in flood risk management and in community resilience to flooding, this chapter focuses on exploring flood groups. These are becoming more common and established in England: in the past decade the number of flood groups has increased from "more than 50" (Defra, 2004:99) to over 221 in England (National Flood Forum internal database, 2015). This rise in prominence indicates a shift in the flood risk management landscape. Despite this, there is no concrete definition of what constitutes a 'flood group'. Existing academic literature and government documentation considers all forms of community groups working on flood issues as 'flood groups', which makes comparisons, generalisations and pinpointing the potential role of flood groups a challenge. In addition, the mere existence of flood groups may not by definition mean that they have an impact on flood resilience, although previous research suggests that they make a contribution towards it (see Geaves & Penning-Rowsell, 2015). This chapter argues that in order to make valid statements regarding the potential role of flood groups in community flood resilience, more needs to be known about their formation, membership, position in the local flood risk management landscape, and activities.

By focusing on developing a working definition of flood groups in England, and by analysing their governance arrangements, this research aims to shed light on their potential influence on community resilience to flooding. The chapter first discusses resilience in relation to flooding at a local level and develops a framework to analyse the influence of flood groups on community resilience to flooding. Second, it provides information on England's current flood risk management landscape. Third, the research methodology is introduced. Fourth, the chapter presents and discusses the findings whilst reflecting on the influences of flood groups and offering insights into the wider implications of this research.

2.2. Flood Resilience

Over the last few decades, the policy discourse on flood risk management in many countries has been moving from a focus on large-scale engineering-based systems towards a more holistic flood resilience approach (Schelfaut et al., 2011; Scott, 2013). This latter approach acknowledges that floods cannot always be prevented, but their impacts can be reduced. It also understands and accepts that uncertainty is present in any flood risk management endeavour and acts on a “more integrated and precautionary basis” (White, 2013:110). Furthermore, in disaster studies, the analysis of resilience has seen the level of the local community as “an appropriate level at which to take action” (Coates, 2015:2). This focus on the community level and community resilience has also been evident at the global level (e.g. the 2009 Global Platform for Disaster Risk Reduction) and in resilience definitions by the United Nations International Strategy for Disaster Risk Reduction (Schelfaut et al., 2011).

2.2.1. Community Resilience to Flooding

‘Community resilience to flooding’ examines flood resilience at the local level and places the community and its resilience to flooding at the heart of the analysis. When placing community at the centre of the analysis, one unavoidably has to pay attention to (often romanticised) assumptions connected to the notion of ‘community’. These include the power relations present on the local level as well as the connected issues of “justice and fairness”, both of which may influence resilience (Coates, 2015; Davoudi, 2012:306; Fainstein, 2015). Variations in the distribution of capacities over community members are inherent to resilience-thinking. Increasing ‘community’ resilience may not necessarily benefit all community groups equally (Fainstein, 2015; Wilson, 2012) with certain groups potentially being excluded or affected unevenly (Davoudi, 2012). This exclusion may exist before any activities to enhance resilience are undertaken when decision-makers define the ‘community’ (Porter & Davoudi, 2012). Ideally the term ‘community’ would include and represent all social groups affected by flooding. However, in practice, the representativeness of flood groups is likely to selectively influence whether the flood groups are improving community resilience for everybody or only for those

included in the flood group and its decision-making processes. Therefore, this research incorporated issues of representativeness and inclusion into the analysis of the flood groups.

In the disaster-related literature, community resilience is often conceptualised as a network of different capacities that can be accessed and harnessed by communities (e.g. Cutter et al., 2008; Cutter, Burton & Emrich, 2010; Forrest et al., 2014; Masterson et al., 2014; Norris et al., 2008). Such conceptualisations suggest that communities can become more resilient by developing and increasing these capacities. Norris et al. (2008) proposed four central capacities for community resilience to disasters in general: community competence, social capital, information and communication, and economic development. Cutter et al. (2008) developed a place-based model for resilience to 'natural' disasters and propose six indicator categories of community resilience: social, institutional, community competence, ecological, infrastructure, and economic. The framework by Cutter et al. (2008) has recently been used to measure community resilience to flooding in England as part of Defra's Flood Resilience Community Pathfinder Scheme 2013-2015 (Forrest et al., 2014). Masterson et al. (2014) used four capitals (social, physical, human and economic) that together describe what they term 'community capacity' to deal with disasters.

There are common elements within the above frameworks, such as the community's internal social capital and external social connectedness and capabilities, the condition of the natural/built environment (i.e. ecological capital, infrastructure capital and physical capital), the characteristics of individuals in the communities (i.e. human capital and community competence), and the economic resources accessible to the community (i.e. economic development and economic capital). This chapter adapts and builds upon these common elements to analyse how flood groups in England have influenced community resilience to flooding in terms of 'community capacity' as defined by four capitals: social, natural/built environment, human, and economic. These capitals relate to the ways that the community is resilient to (i.e. prepares for, withstands, responds to, recovers from, adapts to, and transforms in response to) flooding.

2.2.2. Understanding Community Capacity

Community capacity is understood in this chapter as the "sum of the individual and organisational capacities within a community" and their collective ability to achieve "community goals" (Masterson et al., 2014:36). In this context, the focus is on how the flood groups affect these capacities, within the four capitals, to influence community resilience to flooding. Therefore, to understand community capacity it is relevant to explore the four constituent capitals and the ways these capitals are operationalised for this chapter in more detail (see Table 2.1).

Capital	In this chapter
Social	Focuses on how individuals within a community interact with one another and how the community interacts with local flood actors in relation to flood issues
Natural/Built Environment	Focuses on temporary and permanent changes to the local physical landscape and on rules imposed on changing the landscape (spatial planning) in relation to flood issues
Human	Focuses on the individual's ability to engage with flood issues
Economic	Focuses on the economic resources available for individuals and the community to better engage with flood issues

Table 2.1: Understanding and specifying community capacity in terms of the four capitals. (Source: Author)

Social capital expresses the extent to which individuals interact with one another within a community and how the community's internal social networks and structures, as well as external formal/informal institutional structures and support, influence how individuals engage with flooding (Cutter et al., 2008; Masterson et al., 2014). The relationships between the community and local flood authorities, such as "emergency planners, voluntary sector and local responders" (Twigger-Ross et al., 2014:11), and the institutional structures that exist in the community are important for flood resilience. Individuals and communities with highly developed social networks and institutional structures may have greater access to support and resources to increase flood resilience. The information and communication capacity of a community is important in the case of emergencies (Norris et al., 2008) and informal social networks can act in collaboration with official flood warning systems (Parker & Handmer, 1998). The ability of a community to organise itself, access information and work together (i.e. their community competence) is also important to consider as it will affect their ability to engage with flood issues (Norris et al., 2008).

Natural and built environment capital describes the level to which the spatial planning policies and physical characteristics of the local context support the community's resilience to flooding. Natural environment measures already taken at the catchment level can include upstream land management that supports flood risk mitigation, such as the use of wetlands as a natural flood buffer and woodland for flood attenuation (UK NEA, 2014). The built environment 'indicator' includes the amount of pervious structures within a community, land zoning policies for flood risk, and the resilience of critical facilities (Cutter et al., 2008; Masterson et al., 2014). The built environment also describes permanent and temporary physical flood measures that reduce and manage flood risk such as embankments, river widening and dredging, and temporary barriers.

The key difference between human and social capital as operationalised in this chapter is the explicit focus of human capital on the individuals and their current and potential capability to individually engage with flooding. When evaluating community resilience to flooding it is relevant to pay attention to the general health and wellbeing on the individual level (Masterson

et al., 2014) as individuals with ill-health or disabilities may be less resilient to flooding than the overall community. The level of education, knowledge and skills of the individuals within a community are further characteristics differentiating the flood resilience of individuals within a community and should be considered, especially when aiming to understand vulnerabilities within a community (Cutter et al., 2008; Masterson et al., 2014).

Economic capital refers to economic resources (Masterson et al., 2014) of both the individual and community, such as homeownership, employment rate (Cutter et al., 2014) and community funds. Additional influential economic indicators include the equitable distribution of wealth (Cutter et al., 2008; Norris et al, 2008) and the uptake of flood insurance as a means of spreading the risk (Botzen & Van den Bergh, 2008). These resources can influence the extent to which they are able to be resilient to flooding, especially in terms of preparing for floods and for post-flood recovery.

2.3. England's Flood Risk Management Landscape

According to the House of Commons (2015) approximately 2.4 million properties in England are at risk from fluvial flooding, 3 million from pluvial flooding and 600,000 are at risk from both. In order to deal with the risks, several actors, sectors and policy documents interact and intersect with each other in what this chapter terms the 'flood risk management landscape'. In the context of England, Defra is responsible for national and strategic emergency planning for flooding, whilst the Environment Agency (EA) is responsible for implementing flood risk management works and issuing flood warnings (i.e. the 'boots on the ground'). Additional primary flood actors in England include water and sewerage companies, highway authorities, the Met Office, the Flood Forecasting Centre, the National Flood Forum (NFF), Public Health England, Regional Flood and Coastal Committees, Internal Drainage Boards, coastal erosion risk management authorities, Lead Local Flood Authorities (LLFAs), local resilience forums and local councils.

Meijerink & Dicke (2008) found a general shift towards decentralisation in flood risk management in many countries with governments seeking to share flood risks with other actors. It is particularly true in England's flood risk management landscape where an ongoing trend towards local level involvement/action and the sharing of flood risk between multiple non-state actors, such as the local communities, can be detected. England's Making Space for Water strategy (Defra, 2004) highlights the importance of people at risk of flooding being involved in flood issues in their area through 'flood action groups'. The strategy also places greater responsibility on the public to "manage their own flood risk" (Johnson & Priest, 2008:520) and envisions them being more aware of flood risks and "empowered to take suitable actions themselves where appropriate" (Defra, 2004; Defra, 2005:14).

The Pitt Review (Pitt, 2008), an independent review into the management of the 2007 floods in England, also encourages connecting local groups with local organisations. The review included input from several flood groups, which shows that flood groups were consulted and contributed to this influential document. The Flood and Water Management Act (UK Government, 2010) named LLFAs as responsible for local flood risk management. These LLFAs are encouraged to involve and consult the local community on local flood risk management issues (Local Government Association, 2012). The National Flood and Coastal Erosion Risk Management Strategy for England (EA & Defra, 2011), created as a requirement of the Flood and Water Management Act, also focuses on increasing the involvement of the community in flood risk management. Overall, the shift towards flood resilience in England seems to have been accompanied by a decentralisation in flood risk management and an increased focus on the local level, especially on citizen involvement and responsibility.

2.4. Methodology

In order to understand the governance arrangements and potential influence of flood groups on the four capitals presented in Table 2.1, data were collected from national actors working with local flood groups and associated local actors. Semi-structured interviews were held with national actors in Defra (2 interviewees), the EA (1), the NFF (1) and the Association of Drainage Authorities (1) to gain their perspectives on local flood groups.

An online survey provided data on the governance arrangements of flood groups and their influence on community resilience to flooding. It was distributed to 221 flood groups across England and completed by 40 groups; a further inspection of the low response rate found that the flood groups were being inundated by data requests from academics (and other bodies) and had to prioritise which ones to respond to. The NFF provided additional legitimacy to the research and functioned as a 'gatekeeper' to access and distribute the surveys to the flood groups. However, it meant that the survey missed flood groups with no links to the NFF.

The survey data and recommendations by national level interviewees were used to identify six flood groups for further research. These groups were selected based on following considerations: It was important that the selected flood groups had existed over a sufficient time period (> 1 year) for governance arrangements to have developed and for activities to have been undertaken. Since the research focused on public involvement it was also important to select flood groups that consisted primarily of members of the public with an interest in flooding but without a paid position with a formal flood actor. The position of these flood groups in the local flood risk management landscape was important to understand in order to identify where they were influencing community resilience to flooding and how they were affecting existing local flood actors, especially local flood authorities. Therefore, the flood groups needed to have links with

local flood authorities (i.e. local government) and other local actors. These considerations resulted in the following criteria being applied to the survey data to identify appropriate flood groups that: i) were established over 1 year ago, ii) had a membership consisting of more than 75 per cent members of the public, iii) worked with other local actors and iv) worked with the local council. The six groups selected are represented in Table 2.2.

Flood group	i) Date established	ii) Public membership	iv) Local actors that they work with
Hebden Bridge Flood Action Group	2012	100%	Local Council; EA; Other flood groups
Mytholmroyd Flood Group	2014	100%	Local Council; EA; Other flood groups
Garforth Flood Support Group	2013	94%	Local Council; EA; Other flood groups; Water company
Bodenham Flood Protection Group	2008	100%	Local Council; EA; Other flood groups
Todmorden Flood Group	2000-2003; 2012*	80%	Local Council; EA; Other flood groups; Local community groups
Much Wenlock Flood Action Group	2007/2008	100%	Local Council; EA; Other flood groups; NFF; Water company; Emergency services

Table 2.2: Details of the selected flood groups. *The Todmorden group operated from 2000-2003 before reconvening in 2012. (Source: Author)

A number of semi-structured interviews were undertaken with representatives of these six flood groups and, in the latter two cases, with the local council and the EA representatives that worked with the flood groups. The national interviewee for the EA also represented the Cornwall Community Flood Forum (CCFF) and was also interviewed about this non-NFF flood group. These interviewees were also asked to map the stakeholders that they worked with and to describe their relationships with them. Several also provided additional documentation (e.g. community flood plans) from their flood groups. All interviews were transcribed and coded thematically. The interview data were supplemented by an analysis of the flood groups' documentation provided by interviewees and from desk-based research.

2.5. Findings and Discussion

2.5.1. Flood Groups: a working definition

This research identified 221 flood groups currently active in England. These groups ranged from community flood 'forums', 'committees' and 'action groups' that exclusively focus on flooding to groups that focus on flooding in addition to wider community issues, such as parish councils and residents' associations.

All of the flood groups interviewed aimed to build flood-related community capacity, with the majority also aiming for self-sufficiency (similar to findings by Waylen et al., 2011; Harries, 2009).

The flood groups interviewed in this research made varying contributions to flood risk management and resilience. The survey and interview data showed that several flood groups were action-orientated and focused on measures to reduce flood risk (e.g. clearing out ditches in Bodenham and creating temporary water storage areas in Garforth). Some of these flood groups also focused on actions to reduce the consequences of flooding (e.g. flood stores in Todmorden and Hebden Bridge) and to support flood recovery (as similarly found by Andrew, 2012; Twigger-Ross et al., 2011). Flood groups were also found to be involved with advocacy activities that ranged from discussing local flood issues (e.g. Bodenham, Todmorden, Hebden Bridge and Mytholmroyd) to actively pressuring and seeking to influence (i.e. lobby) authorities on local flood issues (e.g. the development of flood attenuation ponds in Much Wenlock and planning application objections in the majority of interviewed flood groups). This supports previous research that identified flood groups lobbying for local flood defence schemes (Thaler & Priest, 2014) and campaigning for local flood issues (Geaves & Penning-Rowsell, 2015; Neill & Neill, 2012; Thaler & Priest, 2014; Twigger-Ross et al., 2011). Despite previous research indicating their contribution towards the independent scrutiny of previous local flood events (McCarthy & Tunstall, 2008), this was not identified in this research.

It is important to note that the activities of flood groups are flexible and groups may change over time (interview EA, 2015). These changes may be expressed in the activities conducted, with flood groups moving from action to advocacy or vice-versa, and in the types of local flood actors that they work with.

Interview data with some input from literature was used to create a working definition of a 'flood group' that forms a starting point for data analysis in this chapter:

A flood group is primarily made up of a group of individuals with a personal interest in local flood issues who frequently meet with one another in specific flood group meetings to discuss flood-related issues in a specific geographical area. In addition to meeting, a flood group is often involved in action and/or advocacy on flood-related issues in their local area. Importantly, the individuals comprising a flood group form a shared identity that arises from having been affected by a shared flood event, by having a shared local flood source and/or a shared local geographical area at risk of flooding.

2.5.2. Formation and Membership

All the flood groups interviewed were formed after flood events, which is a common narrative in England (O'Brien et al., 2014). The scale of flood disturbance also influenced whether a flood

group was formed or not (Geaves & Penning-Rowsell, 2015). In addition to recent flood experiences, interviews reported a variety of drivers that supported the formation of the interviewed flood groups, such as support from the local parish council (e.g. Bodenham), local referendums and from local politicians (e.g. Much Wenlock). Interviews with flood groups and local flood authorities indicated that it was necessary to have a community demand and interest in having a flood group. Thus flood group formation was typically a bottom-up process which cannot be forced onto communities in a solely top-down manner. However, the findings indicated that flood authorities could encourage the formation of flood groups by providing stimuli such as financial support (e.g. The Defra Flood Resilience Community Pathfinder Scheme in Todmorden, Hebden Bridge, Mytholmroyd and CCFF).

All the flood groups interviewed were comprised of volunteers who could be classified into permanent or convergent volunteers based on the frequency of their volunteering. Permanent volunteers were part of the flood group throughout the year and involved themselves in the ongoing organisation and activities of the group. Conversely, convergent volunteers may have had no previous links to local flood risk management, but volunteered during flood emergencies (interview EA, 2015). Some flood groups had access to large numbers of convergent volunteers that signed up to the flood group or to other community groups.

The role and emergence of so-called 'local leaders' and other influential individuals has been found to be important in the formation and activities of civil society groups in a range of settings (Salemink & Strijker, 2015; Terluin, 2003; Twigger-Ross et al., 2011). The flood groups were also found to have such 'key members': influential residents, who were prepared or able to put time and effort into organising the flood group. Similarly to the interviewee quoted below, all of the interviewed flood groups acknowledged that without their key members they would have been unlikely to have formed and developed to their current levels (cf. O'Brien et al., 2014; Salemink & Strijker, 2015):

"Flood groups that are successful, there's usually a nucleus, someone who really cares and has respect in that community, and I think that you get luck [in] finding that person and you can't appoint someone to this position...as authorities we can't find these people, but if you provide the right stimulus then you'll have these people appear" – Defra interviewee, 2015

However, key members could also have a negative impact upon flood groups. In one flood group, personal disputes between key members and partner organisations dictated the relationship between the whole flood group and the 'external' organisation. In another flood group, such disputes resulted in the deliberate exclusion of individuals from the group. Findings by Coates (2015) provide a similar warning that flood groups centred on key members may deter other

individuals in the wider community from joining and not be representative of the wider community.

2.5.3. Representation, Exclusion and Potential Marginalisation

Power relations need to be examined when researching into resilience (Davoudi, 2012), especially community resilience, and the associated issues of “resilience from what, to what, and *who gets to decide*” (Porter & Davoudi, 2012:331, emphasis added). The last part of ‘who gets to decide’ is important as those involved in the decision-making are able to define the boundaries of their ‘resilience work’ and outline the priorities, which may lead to the exclusion of other perspectives (Davoudi, 2012). In the flood groups interviewed, the permanent members decided on the activities to be undertaken and defined the desired outcomes. Therefore, the representativeness of the permanent members is important to ensure decisions accurately reflected the community.

Several national interviewees suggested that the flood groups were always ‘representative’ of the community as those who want to join are able to join. However, this representativeness should not be taken for granted as there may be individuals that are excluded (Davoudi, 2012), if not purposefully then perhaps inadvertently. Some flood groups interviewed attempted to be representative of the community by creating elected area representatives (e.g. Bodenham) and street wardens (e.g. Todmorden).

At the same time, members of the community were excluded by some of the flood groups interviewed. Interviewees argued that some individuals became excluded because of differences of opinion during meetings with flood groups and local flood authorities. These differences were in how permanent flood group members interacted with local flood officials. For example, in the aftermath of the 2013/14 UK floods, public criticism was directed towards the government and EA for a lack of river maintenance and farmers for inappropriate land management techniques (Thorne, 2014). It was evident from the interviews that, in a similar vein, some individuals in the flood groups blamed the government and local flood officials for failures in dealing with past flood events whilst others did not. These differences led to tensions within the flood groups and made consensus-building difficult. The sharp criticism from these individuals at flood group meetings was also perceived as straining the relations with local flood officials. Furthermore, in two flood groups interviewed the individuals were excluded through personal decisions to leave the flood group and no longer attend flood group meetings as they did not agree with the direction that the flood group was taking in working with their local flood officials. Although this exclusion was beneficial for consensus-building within the flood group and collaboration efforts with local flood officials, it did marginalise certain individuals at risk from flooding.

Inadvertent exclusion may also occur due to the voluntary nature of flood groups. They are formed of volunteers and this introduces a selective aspect to their membership, which has

implications for their representativeness. Recent research found that flood and coastal risk management volunteers in England tended to be older (i.e. above 50 years old) individuals, with few volunteers from poorer backgrounds and with little ethnic diversity (Edwards et al., 2015). Whilst this research did not explore individual background and ethnic diversity, it did support findings about volunteer age. For example, certain flood groups (e.g. Bodenham and Garforth) were predominantly formed of older people and retirees with younger residents being too busy with their families or too tired to attend meetings after work (interview Bodenham, 2015). There was recognition of the need for younger residents to be involved in these groups in order to sustain them. However, this type of inadvertent exclusion and potential marginalisation was considered to be outside the control of flood groups. Several reported experiencing difficulties in recruiting new members and keeping them engaged due to widespread public apathy towards flooding, residents purposely avoiding dealing with flood risk or not wanting to admit having been flooded due to fears about the negative impacts on property prices and flood insurance policies. Such factors could be barriers to community-led schemes in achieving community resilience to flooding.

2.5.4. Flood Groups in the Local Flood Risk Management Landscape

The emergence of flood groups adds a “new element” to the existing governance arrangements for flood risk management at the local level (Geaves & Penning-Rowsell, 2015:1). The flood groups interviewed worked with a range of actors in the local flood risk management landscape (see Figure 2.1). These actors shared resources with the flood groups: physical resources (e.g. meeting rooms, staff members), financial resources, and knowledge and ideas. Knowledge and ideas were the most common resource shared, especially by the County Council, Local/Parish Council and the EA, whilst financial resources were rarely shared. However, financial support was given in the form of small loans (e.g. Bodenham) and through local community funds (e.g. Garforth). The ability of flood groups to access community funds that were not available to local flood authorities is an example of how they add value to the local flood risk management landscape.

The flood groups were also found to have opportunities to influence other actors in the local flood risk management landscape: they were often asked to consult on the plans/documents of the County Council (13 groups), Local/Parish Council (15) and the EA (15), and to support the designing and drafting of their documents (see Figure 2.1). The fact that these important actors interacted with the flood groups in these ways suggests that the groups were established and visible enough in the local context to contribute on flood-related issues. The flood groups also worked with the Emergency Services (police, fire and ambulance service), flood consultants, landowners, village magazines, internal drainage boards, other community groups, universities, Network Rail and Defra (‘Others’ category). This shows that the flood groups interacted with a

broad range of actors and included other specific local organisations, but that these interactions varied considerably across the flood groups.

Figure 2.1: Flood groups and their relationships with other local actors (first column represents the number of flood groups working with the named local actor; some groups had several types of interaction with each local actor; n=36). (Source: Author)

The roles and responsibilities of the state/local flood authorities and civil society/the flood groups were important to understand further especially in light of research suggesting that civil society involvement could lead to a decline in state support (Davoudi, 2012). Many of the flood groups saw themselves as intermediaries between the community and the local flood authorities. National interviewees also viewed the flood groups in this way and as a conveyer of local knowledge. The flood groups did not see themselves as replacing or taking responsibilities from existing actors. There was evidence of local flood officials, from the EA and LLFAs, going beyond their assigned duties by attending extra meetings and providing expertise to support the flood groups interviewed.

Interviews found that flood groups offered added value within the local ‘flood risk management landscape’ in the form of information resources embedded in local knowledge, experiences and engagement. They contributed by sharing local knowledge on their local area and, for example, its drainage system (interview Much Wenlock, 2015), past flood and rainfall data, and river and road ownership (interview Todmorden, 2015). Their inputs were able to correct EA data on previous flooding and help fill existing knowledge gaps. It was also reported by flood group

members and national interviewees that residents were more willing to talk to, and respect, key members in local flood groups than local officials:

“People will talk to us because they know us, they recognise our faces, we’ve been to school with them - people come to talk to us because we’re not the council, we’re not the EA and that’s how we find out more things” – Todmorden flood group interviewee, 2015

However, in some cases actors also withheld from interacting with flood groups, despite appeals by the flood groups themselves (e.g. Yorkshire Water in Todmorden). Reasons for not interacting with the flood groups included the perception that there were better avenues for engaging with local flood risk management.

2.5.5. Influence of Flood Groups on Community Resilience to Flooding

Based on findings from empirical data, Table 2.3 below presents an overview of activities through which the flood groups influenced community capacity and resilience to flooding. Not all of the activities can be solely classified under one category and there are also hybrid links between some categories.

Social Capital

The findings indicate that flood groups influenced the social capital of these communities in terms of their internal social networks and structures, community competence, information and communication, and external institutional structures and support.

Interviews suggested that flood groups maintained and created new social connections by organising social events in the community (interview Bodenham, 2015; interview Garforth, 2015). Internal communication structures were created to support the dissemination of flood warnings (e.g. telephone trees in Much Wenlock and Hebden Bridge) and new governance structures to connect residents and flood groups (e.g. the area representative system in Bodenham). These were examples of community competence (Norris et al., 2008). Interviews suggested that flood groups created and developed links between the community and external institutions such as the EA.

Natural/Built Environment Capital

According to our survey, flood groups were found to influence natural and built environment capital through maintenance measures, temporary physical measures and through spatial planning. For example, the Bodenham flood group maintained and improved the efficiency of water infrastructure by cleaning out watercourses and blocked culverts, in effect replicating the tasks of authorities. Whilst this example shows flood groups taking action to solve flood risk problems themselves, it also raises wider questions about flood risk management

responsibilities. The flood group, in carrying out this maintenance, showed signs of an expanding civil society and community involvement in owning their flood risk. However, it could also be seen as an indication of local government/authorities ‘reallocating’ their duties to maintain watercourses to unpaid members of the public (see also Geaves & Penning-Rowell, 2015).

Community Capacity	Activity	Community Resilience to Flooding
Social Capital	Shared knowledge with neighbouring communities Supplied data for local council flood models Provided knowledge on which drains and ‘pinch points’ to watch during heavy rainfall Created community flood plans Created and supported flood warning systems Reported river blockages and conducted village sewer surveys Installed and tested flood sirens with flood authorities Developed more coordinated approaches and partnership plans across different flood actors Conducted joint flood exercises with local councils and the EA Provided flood recovery support to neighbours	
Natural/Built Environment Capital	Objected (and forced changes) to new building developments that would increase flood risk Integrated flood risk management and spatial planning Encouraged flood risk management to appear in land use plans Cleared and maintained ditches and watercourses Erected flood walls and barriers (property-level protection) Operated flood pumps Developed temporary water storage areas Created community flood stores with post-flood equipment Led catchment based approaches	
Human Capital	Aimed to increase flood knowledge and risk awareness in general Started education initiatives on current and future flood risk for citizens and schools Formed community support networks to help vulnerable people during and after flooding Aimed to reduce deprivation and increase health and well-being in communities	
Economic Capital	Provided flood insurance help and advice Undertook community fundraising for flood mitigation and recovery measures Attracted funding for property level protection measures and early warning systems Accessed local community funds	

Table 2.3: Flood group activities (authors’ own; interview and survey data)

Temporary physical measures such as demountable barriers, flood stores containing post-flood recovery equipment (e.g. Garforth, Hebden Bridge, Mytholmroyd and Todmorden) and water-sacks are examples of flood group actions taken to increase both local flood resistance and resilience. These demountable barriers and water-sacks focus on withstanding and resisting flooding and occur at the neighbourhood and individual property level respectively. However,

the creation of flood stores represents an acknowledgement that some flooding is inevitable and illustrates a focus on reducing the consequences of flooding.

Flood groups also influenced spatial planning in their communities from both a physical and policy-making level. For instance, at the physical level the Garforth flood group raised a bund around a playing field and secured agreement for its use as a temporary water storage area when flooding was predicted. In terms of policy-making, flood groups (e.g. Much Wenlock) were able to influence the content of their local 'neighbourhood plan', a statutory document that strongly influences local planning, to include certain local flood issues in future developments. This influence may alter the perception that future policy-makers have of local flood issues and affects the type of developments that can be undertaken in the future. The flood groups also maintained a critical eye on local planning applications for new developments and raised flood-related concerns with local councils and the EA (e.g. Much Wenlock, Garforth, Bodenham and Todmorden). In some cases they have managed to force changes to new developments, but in others their views have been taken into account but outweighed by other concerns.

Human Capital

Flood groups influenced human capital through their impacts on individual flood awareness and in supporting those deemed more vulnerable to flooding. They also provided emotional support to flood victims and acted "as a shoulder to cry on" (interview Bodenham, 2015), which is important as flood events can have a significant impact on the mental health and wellbeing of those affected (Tapsell & Tunstall, 2008).

It is difficult to specifically estimate the extent to which flood awareness and knowledge increased as a direct result of the flood groups' activities. However, it is possible to state that flood groups maintained awareness of local flood issues by handing out leaflets, publishing in newspapers, producing YouTube videos, and providing personalised flood plans with contact information. Further efforts to increase local flood knowledge were made through the use of flood group websites, an online training module and by working in schools (e.g. CCFF). Such efforts can also be argued to influence the community as a whole and to increase social capital. The existence of the flood groups also served as a reminder to local people of past flooding and of the current flood risk.

Flood groups also supported the more vulnerable, described by the groups interviewed as the elderly, infirm, those with young children, new residents to the area, and residents that are away during a flood and cannot protect their homes. The flood groups organised equipment and helped erect property-level protection measures for these groups of people, with Bodenham having a 'buddy system' that paired residents together so that they can support one another during flood events (related to internal social networks and structures as part of social capital).

Economic Capital

The flood groups interviewed attempted to influence economic capital by lobbying decision-makers and organisations to invest money into their communities to protect them against flooding (interview EA, 2015). Interviewees reported that fundraising (by member subscriptions or from accessing community grants) by flood groups also increased the economic capital available for local flood risk management activities (i.e. community funds). Flood group members without fundraising skills could potentially become marginalised (Geaves & Penning-Rowell, 2015), although at least one flood group interviewed was aware of this and included individually-tailored tasks to avoid this form of exclusion.

Flood groups were found to both positively and negatively influence availability and cost of flood insurance in the community. On the positive side, flood groups were able to act as an official voice and talk directly to insurance companies when residents had been refused flood insurance cover, which was successful in several cases. Key members were also able to use their strong personal relationships with influential individuals to gain access to heads of insurance companies and insurance brokers, and lists of potential flood insurers to distribute to their residents.

Homeowners can have difficulty in obtaining flood risk insurance or face increases in the premiums associated with such policies if they are perceived to be at flood risk (Lamond, Proverbs & Hammond, 2009). Flood insurance premiums are determined by flood risk maps, but these maps are not always reliable in areas where data on previous flooding is incomplete. On the negative side, in one flood group (name withheld), it was reported that several insurance agencies noticed that some properties were at risk of flooding based on the flood group's work and this led to an increase in insurance policy prices. Such outcome represents a common fear of residents, affecting their willingness to acknowledge their own flood risk and in some cases discouraging them from installing visible property-level protection measures.

Community Capacity and Flood Groups

The influence of the flood groups interviewed is typically based on the expansion of existing social capital, following flooding events, through networks of volunteers and facilitated by institutional support. Interventions are focused to a large extent on knowledge exchange, on the local area or on gaining financial support, and interactions around small-scale maintenance-oriented activities.

The influence of flood groups on natural/built environment capital was primarily restricted to smaller, less resource-intensive maintenance and local building protection activities as opposed to larger scale, more resource-intensive activities such as greening of the landscape and the implementation of water-sensitive urban design. The focus on smaller activities is due, in part,

to the fact that they are comprised of volunteers and run as voluntary groups with limited resources. However, a few groups interviewed also carried out more extensive activities such as an attempt to change the local landscape by developing temporary water storage areas and another to influence future urban planning by contributing to long-term strategic development plans.

Human capital influences were typically focused on increasing public flood risk awareness and supporting those that are identified as vulnerable by the flood group. The perceptions of 'who is vulnerable and why' are influenced by local flood authorities and the flood group membership, which increases the importance attached to issues of representativeness and inclusion within the flood groups themselves. The flood groups are also influencing economic capital, albeit to a lesser extent, by increasing levels of social protection through fundraising and from working to ensure insurance coverage. However, the influence of flood group activities on reducing flood insurance premiums is still low due to doubts from insurers over flood group effectiveness in increasing flood resilience and reducing potential flood losses.

2.6. Conclusions

This chapter focused on the influence and potential role of civil society, through flood groups, on community resilience to flooding in England. While flood groups in England are increasing in number and carrying out a diverse range of activities, there is limited research available on the nature of such flood groups and their potential influence on community resilience to flooding. The goal of this research was to provide a working definition for flood groups, introduce their governance arrangements and explore the ways the groups might influence community resilience to flooding. A survey with 40 flood groups and semi-structured interviews with national actors and six selected flood groups provided a basis for reaching these goals.

The flood groups interviewed were all formed in response to a flood event and were predominantly made up of members of the public living in the affected areas with an interest in flooding but without a paid position with a formal flood actor. The flood groups were found to actively interact with other formal flood risk management actors. This chapter discussed the role of these flood groups on community resilience to flooding via their influence on: the community's social connectedness (social capital), the spatial planning and physical characteristics in the community (natural/built environment capital), the capabilities of individuals (human capital), and the economic resources available in communities (economic capital).

The flood groups interviewed were predominantly contributing to expanding communities' social capital and connections with institutions as well as supporting vulnerable individuals and

raising flood risk awareness (human capital). The research suggests a focus on knowledge exchange by the flood groups interviewed. Their influence on natural/built environment capitals was restricted to smaller, less resource-intensive activities, which were strongly dependent on the local context and limited by resource availability. More extensive flood resilience activities such as greening of urban areas or advancing water-sensitive urban design were relatively ignored by the flood groups interviewed and surveyed. However, some more strategic activities such as the development of temporary water storage areas and contributing to long-term strategic plans were undertaken by some flood groups. The influence of the flood groups on economic resilience was limited to fundraising and supporting citizens in gaining flood insurance.

When discussing the contribution of flood groups to community resilience to flooding, the findings of this research highlight that it is important to be critical towards the extent to which a community can be fully represented by community groups (Coates, 2015; Wilson 2012). Flood groups were indeed found to not always represent the full community they intended to represent. Some of the flood groups interviewed included mainly older individuals and retirees, partly due to the voluntary nature of the groups. Community members without the time to volunteer or individuals with different perspectives were excluded. However, some flood groups seemed to be aware of these issues and some were attempting to ensure broader representation and maximising representativeness.

The increasing importance of the concept of resilience in flood risk management alongside the increasing emphasis on self-reliance of communities, via flood groups among others things, in government policies raises questions about whether the state is retreating from its existing responsibilities and reallocating accountability (Davoudi, 2012; Geaves & Penning-Rowsell, 2015). This research found indications of local government retreating (e.g. in relying on voluntary flood groups to maintain local watercourses), but also of the local state going beyond their assigned duties (e.g. by providing additional time and expertise to support the flood groups).

To conclude, this chapter has found that there is value in being receptive to flood groups within the local flood risk management landscape. The following summarises the ways that flood groups were successful in adding value to the local flood actors, the community itself and the individuals within the community: Firstly, they acted as an important local knowledge resource and provided information that local flood actors would not have otherwise been able to access. Secondly, they allowed the community to have a role in the prioritisation and decision-making processes relating to local flood risk management activities. Thirdly, the flood groups played an important role in activating local individuals and creating active flood risk managers, either by

being members of or interacting with the flood groups. Fourthly, their existence also acts as an informal reminder of current local flood risk. This influence on flood risk awareness could be especially useful for countries with high flood risk but relatively low public flood risk awareness, such as in the Netherlands. These four ways in which the flood groups added value can also be useful to other countries that are exploring approaches to increase citizen involvement in local flood risk management to support the transition from technocratic, top-down governance approaches to more bottom-up, citizen supported approaches to flood resilience.

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CHAPTER 3

Civil society contributions to local level flood resilience: Before, during and after the 2015 Boxing Day floods in the Upper Calder Valley

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Abstract

There is an increasing emphasis on the local level as well as growing expectations regarding civil society actors in flood-risk management in the UK. However, not enough is known about the potential contributions of civil society to flood resilience at the local level. This paper addresses this knowledge gap by conceptualising flood resilience at the local level across three phases inherent to flood disasters: pre-flood, during the flood and post-flood. These phases act as the foundation for this paper's exploration of the contributions of civil society to local-level flood resilience. Data were collected before, during and after the 2015 Boxing Day floods through interviews (in 2015 and 2017) and from secondary data sources. The paper identifies the importance of time and place when analysing civil society contributions to local level flood resilience. These contributions were dynamic over time with a strong initial response that diminished over time due to apathy, “active forgetting” and lack of further exposure. Exposure and a sense of community strongly influenced civil society contributions to flood resilience in the Upper Calder Valley. Issues of representation and varying place-based capacities were also identified as relevant for flood resilience-based policies. These results have larger implications for our understanding of the contributions of civil society actors to flood resilience and suggest that while they can deliver better local context-specific approaches, there needs to be caution over the long-term sustainability and longevity of their contributions.

Keywords

Civil society; England; flood groups; flooding; resilience

3.1. Introduction

Flooding is becoming an increasingly urgent societal issue that will worsen in the future. Recently, European countries have experienced damaging flood events, the causes of which can be broadly grouped into issues relating to: a lack of “conscientious planning” (Restemeyer, Woltjer & Van den Brink, 2015, p. 45), urbanisation (Hegger et al., 2016) and outdated infrastructures (Scott, 2013). These causes are expected to be exacerbated by climate change-induced impacts such as increases in the duration, frequency and intensity of high precipitation events, and sea-level rise (Hegger et al., 2016; Restemeyer et al., 2015).

It is not only the intensity and frequency of flooding that is changing, but also the flood-risk management (FRM) approaches applied in practice. In the last few decades, there have been two important shifts in FRM approaches. The first shift that FRM is experiencing relates to the changing roles and responsibilities of both public and private actors. There has been a change in the actors involved with a shift from “government” to “governance” and a greater role for non-state actors (Mees et al., 2016; Meijerink & Dicke, 2008). In England, there has been a shift towards spreading FRM responsibilities across a broader range of actors in addition to the state (Johnson & Priest, 2008; Nye, Tapsell & Twigger-Ross, 2011) and a greater relevance of the local level in FRM since the 1990s (Begg, Walker & Kuhlicke, 2015; Coates, 2015; Twigger-Ross et al., 2014). As part of this shift, there has been an increased focus on empowering and increasing the role of local non-state actors, such as citizens and communities, especially at the local level (Begg et al., 2015; Forrest, Trell & Woltjer, 2017; Johnson & Priest, 2008; Nye et al., 2011). The combination of increasing flood events, non-state-actor involvement in FRM and emphasis on the local level has led to a growing relevance of civil society in FRM.

The second shift is the growing prominence of the “resilience” approach in FRM theory and practice (Restemeyer et al., 2015). In many European countries, over the last few decades, the policy discourse on FRM has been moving from a focus on flood-defence systems based on flood-risk “certainty” towards a more holistic flood-resilience approach, acknowledging that floods cannot always be prevented, but their impacts can be reduced (Meijerink & Dicke, 2008; Nye et al., 2011; Schelfaut et al., 2011; Scott, 2013). The concept of flood resilience also accommodates the growing uncertainty associated with flood risks due to climate change and relates land use with anticipated damages, which is especially attractive to planners (Restemeyer et al., 2015; Woltjer & Al, 2007). This focus change from prevention to anticipation gives more importance to social and spatial measures, which shifts the emphasis to also include interventions before and after a flood event. A strong emphasis emerges on the element of “time” in preparing places for flooding as well as dealing with the actual flood event and its consequences. Hence, in order to understand civil society contributions to local level flood resilience, this paper considers “time”

as a central factor and therefore discusses the civil society contributions by examining three disaster phases: pre-flood, during the flood and post-flood.

Although the two shifts outlined above show a growing role for citizens and a transition towards flood resilience, there has been limited research conducted into the contribution of civil society to flood resilience. In order to understand the contributions of civil society to local flood resilience, the paper will investigate a specific case: the 2015 Boxing Day floods in the Upper Calder Valley, England. This area has experienced multiple flood events in recent years and has evidence of civil society involvement in FRM. In order to explore civil society contributions to flood resilience before, during and after flooding, the paper draws on interviews conducted before (in May 2015) and after (in January 2017) the 2015 Boxing Day floods, supplemented by secondary data sources from during and in the immediate aftermath of the flood.

The paper will first discuss civil society and flood resilience and develop a conceptual framework. Data will then be presented and analysed in order to identify and explore the contributions of civil society to flood resilience in the Upper Calder Valley. Finally, the theoretical, policy and practice implications for local flood resilience, based on the findings, will be discussed.

3.2. Conceptual Framework: Civil Society and Flood Resilience

3.2.1. Civil society's role in FRM

Civil society can be conceptualised as consisting of actors and groups that are non-state, formally or informally constituted, and can be part of the voluntary sector (McIlwaine, 2009). Civil society can also be understood in terms of processes, with Aldrich (2012) associating it with social capital and social networks. Furthermore, Aldrich & Crook define civil society in terms of “networks of trust and reciprocity among citizens” (2008, p. 379) at different scales: these networks can allow issues to be aired in the public arena and can support a strong civil society in pressing for authorities to take action (Jalali, 2002). Conversely, a weak civil society, which is fragmented, hard to mobilise and contains weaker social bonds, may put up less resistance in the face of controversial state decisions (Aldrich & Crook, 2008).

Based on the above, when exploring civil society contributions to flood resilience, this paper understands civil society at the local level as: consisting of social networks of non-state actors, individuals as well as formal/informal groups, acting voluntarily, that are (directly or indirectly) involved in FRM.

There is evidence of civil society playing different roles in local FRM, e.g., contributing knowledge, skills and political/economic resources and capacities (Coates, 2015; Forrest et al., 2017), and encouraging knowledge exchange between authorities and citizens (Cheshire, 2015; McEwen & Jones, 2012). Civil society can also challenge expert flood-risk knowledge, as done by

local flood groups (Forrest et al., 2017; Smith, Porter & Upham, 2017) and communities (McEwen & Jones, 2012) in England. Civil society involvement can also ensure that local, context-specific post-flood needs are met (Rumbach, Makarewicz & Németh, 2016).

3.2.2. Flood resilience

The “resilience” concept originated in the engineering and environmental sciences before being adopted by a range of different disciplines, including disaster management and planning (Trell et al., 2017). This paper refers specifically to “flood resilience,” which can be framed from engineering, ecological or evolutionary perspectives in theoretical discussions (Hegger et al., 2016; Liao, 2012; Twigger-Ross et al., 2014; White & O'Hare, 2014). The engineering perspective is more functionalist, focusing on resistance and a post-flood return to equilibrium (Liao, 2012; Matthews, Sattler & Friedland, 2014). This engineering perspective is commonly used, although not always explicitly described as such, tending to be measured at single points in time and to be quantified in terms of the ability or speed of the system to recover/return to its pre-flood state (Davoudi, 2012; Matthews et al., 2014). This perspective of recovery/return to the pre-flood state can be identified in definitions that refer to post-flood maintenance of the same structures and processes (e.g., in Haase, 2013), which may lead to the reproduction of pre-flood vulnerabilities (Twigger-Ross et al., 2014).

Conversely, ecological and evolutionary perspectives are more dynamic, focusing on adaptability and transformability of a system, emphasising notions such as flood-ability and reorganisation (Liao, 2012; Matthews et al., 2014). Adaptation describes incremental changes that occur within the existing system and draws on characteristics such as flexibility and resourcefulness (Davoudi, Brooks & Mehmood, 2013). Transformation instead describes larger changes “fundamentally altering the nature of the system,” which can include a reorganising and restructuring of the existing system (Walker et al., 2004, p. 2) and creating “a new way of making a living” (Folke et al., 2010; Walker & Salt, 2012, p. 20). Transformation may be seen as relatively long-term changes with characteristics including a need for innovation (Davoudi et al., 2013). It includes “shifts in perception and meaning, social network configurations, patterns of interactions among actors including leadership and political and power relations, and associated organizational and institutional arrangements” (Folke et al., 2010, p. 5). These non-engineering perspectives reject the idea of only a single equilibrium state being available, and of “returning to normal,” and can be further described as ecological or evolutionary, both of which involve the idea of “bouncing forward” and the transition to a “better” state with elements of learning (Davoudi et al., 2013; Hegger et al., 2016). Ecological resilience is non-linear and understands that a disruption will lead to the system moving to one of multiple equilibria available. In contrast, evolutionary resilience emphasises continual change as opposed to reaching the stability of an equilibrium (Davoudi et al., 2013).

These different, and often competing (i.e., resisting or embracing change), perspectives result in problems when translating resilience into policy-making and practice. The theoretical ambiguity and a consequent lack of guidance on resilience in practice has led to a focus on short-term, reactive approaches and “optimistic rhetoric” as opposed to more transformative, longer-term thinking (Davoudi, 2012; Twigger-Ross et al., 2014, p. 2; White & O'Hare, 2014). Furthermore, resilience is often assumed to be a positive attribute/goal with limited reflection on who benefits and who loses (Davoudi, 2012; White & O'Hare, 2014). Issues of power dynamics and justice affect the operationalisation of resilience in practice, but there are limited reflections of these issues, partly due to the natural science origins of resilience (Twigger-Ross et al., 2014; White & O'Hare, 2014). Consideration of these issues requires attention to the varying capacities and resources of individuals and communities and their representation in resilience approaches (Coates, 2015; Forrest et al., 2017; Restemeyer et al., 2015).

This paper considers the above issues in developing a conceptual framework that considers civil society contributions to local flood resilience as withstanding and then recovering from flooding in the traditional engineering perspective of resilience. Furthermore, the paper also integrates aspects of ecological and evolutionary resilience to also consider the potential for civil society contributions to cause changes in place, as opposed to the local level focusing on “returning to normal,” in the form of adaptation and transformation. In discussing and integrating these perspectives into a conceptual framework, the paper aims to also address previous concerns (e.g., White & O'Hare, 2014) over the lack of theoretical clarity when providing frameworks for understanding flood resilience in practice.

3.2.3. Analysing flood resilience over time

In disaster-management literature, the time relative to the disaster is commonly used for the analysis. This paper adopts a similar approach and designates the flood disaster as the central point of the flood resilience analysis. The flood disaster is understood as the moment the natural hazard (e.g., flooding) meets a social system and its vulnerabilities (Wisner et al., 2004). This approach recognises the role of existing vulnerabilities and weaknesses that are exposed by a flood hazard. Understanding a flood disaster in this way acknowledges the significance of social systems in the production of disasters and allows greater focus to be placed on how planners and policy-makers need to continuously consider and engage with existing social systems and not focus only on resistance measures. This approach also considers the pre-disaster phase, in addition to the during- and post-disaster phases.

Following this logic, this paper understands flood resilience as the capacity of actors at the local level to mitigate and prepare (pre-flood), to resist and respond (during the flood), before being able to recover from, adapt and transform after a flood event (post-flood). This approach can

help to better highlight opportunities and shortcomings of civil society contributions and produce an understanding of the potential contributions of civil society to local flood resilience. This definition is visually represented through phases (Figure 3.1), such as pre-flood (no immediate danger; flood imminent), during flood (withstanding floodwater; response to defence failures) and post-flood (immediate recovery; longer-term recovery). It is important to note that all of these phases continuously cycle from one to another in a loop and the moment when the post-flood phase becomes the pre-flood phase will depend on the time between flood events. Although the overlap creates a “grey area” between the two phases, it does help to illuminate the contributions of civil society across the disaster cycle as a whole.

The pre-flood phase (Figure 3.1) includes mitigation, comprising “pro-action” and “prevention,” and preparedness (ten Brinke et al., 2008; Khalilia, Harre & Morley, 2015; Messer, 2003; Schelfaut et al., 2011). The pro-action mitigation focus is on spatial planning measures to eliminate “structural causes of ... disasters” and to prevent disasters from occurring at all (ten Brinke et al., 2008, p. 94). They can include building restrictions in high-flood-risk areas (ten Brinke et al., 2008), land use controls, the incorporation of sustainable urban drainage systems and stronger building codes (Messer, 2003; White, 2010). Prevention measures aim to control the hazard to avoid flooding (Thieken, Kreibichm & Müller, 2007) and focus on the development of physical areas, such as nature-based approaches to reduce flood risk, embankments and sea walls.

Preparedness focuses on building capacities of citizens and institutions in order to have an effective response to potential flooding (Messer, 2003). When there is no imminent threat the focus is on the promotion of community action and flood-risk awareness (Schelfaut et al., 2011), as well as the creation of evacuation plans and the pre-stocking of relief items (Messer, 2003). When a flood is imminent, this focus changes to moving assets out of harm's way, erecting property-level protection (PLP) measures and disseminating flood warnings (Thieken et al., 2007).

Figure 3.1: A representation of local level flood resilience and the potential contributions by civil society. (Source: Author)

The during-flood phase (Figure 3.1) includes robustness (Restemeyer et al., 2015) and responses to the flood (Thieken et al., 2007). Robustness is the ability of the local structures/infrastructure to withstand flooding and is underpinned by previously mentioned mitigation measures. The response focuses on minimising the potential consequences of actual flooding and can include using search and rescue teams (Messer, 2003) and pumps to reduce the spread of flooding with the aim of safeguarding people and limiting asset losses.

The post-flood phase (Figure 3.1) includes the immediate recovery process, namely restoring utilities and services, and repairing flood-damaged buildings and infrastructure (Messer, 2003), setting up emergency centres, providing immediate aid and cleaning/decontaminating property. Longer-term recovery includes rebuilding and may mean adjusting the local level so that, while flooding occurs, it does not cause substantial damage (Restemeyer et al., 2015).

There are ongoing changes (Figure 3.1) that influence local level flood resilience and are not contained within a single phase. These refer to social processes that are not necessarily related to FRM, but could influence local level flood resilience in terms of mobilising and organising the capacities of local level actors. These could include changes in social capital, social networks, community spirit, place attachment, and access to social resources (Aldrich, 2012; Aldrich & Crook, 2008; Cutter, Burton & Emrich, 2010; Jalali, 2002). These capture the connection between individuals, their local context and communities (Coates, 2015; Cutter et al., 2010). These issues are relevant in the context of local FRM as those more strongly connected are likely to be involved in civil society groups to provide resources and “neighbourly” support. However, these

social processes may also have negative impacts at the local level. For example, the strengthening of social capital may also lead to the exclusion of certain citizens, the creation of powerful community voices at the expense of others, and the curtailing of participation (Rydin, 2016). These unequal power dynamics and potential for exclusion support the need for greater attention to power and reflection on resilience of what, to what, for whom, to what purpose, and who gets to decide (Carpenter et al., 2001; Davoudi, 2012; Lebel et al., 2006).

Ongoing changes also include the accumulation and retention of flood memories and lay knowledge, which are important for flood resilience but tend to fade over time (McEwen et al., 2017). Social processes can allow the transfer of lay knowledge vertically between generations and horizontally within social networks, which can also be understood as social learning (McEwen et al., 2017). However, lay knowledge may conversely result in uncertainty over appropriate FRM actions or more optimistic (but unrealistic) assessments of flood risk (Twigger-Ross et al., 2014) and may need refining by experts (McEwen & Jones, 2012) to prevent maladaptation. The potential for learning or the capacity to learn, which is referred to in several flood resilience definitions (e.g., Haase, 2013; Liao, 2012), is an important part of adaptation and transformation in evolutionary resilience.

In addition to the three time phases outlined above, this paper will therefore pay attention to the ongoing changes, to identify and analyse the contributions of civil society to local flood resilience.

3.3. Research Methodology

Data were first collected in the Upper Calder Valley in May 2015 as part of an attempt to better understand the role and relevance of flood groups for flood resilience across England (see Forrest et al., 2017). However, after the initial data collection, several towns in the Upper Calder Valley experienced devastating flooding during Boxing Day (26 December) 2015. This presented an opportunity to explore not only the contributions of civil society to local level flood resilience in preparation for a potential flood event, but also their contributions during and after the disaster.

Interviews were held before the floods in May 2015 and again one year after the floods in Todmorden, Hebden Bridge and Mytholmroyd (Table 3.1). The first round of interviews were conducted after the 2012 floods, but were framed around a reasonable expectation of future flooding, set in a context where the interview focus was on measures that could reduce the consequences of future flooding. The second round of interviews was held in the post-2015 flood period, but the respondents were explicitly asked (during regular as well as the walking interviews) to reflect on the time of the actual flood events and activities by civil society actors in retrospect. Walking interviews allowed interviewees to visit and connect to local places with

their flood experiences and reflect on the flood event better in retrospect (see Trell & Van Hoven, 2010). To explore changes in experiences, activities and perceptions, the aim was to interview the same individuals/organisations in 2015 and 2017 as well as interviewees from national/regional levels with relevant knowledge of the Boxing Day flood event in the Upper Calder Valley. Interviews were recorded and transcribed with permission from interviewees. The transcripts were deductively coded along the three disaster phases (Figure 3.1) using ATLAS.ti qualitative data analysis software.

Organisation	Number of Interviewees	
	2015	2017
National Level		
Defra ^b	1	-
National Flood Forum ^a	1	1
Regional Level		
Environment Agency (EA) ^b	1	2
Calderdale Council ^b	1	2
VBA (a joint venture of VolkerStevin, Boskalis Westminster and Atkins)	-	1
Treesponsibility ^a	-	2
Community Foundation for Calderdale ^a	-	1
Local Level		
Mytholmroyd Flood Warden ^a	1	1
Hebden Bridge Community Association ^a	-	1
Hebroyd Flood Group ^a	2	2
Todmorden Flood Group ^a	2	2
Local Residents (not flooded) ^a	-	2
Total	9	17

Table 3.1: Interviewees overview ^aCivil society. ^bState organisations. (Source: Author)

There are inherent considerations relevant to collecting data during a disaster event and in the immediate aftermath: from the ethical perspective, flooding is a traumatic event and those affected need privacy to deal with it; pragmatically, the unpredictable nature of disaster events means that researchers cannot (and perhaps should not) plan to be present. Due to the traumatic nature of a flood event, we waited a respectful period of time after the floods to conduct the second round of interviews, which collected data for both during the flood and post-flood phases. Interviewees' memories of traumatic flood events may change over time and therefore the post-flood phase interview data about civil society contributions during the floods in the immediate aftermath were triangulated using secondary data sources.

These secondary sources reported on civil society contributions during the flood and in its aftermath and were newspaper articles and data from Facebook. Relevant newspaper articles were found through the Lexis Nexis Academic database. A limited time-period (25/12/15–15/01/16) was chosen to identify information reported during the flood and its immediate

aftermath. Originally, 174 articles were identified, which reduced to 73 results when grouped by moderate similarity. Only a small number of these articles explicitly focused on civil society contributions in the towns of interest, which led to the selection of six key articles for the analysis. To capture local activities at the time of the floods, we also analysed posts in the public Facebook Group, “Calder Valley Flood Support Group”: we only reviewed posts made by known flood wardens in the three towns.

Additional data for all phases were collected by attending the Community Foundation for Calderdale (CFFC) AGM, and from documents and local websites (e.g., Calderdale Flood Commission, 2016; HebWeb, 2016) recommended by the interviewees.

3.4. The 2015 Boxing Day Floods

The Upper Calder Valley is located in West Yorkshire and consists of several towns located along the River Calder. This paper focuses on the three towns of Todmorden, Hebden Bridge and Mytholmroyd, which are affected by flooding from the river and hillside surface run-off. River flooding is exacerbated by heavy rainfall and can overspill into nearby canals that are then overwhelmed.

The three towns experienced minor flooding incidents between 2005 and 2011, severe flooding in 2012 and a “near-miss” in November 2015, before all being flooded in the 2015 Boxing Day floods. The three towns experienced less rain in the 2015 Boxing Day floods than in 2012, but the 2015 floods were preceded by large volumes of rain in November and December that saturated the ground and led to both river and surface water flooding. The Boxing Day floods were described as “extreme” by several interviewees, including one from the Environment Agency (EA). The flood impacts included electricity and gas being cut off, assets (e.g., sheds, household goods and business equipment) being washed away, damaged buildings (Figure 3.2a), residents being trapped in their homes due to floodwaters and the sludge that remained after they receded, and local transport routes becoming impassable.

Figure 3.2: (a) The floods did considerable damage to the buildings and roads in Mytholmroyd. (b) Watermark poster with words describing the 2015 floods. (c) Reminder of the 2015 floods. (d) Tree-planting on a slope. (Source: Author)

In addition to the civil society actors interviewed, the research identified flood groups created in response to the 2015 floods (e.g., Slow the Flow), the Calder Valley Search and Rescue Team, and regional/national-level volunteers as civil society actors that were relevant in contributing to local flood resilience. Flood groups in Hebden Bridge, Todmorden and Mytholmroyd formed after the 2012 floods with financial support from Defra's Flood Resilience Community Pathfinder Scheme, which focused on planning for future flooding through community action (Twigger-Ross et al., 2014). This led to Calderdale Council and the EA supporting the flood groups with help-in-kind and expert knowledge (Forrest et al., 2017). However, it was reported that this support was waning at the time of interviews in June 2015 as there had not been further floods since 2012. The EA also provided flood wardens with training on monitoring river levels and then reporting flood risks to the EA.

3.5. Civil Society Contributions to Local Level Flood Resilience

3.5.1. Pre-flood

No flood imminent

There was evidence of NGOs (e.g., Treesponsibility) contributing to pro-action measures regarding changes to spatial planning. The NGO was involved in small-scale nature-based approaches, such as tree-planting, thereby contributing to flood resilience (Figure 3.2d). Civil society actors interviewed were found to have only limited involvement in prevention measures and were not involved in typical FRM issues like sustainable urban drainage or developing embankments.

The data showed that civil society actors were prominently involved in preparedness measures aimed at building capacities of citizens and institutions to improve responses. Local flood groups were found to be advocating policy on FRM and pre-stocking relief items in “flood stores” in the three towns. These flood stores were metal containers located at strategic points across the towns with equipment such as sandbags, road diversion signs and cleaning/decontamination equipment. The equipment varied in each town and depended on the choices made by the local flood groups, which is an example of civil society being able to ensure context-specific flood needs are met (see Rumbach et al., 2016). These groups also encouraged the installation of PLP measures and the modification of properties (e.g., hard floors and raising items) to reduce damages from flooding. Furthermore, local flood groups and flood wardens also contributed to local flood-risk awareness through Facebook pages, publicity events and flyers.

Flood imminent

Civil society actors contributed to preparedness as it became evident that a flood was imminent. In the days leading up to the Boxing Day floods, flood wardens and flood-group members reported going door-knocking with businesses to warn them about the likelihood of flooding in Hebden Bridge and to encourage them to put flood gates up and move things higher up.

There was evidence of civil society actors’ contribution to flood preparedness and prevention on the night before the Boxing Day floods. Interviewees reported that local flood groups and flood wardens encouraged citizens to move their assets to safe places out of reach from the floodwater, which was confirmed by secondary data sources (CVFSG, 2015). Flood sirens alerted local residents to the potential for a flood event and approximately 40 of them assembled in the town centre. A Hebden Bridge flood warden reported organising these volunteers in erecting temporary barriers (i.e., prevention) to protect the terrace houses and premises along Market Street.

Both the communication of flood warnings and the mobilisation of these volunteers for erecting barriers were important civil society contributions. Local authorities were not able to do this and it was made possible as these civil society actors lived locally, were able to act on short notice and during a public holiday, and were more able to activate and use the informal social networks in their towns.

3.5.2. During the floods

Withstanding floodwater

Local flood wardens and flood-group members erected temporary barriers and activated PLP measures, installed after the 2012 floods, in response to the imminent flood. There were cases of temporary barriers and PLP measures being overtopped overnight due to the sheer volume and pressure of water. In some areas, these were still withstanding the floodwater during the morning on Boxing Day, and local flood wardens and residents monitored and reinforced them with sandbags and sheeting from the flood stores where possible. Interviewees and secondary data sources reported that civil society actors were able to monitor these defences, but that they were not able to monitor them during the entire night (CVFSG, 2015).

Response to defence failures

Flood-group members reported that they had a limited role in this phase as many were themselves flooded, although secondary data sources show that they supported road closures and helped neighbours (CVFSG, 2015). Local flood wardens were able to respond to the failure of permanent and temporary flood defences by acting as “local leaders” and directing residents in their attempts to use plastic sheeting to reduce flooding and traffic cones to cordon off roads. Interviewees and secondary data sources (CVFSG, 2015; Taylor, 2015) reported that flood wardens and voluntary search-and-rescue teams also supported in monitoring and evacuating elderly residents from flood-affected areas. At this point “outside” help was not available and the three towns relied on local volunteers, citizens and the flood stores.

Civil society actors were also involved in communication and fundraising when the flood defences failed. Interviewees and secondary data sources show that local flood wardens continued to update residents and the EA about the flood conditions in Todmorden and Mytholmroyd (CVFSG, 2015). However, flood wardens in Hebden Bridge were unable to report their flood conditions as landline and mobile phone systems were disrupted. During the CFFC AGM it was described how the CFFC also started an online flood fund to collect donations for flood-recovery efforts at the onset of the flooding, which was also shared by flood wardens on Facebook.

3.5.3. Post-flood

Immediate recovery

Local residents were the “first responders” (similarly found by Masterson et al., 2014) as “traditional,” but non-local, emergency responders were not able to reach towns for up to 36 hours after the flooding began due to disrupted transport connections. Interviewees and secondary data sources reported that citizens had to rely on themselves to recover in the immediate aftermath: restoring utilities and services back to their previous pre-flood state, helping to remove flood debris and cleaning flood-contaminated buildings (Ashworth, 2016; CVFSG, 2015). It was reported that “Hebden Bridge flood volunteers ‘became an anchor’ for victims” (Ashworth, 2016, n.p.) and interviewees believed that the timing of the flood event in the Christmas holiday period was important: there was an enhanced ability to access nearby social networks and resources as many residents, including tradespeople, were not working and instead able to support the recovery.

In the absence of local authorities, the local flood-group members and flood wardens reported being seen as sources of flood knowledge by residents who were reported to have sought them out for advice. At first, these efforts emerged in a largely uncoordinated way and appeared to be examples of self-organisation as seen in the aftermath of previous disasters (see Comfort, 1996):

“People got the town hall open, the trades club open, people were out in the streets helping ... It was an anarchic operation in the way that everyone came together” – Treesponsibility

Interviewee, 2017

Tierney (2014, p. 235) reports that “resilience is achieved when novel behaviors, groups, and networks emerge that are responsive to disaster conditions.” In the immediate recovery, interviewees and secondary data sources (Ashworth, 2016; HebWeb, 2016) reported examples of networks and groups emerging through the unplanned creation and operation of emergency centres called “flood hubs” by networks of different civil society actors (flood groups/flood wardens, community foundations, community associations and local residents) in each of the three towns. The flood hubs “sprang up” (HebWeb, 2016, n.p.) and were an example of the emergence of novel behaviours and improvisation to the flood conditions: their unplanned usage arose because many of the council buildings and large buildings were flooded. The flood hubs became focal points in the immediate recovery for both volunteers to mobilise from and for donations in Hebden Bridge, Todmorden and Mytholmroyd.

The flood hubs embodied many traits associated with transformation, such as innovation (Davoudi et al., 2013), changes in patterns of interaction and organisational arrangements (Folke et al., 2010), in addition to changing the nature of the system (Walker et al., 2004) in that civil

society actors were taking leadership roles in the absence of state actors. However, the flood hubs existed as a temporary transformation in response to the dramatic local level (i.e., system) change as a result of the floods. Over the following weeks and months, the dramatic local level change had faded and while they had served a particular purpose in the immediate recovery, they then “deactivated” when they were no longer needed. The flood hubs acted as a source of help “inside” the flood-affected areas for when “outsiders” were not able to access the towns.

Interviewees from civil society, the EA and local council all reported that regional/national-level volunteers, both individually and as part of organisations such as Khalsa Aid, travelled from across England to the flood-affected areas to support the recovery. This highlights the important fact that flood resilience at the local level does not exist in its own contained “bubble,” but is influenced by multiple scales. The role of social media and online fundraising platforms, in allowing details of the flood event to be broadcast beyond the local level through Twitter and in allowing regional/national-level actors to pledge financial assistance online, supported local civil society contributions. Flood-hub volunteers also used Facebook groups to offer help to local residents as well as to communicate live updates and advice on how to access help.

The CFFC AGM reported that there were online donations, including from the UK Government (£1.5 million match-funded), to the CFFC’s online flood fund that raised a total of £3 million. Some of these funds were distributed relatively quickly to individuals, as cash payments for repairs and replacement of damaged items, despite uncertainty over the exact flood damages (reported at the CFFC AGM). The CFFC did not need to conduct damage assessments before distributing funds, unlike local authorities, and were therefore able to distribute the funds more quickly and with greater flexibility.

Longer-term recovery

Civil society actors were involved in the longer-term recovery with activities that aimed to support “bouncing forward” and ongoing changes. The CFFC AGM reported how the CFFC used part of the online flood fund to create the “WaterMark” (Figure 3.2b) and “FloodSave” schemes, both of which aim to raise funds in anticipation of the next flood event. These schemes are examples of adaptation to flooding as they are incremental changes that contribute to the local level’s flexibility and resourcefulness so that the impacts of future flooding can be lessened. The UK Government’s matching-funding is an example of the state-backed efforts that are needed to support civil society actors and allowed the CFFC to actively build up financial reserves for future flood events: however, smaller civil society actors may struggle to do the same.

There was evidence of reorganising and restructuring (i.e., transformation as described by Walker et al., 2004) of the local level in terms of the institutionalisation of flood hubs into formal emergency plans. Furthermore, there was evidence of shifts in social network configurations and

institutional arrangements (i.e., transformation as described by Folke et al., 2010) in the creation of new civil society groups post-flood (e.g., Slow the Flow Calderdale and the Catchment Flood Studies Network). This shows an ambition to change the existing systems and for local residents to take a greater role in contributing to local flood resilience, as well as to challenge the previous FRM role of citizens.

Shifts in perception and meaning are examples of transformation given by Folke et al. (2010), which in this context would refer to changes in local citizens' flood-risk awareness. Interviewees reported that the 2015 Boxing Day floods and the previous 2012 floods both led to increases in flood-risk awareness. However, this appeared to be a short-lived, temporary transformation, with interviewees in both 2015 and 2017 reporting that citizen apathy regarding flooding and the flood groups' work had become more prominent as time since the flood increased. One interviewee attributed this to a mixture of both citizen beliefs that "somebody else will sort it out" and that citizens were so anxious and frightened by the floods that they wanted to ignore the issue of flood risk. The latter is also a sign of "active forgetting," where those affected by flooding actively repress their memories of the event or defer responsibility for FRM to others (McEwen et al., 2017; Twigger-Ross et al., 2014). Flood groups and flood wardens were also trying to persuade citizens to take greater responsibility for their own flood risk and for them to put preventative measures into place before a flood. However, an interviewee reported a sense of complacency among local citizens:

"Very much a feeling that it wouldn't happen again, it'll be alright ... Even now, when you talk to people in the valley, they're like oh, floods, yeah that happened didn't it. Unless you've been physically affected by it, lost your business, your house, or had someone affected by it, people forget about it really quickly" – TFG Member, 2017

3.5.4. Ongoing changes to local level flood resilience

Civil society actors influenced the ability to mobilise and organise the networks of social resources that exist at the local level. These were mainly through changing social capital and networks, as well as community spirit, all of which were reported as being important in the flood (Figure 3.2b). Interviewees reported that there were changes in social network configurations and patterns of interactions (i.e., transformation as described by Folke et al., 2010) through the door-knocking and Facebook activities of the flood groups and flood wardens. There was also evidence of social networks being "activated," in the sense that they existed in a loose form, but came into use in response to the 2015 flood event. For example, both flood-group and flood-warden interviewees reported that neighbours sought advice from them as they knew about their flood-group and flood-warden roles. A sense of community spirit (i.e., residents sharing resources and supporting each other) among those affected or at flood risk was also formed

online through Facebook groups, such as the “Calder Valley Flood Support Group” (CVFSG, 2015).

The creation of new citizen initiatives and groups was a result of citizens being more involved and creating new networks. However, in the case of one town, interviewees familiar with both the existing and new group reported conflicts between them, which were influencing their ability to collaborate and contribute to flood resilience at the local level. These conflicts were driven by questions surrounding which individuals get to decide the way in which FRM activities are undertaken (Davoudi, 2012) and on who is able to participate and lead them.

Civil society actors sought to support the accumulation and retention of flood memories and lay knowledge throughout the phases. The flood groups and flood wardens initiated activities to increase flood-risk awareness at the local level through their “Eye on Calderdale” website and the running of open information sessions. The links fostered by the Pathfinder scheme meant that the flood groups supported the exchange of knowledge between local citizens and the EA:

“The EA want us to be eyes and ears on the ground, and passing their info down to local people and us passing info back up to them” – HFG Member, 2017

This contribution to knowledge exchange can be something that local authorities struggle with as they do not always have the same types of personal relationships with citizens. Therefore, this civil society contribution is contributing to local level flood resilience in a manner that local authorities are not able to do as well. However, state actors interviewed were aware that the flood groups may miss people and their needs as they may not be in the same social networks or may choose not to engage.

The flood groups also provided a way for local citizens with relevant lay knowledge, such as on drainage systems, to share their knowledge with other local citizens. There were also attempts by the CFFC to encourage “active remembering” (McEwen et al., 2017) by placing quotes from the floods and other reminders in the town hall (Figure 3.2c), by having a small art exhibition on the floods in the town hall and by displaying newspaper articles about the flood impacts. However, the use of local knowledge of previous flooding to guide future flood-risk protection measures led to maladaptation with the overtopping of the PLP measures.

In addition to these forms of social learning, there was evidence of medium-term learning with the flood stores (i.e., the need to stock more supplies and to use whiteboards to communicate with other volunteers). Longer-term measures include Calderdale Council's development of a new communications system that can withstand future flooding and the formalisation of the flood-hub role in preparation for future hazard (not limited to flooding) events. The CFFC AGM

reported that their fund, in creating FloodSave and Watermark, is learning from the impacts of the 2015 floods and supporting appropriate adaptation measures.

3.5.5. Critical considerations: Civil society and flood resilience

In terms of the sustainability of civil society contributions, interviewees identified time pressures for volunteers (e.g., attending meetings with formal actors) and volunteer fatigue as obstacles that they faced. Volunteers interviewed were motivated to volunteer by their desire to help their local place and communities to be better prepared and able to handle future flooding. Involvement in civil society, in flood groups or as flood wardens, was dynamic, with low levels in the pre-flood phase. During this phase, flood groups in Mytholmroyd and Hebden Bridge merged to form HFG due to a lack of volunteers from Mytholmroyd: some volunteers felt that they were not getting “enough traction” with local authorities and decided to stop. The Boxing Day 2015 flood event led to an increase in citizen involvement and in the willingness of local residents to organise and help run flood groups and to become flood wardens. This was especially noticeable in Mytholmroyd, where local residents were unhappy with the flood group's efforts during the flood, which in part was due to a lack of volunteers. However, reported post-flood citizen apathy (previously mentioned) could undermine the sustainability of civil society actors in the long term and their eventual contributions in the case of a next flood event are unclear.

Interviews with the EA and the local council acknowledged this and post-flood the latter created specific “Neighbourhood Coordinators” who work with flood groups and wardens. This “state support” aims to support the longevity of flood groups and wardens by reducing the organisational/administrative burden on volunteers (i.e., reducing volunteer fatigue) as well as trying to institutionalise their local knowledge. However, state support may also be temporary and funding is not guaranteed for the long term. Furthermore, flood group members reported that this new state support created new forms of bureaucracy, especially for ordering new equipment.

Flood groups became a desirable form of civil society contribution, with post-flood policy documents recommending supporting existing ones and encouraging more of them in surrounding areas (e.g., Calderdale Flood Commission, 2016). It is important to monitor whether this potentially empowered and stronger civil society, and their “powerful community voices,” will lead to the exclusion of others (Rydin, 2016) and their local knowledge. Both pre-flood and post-flood, the flood groups had disagreements about the siting of flood stores, highlighting that the aims of flood groups do not always match the local residents’ wishes. The disagreements centred on the flood stores being an “eyesore” and the worry that they would cause property damage if dislodged during a flood.

The varying levels of capacities in the different towns were also recognised by civil society actors who attempted to direct support towards them pre-flood (2015), although there was uncertainty about how it would work in a flood event:

“Flood store equipment really for the vulnerable, the elderly and infirm, but when there is a flood, everyone will be there wanting the equipment because they haven't prepared beforehand” – HFG interviewee, 2015

Furthermore, interviewees familiar with the distribution of CFFC flood funds in the post-flood phase also observed that poorer areas were less likely to be aware of and apply for CFFC funding.

3.6. Conclusion

Flood-risk management is experiencing two important shifts towards a greater role for non-state actors (Mees et al., 2016; Meijerink & Dicke, 2008) and an approach change from flood defence towards flood resilience (Restemeyer et al., 2015; Schelfaut et al., 2011; Scott, 2013). However, the literature is currently missing a detailed understanding of this new role for non-state actors and their contributions towards flood resilience. This paper sought to address both of these shifts by exploring the contributions of civil society to local level flood resilience before, during and after a flood event.

Three key findings can be distilled from this paper. First, the issue of time was important and local civil society contributions were found to be pervasive and dynamic, with an intense initial response to the flood event. However, the contributions of civil society appeared difficult to sustain across the three towns and their activity was found to diminish over time after the flood due to apathy, active forgetting (McEwen et al., 2017) or lack of further exposure. Issues of representation and volunteer fatigue within civil society were also reported and approaches to address this need to be identified. Therefore, caution must be urged when looking to transfer responsibilities from the state to these non-state actors, with state support remaining crucial for local level flood resilience (as suggested by Begg et al., 2015).

Second, the paper identified the importance of place and that the local ad hoc response to floods in the Upper Calder Valley was based on the distribution of flood exposure and social processes. Those interviewed had strong relationships with their local place and community, which motivated their involvement in the civil society groups and therefore positively influenced local level flood resilience. This paper extended previous findings (Masterson et al., 2014) and found civil society actors acting as the first responders, in response to the flood, before the arrival of local state actors and emergency services. Living locally meant that they could more quickly offer support than actors from outside the area. Although increasing the involvement of civil society may be an attractive FRM option for policy-makers in the context of continuing austerity and

restricted resources, the varying levels of capacities in different flood-affected places needs critical consideration. For example, areas with lower levels of social capital and less active citizens may struggle to replicate the contributions highlighted in this paper. Putting increasing emphasis on “community flood resilience” in these areas could lead to the creation of inequalities within flood resilience practice, with more active/affluent people and areas receiving more attention, as they have a strong civil society and social bonds, and becoming more flood resilient, while other local people and areas are forgotten.

Third, this paper reflected on flood resilience in theory and practice. A lack of theoretical clarity of the concept has led to a lack of guidance and a focus short-term bounce back approaches instead of more transformative, longer-term thinking (Davoudi, 2012; Twigger-Ross et al., 2014, p. 2; White & O'Hare, 2014). This paper identified examples of this, such as the short-term focus on flood stores as a means to bounce back from flooding. The analysis suggests that a long-term perspective based on a flood experience will be difficult to sustain. Although in the post-flood phase, the paper identified approaches (e.g., Watermark and FloodSave) that reflected learning and longer-term thinking. A greater understanding of potential contributions was achieved by using the paper's framework to structure the data over time. Although the framework did not initially capture the elements of power and representation, they emerged as relevant factors influencing civil society contributions and were included in the data analysis and should be used in future research. Furthermore, the varying capacities and resources of individuals also need to be considered, especially within the context of shifting responsibilities from state to non-state actors.

To conclude, issues of time and place emerged from this research as important in understanding the ways in which civil society actors can contribute to local level flood resilience. The involvement of civil society actors, particularly citizen groups and initiatives, can lead to a more local, context-specific approach to flood resilience that integrates existing state-backed efforts with civil society actors and resources. This time-based framework appeared valuable in gaining insights into civil society contributions, but could benefit from further consideration of place-based capacities. Policy-makers are recommended to recognise the importance of both temporal variation for citizen involvement and place-based capacities in developing local flood-resilience policies. Future FRM research would benefit from critically assessing the role of other non-state actors, involved in upland land use and management as well as urban development, and of the varying capacities of communities to support civil society contributions.

3.7. References

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CHAPTER 4

Emerging citizen contributions, roles and interactions with public authorities in Dutch pluvial flood risk management

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Abstract

This article focuses on the emerging role of citizens and their increasing contributions to local pluvial flood risk management in the Netherlands. A qualitative research approach is followed with semi-structured interviews, and analysis of policy documents and media reports. A typology of physical resources and actions, knowledge and advocacy activities shows evidence of locally focused citizen contributions to pluvial flood risk management in the Dutch city of Arnhem. We find that this emerging citizen role is being shaped by traditional authority-led interactions, creative and dialogical approaches to citizen engagement, and citizen-initiated contributions that then interact with authorities.

Keywords

Pluvial flooding; flood risk management; citizen initiatives; Netherlands; authority-citizen interactions; flood resilience

4.1. Introduction

Pluvial flooding is emerging as a ‘critical issue’ (Rosenzweig et al., 2018, p. 1) in water management and is expected to worsen due to urban growth and development combined with climate change-induced increases in extreme rainfall intensity and frequency (see also Hegger et al., 2016; Schanze, 2018)². Furthermore, future heavy rainfall events are predicted to overwhelm existing sewerage systems (Scott, 2013), and the traditional approach of continuing to expand sewer system capacity is increasingly seen as costly, unsustainable and inadequate in coping with these events (Rosenzweig et al., 2018; Van Riel, 2011). These concerns with traditional flood risk management (FRM) approaches have led to a growing interest in resilience in pluvial FRM. The concept of ‘flood resilience’ represents an acceptance that floods may happen, despite defences being in place, and also emphasizes reducing potential flood consequences and ‘living with floods’ (Forrest, Trell, & Woltjer, 2019; Liao, 2012; Scott, 2013). Approaches that accommodate excess rainwater and reduce pluvial flood consequences require changes in land use in the local urban environment: land that is owned and controlled by citizens. Therefore, the shift to flood resilience implies a potential role for citizens in local FRM.

Research has found evidence of an emerging role of communities and citizens in local FRM (Edelenbos, Van Buuren, Roth, & Winnubst, 2017; Forrest et al., 2019; Geaves & Penning-Rowsell, 2015; Harris, Shaw, Scully, Smith, & Hieke, 2017; McEwen, Holmes, Quinn, & Cobbing, 2018; O’Brien, Ambrose-Oji, Morris, Edwards, & Williams, 2014a; Seebauer, Ortner, Babicky, & Thaler, 2018). This increasing involvement of citizens is driven by both flood experiences and national policy agendas, such as the Participation Society in the Netherlands, that seek to stimulate citizens to be more active and willing to take a greater role in their local milieu (Seebauer et al., 2018; Verhoeven & Tonkens, 2013). The contributions and emerging roles of citizens in local FRM can have implications for local flood resilience and for more holistic FRM approaches that draw on broader knowledge and expertise than in the past (Forrest, Trell, & Woltjer, 2017; Forrest et al., 2019; McEwen et al., 2018; McEwen & Jones, 2012; O’Brien et al., 2014a).

The emerging roles and contributions of citizens can also have implications for established authorities already engaged in local FRM. There have been efforts to understand how public authorities, which have traditionally been responsible for FRM, can and should interact with citizens (e.g. Harris et al., 2017; O’Brien et al., 2014a). Citizen contributions, whether arising from public authority interventions or from citizens themselves, may help find FRM solutions in collaboration with public authorities (Harris et al., 2017; Twigger-Ross, Orr, Brooks, & Saduaskis,

² This article follows recent work (e.g. Schanze, 2018) in understanding ‘pluvial flooding’ as related to heavy rainfall at the local level with no direct relation to the main river networks, as opposed to ‘flash floods’, which relate heavy rainfall to river networks and cover a larger spatial scale.

2016). These interactions between citizens and authorities can lead to changes in the distribution of tasks and responsibilities between the government and local citizens, with the government potentially retreating from some of its tasks (Begg, 2018). Therefore, it is important not only to understand the emerging roles of citizens in local pluvial FRM, but also to see how they influence the division of responsibilities in local flood resilience.

Analysis of an emerging role of citizens in FRM has been undertaken in many Western countries with recent flood experiences, including England, Germany, North America and Australia (Seebauer et al., 2018). However, in the Netherlands there has been a lack of public debate on FRM, and in particular on the role of civil society in FRM (Terpstra & Gutteling, 2008), probably due to the high level of perceived flood safety, and the Dutch government being primarily responsible for FRM. This has resulted in low citizen FRM participation and flood risk awareness in the Netherlands (Hegger, Mees, Driessen, & Runhaar, 2017; OECD, 2014; Terpstra & Gutteling, 2008; Wehn, Rusca, Evers, & Lanfranchi, 2015). Citizens' pluvial flood risk awareness is particularly low, as it is not generally considered as important or threatening as river and coastal flooding, despite the tens of millions of euros' worth of damage and disruption it has caused in the Netherlands (NOS, 2016; Van Riel, 2011). However, the growing risk and experience of pluvial flooding in the Netherlands (Dai, Wörner, & Van Rijswijk, 2018; H2o, 2016; PBL, 2015), a more active citizenry in water management (Duijn, Van Buuren, Edelenbos, Van Popering-verkerk, & Van Meerkerk, 2019), and encouragement by the Participation Society policy agenda (Verhoeven & Tonkens, 2013) are the context for citizens to be increasingly interested and engaged in local FRM. Acknowledging this new phenomenon, this article focuses on the potential and actual role of citizens in local pluvial FRM. Furthermore, it analyzes how public authorities position themselves in this changing FRM landscape and how they relate to the different citizen roles and contributions.

This article focuses on the Dutch city of Arnhem, which is selected for its recent experiences with pluvial flooding (2011, 2014 and 2016) and the predictions of worsening pluvial flooding in the future (Trell & Van Geet, 2019). Further justification for this selection is that in recent years the public authority (Municipality of Arnhem) has been actively engaging with pluvial FRM and looking for ways to more actively involve citizens in pluvial FRM (De Gelderlander, 2014; Verhoeven, 2016). In doing this, the municipality has been raising awareness about the redistribution of roles and responsibilities (Trell & Van Geet, 2019). Furthermore, several citizen initiatives focusing on pluvial flood risk have been set up in Arnhem in recent years (Arnhem Klimaatbestendig, 2019).

We first analyze the potential contributions of citizens in local pluvial FRM to clarify their potential roles. We then discuss how public authorities interact and collaborate with the

emerging citizen initiatives while also trying to define a new role for themselves in the changing FRM landscape. We draw on qualitative data from in-depth semi-structured interviews with both representatives of public authorities and local citizen initiatives, policy documents, and media reports. Thus we can critically reflect on the changing roles of both citizens and local authorities as well as the implications for local flood resilience.

4.2. An emerging citizen role in pluvial FRM

4.2.1. Changing citizen roles in FRM

Traditionally, the design, implementation and maintenance of FRM approaches have been predominantly a responsibility of public authorities (Pahl-Wostl, 2009). There has been a dominance of top-down, command-and-control approaches to water management in European countries (Pahl-Wostl, 2009). However, there is an ongoing transition from government to 'governance' in water management and FRM, which subtly implies a greater role for non-state actors. This broadening of the circle of involved actors is part of the 'social shift' in FRM (Nye, Tapsell, & Twigger-Ross, 2011) and it is therefore not surprising that in recent years there has been growing evidence of an emerging role for non-state actors, such as citizens, in local FRM (Edelenbos et al., 2017; Forrest et al., 2019; Geaves & Penning-Rowsell, 2015; McEwen et al., 2018; O'Brien, Ambrose-Oji, Morris, & Edwards, 2014b; Seebauer et al., 2018). Beyond simply being consulted or involved in ad hoc activities, citizens have also become organized in several different ways through flood action groups (Forrest et al., 2017; Geaves & Penning-Rowsell, 2015; McEwen et al., 2018; Twigger-Ross et al., 2016), participating in FRM as flood volunteers (O'Brien et al., 2014a, 2014b) or setting up various bottom-up citizen initiatives (Seebauer et al., 2018).

To explore citizen roles and contributions in pluvial FRM, this article develops a typology of different forms of contributions based on the existing literature. This typology will be used in the data analysis to help identify and classify citizen contributions to pluvial FRM in Arnhem. Previous attempts to identify and classify citizen contributions to FRM make a distinction between the emergency response to a flood disaster and the time period when there is no imminent flood threat (e.g. Forrest et al., 2019; Seebauer et al., 2018). However, the emergency phase is less prominent for pluvial flooding in the Netherlands since it is a flat country where pluvial flooding causes damage and disruption but is not considered a cause of casualties. Therefore, citizens in the Netherlands do not typically have a direct role in the emergency phase of pluvial flooding, but play a role after the floodwaters have receded. Based on this, we analyze the role of citizens when the floodwaters have receded.

Table 4.1 presents a summary of recent work on citizen contributions to local FRM. Three categories of citizen contributions were developed inductively based on this research: physical action and resources; knowledge; and advocacy activities. This typology can help identify and

classify citizen contributions in Arnhem. The first category, physical actions and resources, has two components that are closely connected. Citizens can play a role in flood risk mitigation or flood consequence reduction (Coates, 2015; Forrest et al., 2019; Geaves & Penning-Rowsell, 2015), as well as being resource creators (e.g. creating flood stores with emergency equipment – Forrest et al., 2017; Seebauer et al., 2018), resource accessors (e.g. accessing funds for the community and local area – Forrest et al., 2019; Geaves & Penning-Rowsell, 2015; O'Brien et al., 2014a) or resource providers (e.g. distributing funding to the flood-affected – Forrest et al., 2019; Seebauer et al., 2018).

The second category relates to knowledge contributions. Although knowledge can be understood as a resource, it is different from physical resources such as finances. Citizens have an important role in contributing to knowledge about local flood risk and to knowledge exchange with technical experts, public authorities, and residents in flood risk areas (Forrest et al., 2019; O'Brien et al., 2014a; Seebauer et al., 2018; Wehn et al., 2015). In the knowledge category, citizens can have an important role as knowledge gatherers (e.g. providing local context and flood risk knowledge to authorities – McEwen & Jones, 2012; O'Brien et al., 2014b; Twigger-Ross et al., 2016) and knowledge verifiers (e.g. revising hazard maps – Seebauer et al., 2018) for the actors traditionally in charge of FRM, in addition to being trusted FRM knowledge providers (e.g. providing knowledge on flood insurance – Forrest et al., 2017; Seebauer et al., 2018) for fellow citizens.

The third category can be summarized as 'advocacy activities'. These can target public authorities or fellow citizens. In both cases, citizens play a role in influencing FRM through lobbying, campaigning and persuading (Forrest et al., 2017; Geaves & Penning-Rowsell, 2015; Raadgever et al., 2016; Thaler & Priest, 2014; Twigger-Ross et al., 2016). Citizens can raise awareness of flood risk and of FRM actions their fellow citizens can undertake (Forrest et al., 2019; McEwen et al., 2018; O'Brien et al., 2014a; Seebauer et al., 2018), which extends beyond distributing knowledge. To increase flood risk awareness, citizens can be informed through providing knowledge or persuading them. The latter is more related to influencing and advocacy (e.g. disseminating knowledge through online and paper-based information – Dai et al., 2018; Geaves & Penning-Rowsell, 2015), hence its inclusion in the third category. Opposing local developments that could increase flood risk may be a particularly relevant role for citizens in pluvial FRM. However, it has also been noted that too much negative lobbying can be counter-productive in the longer term and lead to authorities being more defensive towards bottom-up initiatives (Edelenbos et al., 2017). Through advocacy activities, citizens are thus assuming a role that tries to change the perspectives and FRM approaches of public authorities as well as of their fellow citizens.

Physical Action and Resources			
Risk mitigation	Consequence reduction	Creating and accessing resources	Providing resources
Implementing natural flood defences; clearing and removing debris from watercourses; leaf litter clearing; installing river gauges; maintaining rivers; operating and maintaining authority FRM assets; creating temporary water storage areas; erecting flood walls and installing property-level protection; diverting rainwater from roofs into gardens	Helping clean and decontaminate flood-affected households; closing flood doors and activating flood pumps; purchasing insurance products or self-insuring; restoring utilities and services	Setting up and maintaining flood stores; creating databases of vulnerable people; community and online fundraising for FRM; accessing local community funds; bringing authorities together to raise funds; investing in warning systems; training volunteers to contribute to FRM	Distributing funds through donations and grants to those affected and FRM schemes
Knowledge			
Gathering knowledge	Verifying/updating existing knowledge	Providing knowledge to authorities and citizens	
Surveying waterways; checking river gauges and river monitoring; identifying watercourse blockages and obstructions; providing scientific observations	Revising hazard maps; supporting mapping of flood processes; augmenting, validating and challenging expert knowledge; correcting and verifying authority data on previous flood impacts; updating knowledge on ‘pinch points’ and drain locations	Reporting and informing authorities of impending flood incidents; reviewing and providing input to authority flood plans; supporting the exchange of knowledge between citizens and authorities; acting as a source of flood knowledge for residents; assisting with flood insurance queries; creating and supporting community flood warning systems; warning residents of potential imminent flooding; disseminating flood warnings and alerts	
Advocacy activities			
Campaigning for authorities to change FRM approach		Raising awareness of flood risk and of potential citizen FRM actions	
Lobbying for flood defence schemes; persuading authorities to take responsibility for a flood; campaigning for investment in local FRM; actively pressuring and seeking to influence authorities; objecting to planning applications; opposing further urbanization; petitioning against building on flood plains; objecting to new building developments that would increase flood risk		Raising awareness of flooding by working with schools; promoting the uptake of local flood warden services; promoting flood risk awareness in households; handing out leaflets, publishing in newspapers, producing videos, creating online training modules, using websites and social media to raise awareness of flood risk and actions citizens can take; running art exhibitions on previous floods; carrying out yearly flood training; encouraging the installation of property-level protection measures	
Sources: Coates, 2015; Dai et al., 2018; Edelenbos et al., 2017; Forrest et al., 2017, 2019; Geaves & Penning-Rowsell, 2015; Hegger et al., 2017; McEwen & Jones, 2012; McEwen, Garde-Hansen, Holmes, Jones, & Krause, 2017; O’Brien et al., 2014a, 2014b; Raadgever et al., 2016; Seebauer et al., 2018; Thaler & Priest, 2014; Twigger-Ross et al., 2016; Wehn et al., 2015.			

Table 4.1: Overview of citizen contributions to local flood risk management (FRM). (Source: Author)

The emergence of these citizen contributions has implications for traditional FRM actors, such as public authorities, which are in the process of reinventing a new role and position for themselves in pluvial FRM in the Netherlands. Therefore in addition to exploring the emerging roles of citizens, we also consider the interaction between citizens and public authorities and how the authorities perceive the role division in pluvial FRM.

4.2.2. Interactions between citizens and authorities

In the Dutch context, public authorities still have a dominant role and the primary responsibility for pluvial FRM. However, these public authorities may need to reinvent their own role and look for ways to interact with, involve or facilitate citizens in the context of increasing citizen engagement.

Traditional, authority-led interaction with citizens allows the authority, as the initiator, to define the ‘scope, moments and methods of participation’ in FRM (Edelenbos et al., 2017, p. 50). This means that the role of citizens in these interactions is already decided by the public authorities. But dissatisfaction with public authorities may stimulate citizens to initiate their own involvement in FRM (Geaves & Penning-Rowse, 2015), during which they may interact with public authorities. These interactions could be reacting to government FRM interventions (Edelenbos et al., 2017) or opposing proposed FRM plans (Roth & Warner, 2007). Citizens may informally collaborate and share resources with authorities (Forrest et al., 2017) or use more formalized approaches, such as the Community Flood Resilience Pathfinder Scheme in England (Twigger-Ross et al., 2014) or through elected representatives in water boards in the Netherlands. Alternatively, citizens may take the initiative and develop their own ideas on how to contribute to local FRM and thus not be restricted by public authorities defining the scope of their role (Edelenbos et al., 2017).

The public authorities, particularly in the Dutch context, can be expected to have a strong influence on the role of citizens in FRM and on the contributions that they can and will make. Research indicates that previous interactions with public authorities can influence citizens’ expectations from authorities, which affects the citizens’ engagement in FRM (Geaves & Penning-Rowse, 2015) as well as the ‘success’ of citizen initiatives in FRM in general (Edelenbos et al., 2017). For example, public authorities acting defensively towards local initiatives (Edelenbos et al., 2017) can be a reason for the lack of citizen involvement and interaction with authorities. On the other hand, public authorities may perceive these initiatives as being able to take FRM action without being constrained by legal and administrative rules (Seebauer et al., 2018). Therefore, public authorities may instead embrace citizen action and see it as an opportunity to improve local pluvial FRM in ways they cannot achieve alone.

Considering that citizen initiatives in pluvial FRM are a relatively new phenomenon in the Netherlands, it can be expected that the public authorities are in the process of searching for ways to best react and interact with them. Previous research indicates that the division of responsibilities in such contexts is not completely clear (Terpstra & Gutteling, 2008; Trell & Van Geet, 2019). How public authorities, who are traditionally in charge of FRM, interact with citizens is influenced by the perception these authorities have of the division of roles and responsibilities (Trell & Van Geet, 2019). By extension, this perception influences the possible and actual contributions and roles of citizens in pluvial FRM. Therefore to explain the potential for citizen contributions in pluvial FRM, we also focus on how the public authorities perceive the division of roles and responsibilities and how they interact with citizens in FRM.

4.3. Pluvial flooding and shifting roles in pluvial FRM in the Netherlands

4.3.1. Pluvial flood experiences in the Netherlands

The Netherlands has recently experienced intense pluvial flooding in the south-western and northern areas (2004), Rotterdam (2009), Amsterdam (2010), Arnhem (2011, 2014 and 2016) and North Brabant and Limburg (2016 and 2017) (Pieters, 2016; Spekkers, Kok, Clemens, & Ten Veldhuis, 2013; Trell & Van Geet, 2019; Van Riel, 2011). Pluvial flooding in the Netherlands costs approximately €90 million per year, and this could increase to €200 million per year, based on predictions of more frequent periods of extreme rainfall in the future (NOS, 2016), and therefore pluvial flooding is a growing concern for the Netherlands (H2o, 2016; PBL, 2015).

However, pluvial flooding is often not perceived to be as serious as coastal and fluvial floods in the Netherlands (Van Riel, 2011). It may not cause significant damage, and the impacts may not be recorded, which can result in it being seen as a risk that needs action in the future. It has been referred to as an 'invisible hazard' (Houston et al., 2011, p. 1), as there are no visible signs that homes are at risk until a heavy rainfall event occurs. In Dutch, pluvial flooding is *wateroverlast*, or 'water nuisance', implying that it is not expected to cause casualties or severe disruption. This stands in sharp contrast to the translation of coastal or fluvial flooding, which is called *overstroming* ('flood'/'inundation') and is associated with casualties and widespread disruption. Overall, the issue of pluvial flooding is not prioritized in the same way as other forms of flooding and climate adaptation, despite the financial damage it has caused.

4.3.2. Pluvial FRM in the Netherlands

In the Netherlands, public authorities (provinces, municipalities and water boards) still have a dominant role in pluvial FRM. Provinces and municipalities are authorities with a range of responsibilities at the regional and local levels, respectively. Provinces and municipalities have an elected council and are democratically organized, with a civil service that implements their

policies. The municipality is responsible for managing rainwater in urban spaces by providing drainage or transporting it to treatment plants (Havekes et al., 2017). Individual households are responsible for pluvial flooding on their own private property, but the municipality still has a 'duty of care' for extreme pluvial flood events (Wiering, Green, Van Rijswijk, Priest, & Keesen, 2015). Water boards are functional agencies with an elected council and board. They are responsible for waterway drainage and management, for taking a regional perspective on monitoring and altering the water levels, and for managing excess water stored in rural areas, which helps accommodate predicted heavy rainfall and reduce the likelihood of urban flooding (Havekes et al., 2017). However, water boards are increasingly being involved in local pluvial FRM due to their responsibility for processing sewage water collected through municipal systems.

National-level plans (e.g. the Dutch Delta Plan 2018) outline a greater role for non-state actors, such as communities and citizens. There have been efforts to increase citizen involvement through workshops and consultation sessions (Wehn et al., 2015), engaging citizens in spatial planning projects (Dai et al., 2018), and providing subsidies for bottom-up projects (Mees et al., 2016). There are also increasing attempts to get citizens to take more personal responsibility and interest in FRM through online resources³ and the 'Week of Our Water' event (H2o, 2017).

There are signs of public authorities attempting to involve citizens and community-based initiatives in Dutch water management and local pluvial FRM, but there is much variation in their approaches and their success (Duijn et al., 2019; Edelenbos et al., 2017; Rioned, 2014). Local public authorities in the Netherlands are working with other organizations to involve citizens in pluvial FRM, such as the Arnhem Climate-Proof Platform (Platform Arnhem Klimaatbestendig, 2019) and Amsterdam Rainproof (2016). However, there are challenges in mobilizing citizens in the Netherlands due to their low flood risk awareness (Hegger et al., 2017; OECD, 2014; Terpstra & Gutteling, 2008; Wehn et al., 2015) and the constitutional expectation of the government to maintain flood safety (Wehn et al., 2015).

4.4. Methodology

The article reports on the emerging role of citizens and the interactions between citizens and public authorities, with qualitative data collected from semi-structured interviews and analysis of policy documents and media reports. As established, Arnhem is illustrative of pluvial flood risk in the Netherlands and features emerging practices of citizen contributions.

We conducted 12 in-depth semi-structured interviews, each between one and three hours and conducted in English (key interviewees in Table 4.2). Some interviewees were interviewed twice.

³ For example, <https://overstroomik.nl/> shows how high the water can get in your neighbourhood.

Interviews were also conducted with national-level actors: one academic, a member of Stichting Rioned (a Dutch urban water management and sewerage organization), and a member of the Steering Group on Spatial Adaptation for the Delta Plan 2018. These national-level interviews were relevant for a better understanding of national-level FRM as well as the Dutch FRM landscape, but quotes from the interviews are not used in the article and therefore they are not listed in Table 4.2.

Role(s)/organization(s)	Year	Interviewee Code
Role relating to flood risk management and policy, part of Team Wateroverlast, Municipality of Arnhem	2017, 2018	MUN1, 2017; MUN1, 2018
Role relating to sewerage systems and flood modelling, part of Team Wateroverlast, Municipality of Arnhem	2018 (twice)	MUN2, 2018
Role relating to urban design and the chair of Team Wateroverlast, Municipality of Arnhem	2018	MUN3, 2018
Role in identifying and supporting citizen initiatives relating to greening in Arnhem (Groen Arnhem)	2018	GRO1, 2018
Role in organizing neighbourhood initiatives and in citizen initiatives relating to pluvial flooding in Arnhem (Arnhem Climate Platform and Le Far West)	2018	ACP1, 2018
Role in organizing neighbourhood initiatives and supporting neighbourhoods relating to climate change adaptation and pluvial flooding (Climate Active Neighbourhoods and 026 Regenton)	2018 (twice)	CAN1, 2018

Table 4.2: Overview of key interviewees and interview codes. (Source: Author).

Semi-structured interviews were conducted with three representatives of the Municipality of Arnhem involved in pluvial FRM who were selected based on their role in interacting with citizens. The first key municipality representative was identified due to their role in putting pluvial flooding on the agenda for local policy makers after the 2014 floods in Arnhem. This key municipality representative interacts with citizens in pluvial FRM activities and has authored several important policy documents that we analyzed. Snowball sampling was then used with this first key representative to identify other municipality representatives who were engaged in pluvial FRM (as part of Team Wateroverlast, or Team Pluvial Flooding) and had experience with interacting with citizens on pluvial FRM. The circle of potential interviewees from a citizen perspective in Arnhem is limited by the often informal and emergent nature of citizen roles and contributions. Therefore, we chose to identify umbrella organizations that worked with multiple citizen initiatives and knew of informal and emergent citizen activities taking place in Arnhem. Three umbrella organizations were identified based on interviewee recommendations and verified through the media report analysis: the Arnhem Climate-Proof Platform (Arnhem Klimaatbestendig), Green Arnhem (Groen Arnhem) and Climate Active Neighbourhoods. These organizations identify and support citizen initiatives and activities relating to pluvial flooding

and other rainwater-related urban issues (e.g. greening of neighbourhoods). Importantly, they did not only coordinate citizen initiatives, but their members also took an active, hands-on role in pluvial flood-related issues in different neighbourhoods of Arnhem. For example, representatives of the Arnhem Climate-Proof Platform and Climate Active Neighbourhoods were involved in coordinating existing citizen initiatives, but also worked on setting up new citizen initiatives in their own neighbourhoods in Arnhem. These umbrella organizations were thus expected to have an overview of citizen initiatives and activities in Arnhem as well as experience with being involved in pluvial FRM as citizens themselves.

The interviewees were asked open-ended questions about their experiences of managing pluvial flooding, the emerging roles and contributions of citizens, interactions between citizens and authorities, and authorities' perceptions of citizens. The interviewees used visual aids (e.g. computer-based flood models) and maps to explain pluvial flood risk and FRM in Arnhem. The interviews were recorded and transcribed verbatim before being coded both by the three categories (physical actions and resources; knowledge; and advocacy) and in terms of the type of interaction in specialist coding software, ATLAS.ti. This was done in combination with an emergent approach that coded further contributions, roles and interactions that emerged from the data collection process.

Media reports and policy documents were used to complement and contrast the knowledge gained from the interviews. These data sources were used to better understand the Arnhem pluvial flooding and FRM context, identify citizen contributions, and illustrate the perceived role of citizens among the authorities.

The Arnhem Climate-Proof Platform website was used to identify further citizen initiatives in Arnhem. References to media reports are included in the research findings where relevant to illustrate the story and to relate to interviewee data. The policy document analysis included 13 documents from Arnhem, with key documents listed in the Appendix and discussed in the empirical findings section. Relevant policy documents were identified through desk-based searches of online documents relating to pluvial flooding from the authorities in Arnhem and supplemented by documents provided by interviewees. These documents were read and references to interactions with citizens, citizen roles and contributions, and pluvial FRM approaches were identified. Analysis of the interviews, policy documents, media reports and information from the Arnhem Climate-Proof Platform website allowed a nuanced understanding of Arnhem's pluvial flood context and the contributions and roles of citizens.

4.5. Research findings and discussion

4.5.1. Pluvial flooding: experiences, perceptions and approaches in Arnhem

Arnhem experienced severe pluvial flooding in the northern part of the city, above the Nederrijn River, in 2014 (Arnhem Pluvial Flooding Action Plan, 2014; Arnhem-North Pluvial Flooding Approach, 2015; De Gelderlander, 2014), 2016, and then again in 2017 (MUN1, 2018). The most damaging and extreme recent pluvial floods were in 2014 (Figure 4.1). The northern part of the city is on a gradient, which causes rainfall to flow towards the low-lying neighbourhoods and collect there during extreme rainfall events (Arnhem Pluvial Flooding Action Plan, 2014). In addition to the disruption to traffic and the flooding of cellars through underground windows (*koekoekkelder*), the city hospital was flooded in 2014, which illustrates that pluvial flood risks have not been adequately addressed in the past. The city's impermeable surfaces and shared sewer system resulted in rapid overflowing of the sewers and consequently in street-level flooding (Arnhem Pluvial Flooding Action Plan, 2014).

Figure 4.1: Map of Arnhem showing the extent of the 2014 floods (dark blue shows areas that were flooded). (Source: Arnhem-North Pluvial Flooding Approach, 2015).

Interviewees from the Municipality of Arnhem predominantly perceived pluvial flooding as a disruption that disappears within a few hours, although there is recognition of 'pinch points' where it was known to cause more significant disruption. Interviewees also perceived pluvial

flooding as a future problem (GRO1, 2018; MUN1, 2018). In a similar vein, policy documents revealed that extreme rainfall events are perceived as the biggest threat to Arnhem in the future (e.g. Water Management Plan, 2015), and public authorities are attempting to take it into account when expanding existing urban areas (MUN1, 2017).

As a response to the threat of pluvial flooding, and in the aftermath of the 2014 floods, the Municipality of Arnhem developed a pluvial flooding action plan (Arnhem Pluvial Flooding Action Plan, 2014). In addition, a Pluvial Flooding Team was set up by the municipality after the 2014 floods (MUN3, 2018). In the aftermath of the 2014 floods, critical infrastructure such as the hospital in Arnhem received some extra funding, but for other cases, the focus was on 'being creative' in seeking pluvial FRM solutions (MUN1, 2018). After the 2014 floods, the Municipality of Arnhem decided to seek pluvial flooding solutions that tackle multiple other problems in addition to pluvial flooding, to look for spatial solutions before technical solutions, to prevent damage to property, and to collaborate with residents (Arnhem-North Pluvial Flooding Approach, 2015). This decision was due to limited resources, as the Municipal Sewerage Plan 2014–2018 did not allocate funds to pluvial flooding, because it was not seen as a problem at the time of compiling the plan (MUN1, 2018; MUN3, 2018; MUN2, 2018). However, the 2018 municipal elections in Arnhem led to the Green Left (Groen Links) political party taking a leading role in forming a coalition. Interviewees reported that recent floods in Arnhem and climate change in general were discussed in the elections and that there was greater political interest in the subject, which has led to expectations of additional funding for pluvial FRM and the 'greening' of areas in the future (MUN1, 2018; MUN2, 2018; MUN3, 2018).

There is a growing acknowledgement within the municipality that some pluvial flooding will happen and that citizens will need to accept that the municipality cannot prevent pluvial flooding in extreme rainfall events (MUN1, 2018). The enormity of the problem of pluvial flooding led to interviewees stating that they could not solve it alone and that it was a 'shared responsibility' between the municipality and citizens. A response to the Spijkerkwartier neighbourhood campaigning group by the Alderman for Public Space also emphasized that local pluvial FRM was a collaborative effort between residents and the government and that there was space for new ideas from residents to make Arnhem more water-resistant (waterbestendiger) (Municipality Letter, 2016). Furthermore, policy documents encourage municipalities to take a leading role in climate adaptation, acknowledge that both top-down and bottom-up initiatives can provide solutions (Climate Adaptation in Arnhem, 2010), and support the creation of civic initiatives (Arnhem's Green Vision, 2018).

4.5.2. Citizen roles and contributions to local pluvial FRM

To explore citizen contributions to local pluvial FRM, the interview data were coded, supplemented by relevant media articles, and sorted into physical action and resources, knowledge, and advocacy activities (Table 4.3).

Physical action and resources

A number of risk mitigation actions by citizen collectives were made possible by residents coming together to access financial resources. For example, the Green Arnhem West community group won the Municipality of Arnhem's annual Neighbourhood Prize in 2016 and used the prize money to replace parts of the pavement with grass tiles that cars could still park on, but which also stored rainwater (GRO1, 2018; Arnhem Klimaatbestendig, 2017). Unfortunately, the technical aspects of the greening in this experiment failed, but it was not a failure of citizen engagement, and the experiment provided experience that could be used in future projects (GRO1, 2018). Another example came from the Molenbeke neighbourhood, where citizens made use of the Arnhem-based AANjaagfonds [Neighbourhood Support Fund] scheme to install rain barrels (regentonnen) and green roofs in their neighbourhood (De Gelderlander, 2018)⁴. The installation of rain barrels was part of a citizen-initiated and Arnhem-based project called 026 Regentonnen to encourage citizens to decouple their properties (De Gelderlander, 2018; CAN1, 2018)⁵. The decoupling (afkoppelen) meant that rainwater would be stored on the individual property in rain barrels instead of flowing into the publicly maintained shared sewer system. This reduces the volume of rainfall that enters the public sewer system and thus the likelihood of it being overwhelmed, causing street-level flooding (CAN1, 2018). The replacement of paved road parking areas and the installation of rain barrels are both risk mitigation actions that were supported by the Municipality of Arnhem and an Arnhem-based project using funding from the European Regional Development Fund. A citizen-run but municipality-funded Neighbourhood Platform also provided resources. Resource benefits could also be accessed by citizen initiatives, such as the benefits of purchasing at scale. For example, citizens in the Molenbeke neighbourhood coordinated their efforts to receive a discount on materials for the installation of green roofs on 25 homes (CAN1, 2018; De Gelderlander, 2018).

These contributions were focused more on mitigating flood risk (e.g. installation of rain barrels, green roofs and grass tiles) as opposed to the consequence-reducing activities (e.g. installation of flood pumps, stockpiling of recovery equipment) identified in the literature.

⁴ The AANjaagfonds scheme was set up by a group of residents to support citizen initiatives in Arnhem and funded by the European Regional Development Fund (Aanjaagfonds, 2018).

⁵ Named after the Arnhem area's telephone code (026).

Physical action and resources			
Mitigating risk	Reducing consequences	Creating and accessing resources	Providing resources
<ul style="list-style-type: none">● Installed rain barrels (Molenbeke and St Martins Sonnbeek)● Installed green roofs (Molenbeke and Green Arnhem West)● Greened parking area (Green Arnhem West)	<ul style="list-style-type: none">● None identified	<ul style="list-style-type: none">● Green Arnhem West won the Wijkpris 2016● Accessed AANjaagfonds to support scheme to instal rain barrels (Molenbeke)● Accessed EU Interreg funds● Accessed cheaper materials by purchasing at scale	<ul style="list-style-type: none">● St Martins Sonnbeek Neighbourhood Platform provided money for installation of rain barrels
Knowledge			
Gathering knowledge	Verifying/updating existing knowledge	Providing knowledge to authorities and citizens	
<ul style="list-style-type: none">● Citizens took photos and videos and uploaded them to social media● Citizens in Molenbeke did surveys with residents before the ‘post-flood neighbourhood walks’● The Spijkerkwartier online flood platform gathered ideas and opinions	<ul style="list-style-type: none">● Photos and videos uploaded to social media were used by authorities to verify flood models	<ul style="list-style-type: none">● Provided local flood experiences to authorities through social media● Provided ideas for Geitenkamp neighbourhood renewal● Provided ideas, knowledge and potential FRM solutions to public authorities during post-flood neighbourhood walks in Arnhem	
Advocacy activities			
Campaigning for authorities to change FRM approach		Raising awareness of flood risk and of potential citizen FRM actions	
<ul style="list-style-type: none">● Citizens complained after pluvial flood events caused household damage● Citizens in Molenbeke directly challenged authorities’ suggestions in ‘post-flood neighbourhood walks’● Attended a council meeting (Spijkerkwartier)● Wrote an open letter (Spijkerkwartier)● Used the Spijkerkwartier online platform to organize campaigning and keep residents updated		<ul style="list-style-type: none">● Encouraged citizens to buy rain barrels (o26 Regentonnen project)● Ran Climate Carousels (Klingelbeek)● Ran morning walks (Green Arnhem West)● Publicized measures citizens can take in the local Molenbeke newspaper	

Table 4.3: Citizen contributions to local pluvial flood risk management (FRM) identified in Arnhem. (Source: Author).

Knowledge

Citizens played several knowledge-related roles in pluvial FRM in Arnhem (Table 4.3). They took photos and videos of the Arnhem pluvial floods in 2014, 2016 and 2017 and shared them on social media; see Dijkgraaf (2014) for an example. The video provides information on the streets flooded, including the speed of the water and the scale of potential damage and disruption. By sharing these media, the citizens were acting as knowledge gatherers and (perhaps

unintentionally) knowledge verifiers, by providing information that could be used by public authorities to improve and verify their flood models (MUN2, 2018).

A number of post-flood neighbourhood walks were undertaken by public authorities through neighbourhoods after the 2014 floods (CAN1, 2018; MUN2, 2018; MUN3, 2018; De Gelderlander, 2015). Before the walks, the Municipality of Arnhem surveyed local residents to gather knowledge about the recent floods (MUN1, 2018; MUN2, 2018). In some neighbourhoods, active citizens also gathered knowledge from other residents that was then shared with public authorities (CAN1, 2018). In Molenbeke and Spijkerkwartier, there were resident-initiated surveys, with 120 responses received in Molenbeke, and door-to-door canvassing to understand the problems faced by residents (CAN1, 2018; MUN2, 2018; De Gelderlander, 2015). In addition to this knowledge-gathering role, citizens also played a knowledge-providing role by providing ideas and suggestions during the neighbourhood walks and for the Geitenkamp neighbourhood redevelopment. Overall, knowledge contributions were predominantly visual (photos and videos) and experiential knowledge from the flood events. While knowledge was gathered, no coordinated collection of quantitative data for experts to use was identified.

Advocacy

Many of the advocacy activities happened in the aftermath of the 2014 floods, with individual residents complaining of basement flooding to the municipality, police and fire service (MUN1, 2017; MUN2, 2018; Arnhem-North Pluvial Flooding Approach, 2015). The municipality tried to visit as many properties as possible to talk to residents about their flood damage and to suggest how to make repairs and prevent such damage in the future (MUN1, 2017). Citizens in Molenbeke were able to provide place-specific ideas directly to public authorities during the post-flood neighbourhood walks (CAN1, 2018). Citizens in Spijkerkwartier created an online flood platform to gather local ideas and opinions for pluvial FRM and to coordinate their efforts to influence authority approaches to FRM (MijnSpijkerkwartier, 2016). They also wrote an open letter to the city council (Mijnspijkerkwartier, 2015a) listing residents' expectations of the public authorities and demanding action. The Spijkerkwartier Floods (Wateroverlast Spijkerkwartier) group also encouraged fellow residents to meet and to attend a municipal council meeting together, as a way to 'strengthen their case' (Mijnspijkerkwartier, 2015b). This campaigning role was strongest in the direct aftermath of the 2014 floods; there were no signs of it continuing in 2018–2019.

Citizens also took a role in increasing fellow citizens' awareness of flood risk and actions that can be taken. 'Climate carousels' were organized in the Klingelbeek neighbourhood by local residents. These were events where interested residents visited different local properties that showcased pluvial FRM measures:

“The idea behind that [Climate Carousels] was that people like to peek at their neighbours’ gardens, because we are all curious. And I think that [seeing the activities] really helped, because if you’re saying that it’s a really good example and it’s on the other side of the city, just go and have look on your own, no one goes. But now we organize it really simply. ... We start at 3 pm, we end at 5 pm, then we also have a drink, and everybody’s happy. ... People were really enthusiastic, and at every house the owner said something about what they did, why they did it, and also something about the costs. ... So that people really got an insight into what they could do for themselves and whether it’s difficult to take action”
– ACP₁, 2018

Similar activities were organized by Green Arnhem West in the form of ‘morning walks’. The walks showcased examples of climate change adaptation measures (rain barrels, green roofs, etc.) that residents had installed on their properties and encouraged others to do the same:

“I think showing good examples to neighbours is also very important. You see that my neighbour has this and this, I also want to do that. They have a green schoolyard, I also want a green schoolyard. That company has a green roof, I also want a green roof” – GRO₁, 2018

There were limited attempts to raise flood risk awareness, and nothing was identified relating to being ready to face (and cope with) an actual pluvial flood event. Furthermore, we identified no attempts to challenge the authorities’ knowledge or to object to new development plans.

4.5.3. Authorities’ interactions with and perceptions of citizen roles

Authorities’ interactions with citizens

The interaction between public authorities and citizens in pluvial FRM in Arnhem happened at the initiation of both the municipality and the citizens.

First, public authorities took the lead in pluvial FRM in some instances and were therefore able to better control the scope, moments and methods of interaction with citizens (Edelenbos et al., 2017). In one case, the Municipality of Arnhem held consultation meetings with local residents on planned developments (MUN₁, 2018). These meetings were initiated by the municipality to present options for the development (i.e. they had chosen to interact after the options had been chosen) and discuss the planned developments with residents. This form of relatively top-down consultation also served as a means of expectation management by the municipality:

“They [the residents] wanted everything... Then finally they came around to the fact that the municipality has limited resources and cannot do everything ... Choices need to be made” – MUN₁, 2017

The Municipality of Arnhem also initiated interactions with residents as part of the Geitenkamp neighbourhood redevelopment, which aimed to replace the sewer network. The project was authority-led, but the municipality aimed to improve the neighbourhood and to include opportunities for local residents to make suggestions to improve the redevelopments (MUN₁, 2018; MUN₂, 2018; MUN₃, 2018). There was some existing mistrust of authorities in the neighbourhood (MUN₁, 2017). Accordingly, the municipality decided to broaden its approach and find a different way to encourage residents to air grievances about their neighbourhood in general. The municipality hired comedians as intermediaries to knock on doors and ask local residents about their well-being and how they would like the neighbourhood to look. Thus, the Municipality of Arnhem attempted a more creative and dialogic approach to engage with local residents:

“The first idea was just that they [the residents] could air their grievances, and then the second time it was to ask them what they’d like to change in the area... Although they are funny [the comedians], they collect stories, and these stories they use to ‘tear down the wall’ [between authorities and residents]” – MUN₁, 2017

As mentioned, the Municipality of Arnhem engaged in post-flood neighbourhood walks in the aftermath of the 2014 floods. Municipality officials circulated surveys in advance of these neighbourhood walks to identify flood-related problems and potential solutions (MUN₁, 2017; MUN₂, 2018). During the walks, officials discussed potential spatial and technical solutions with citizens, and later they used the information collected from discussions and surveys to create the Arnhem-North Pluvial Flooding Approach (2015), which was then used to deliver the final pluvial flooding action plan (MUN₁, 2018; MUN₂, 2018). However, contrary to municipality expectations, some residents appeared to be ‘surprised and angry’ that they were asked for solutions:

“They [the residents] were angry that we [the municipality] asked for cooperation. We thought, well if we ask for cooperation, we get more ideas, because these people will know from the area probably more specific information than we have. ... But also people were surprised: ‘Oh, that’s not our problem. You should do something about it’” – MUN₂, 2018

The municipality also tried to incentivize and facilitate citizen action to reduce paving and increase greenery on private property. They participated in Operatie Steenbreek [Operation Stone-breaking], a national programme that encourages municipalities to work with garden centres; residents who remove their garden paving stones can exchange them for plants and greenery at the garden centres. This authority-initiated approach was not fully implemented in Arnhem: a free service took stones away, but no greenery was provided in exchange.

Second, citizens initiated FRM-related action and then interacted with public authorities for local FRM. For the green road parking areas, an agreement was reached between Green Arnhem West and the municipality, with the latter funding the installation (at €2,000) as part of a trial, with the intention of extending it to other neighbourhoods (Arnhem Klimaatbestendig, 2017a). However, there were also conflicts between citizen-initiated actions and authorities. The campaigning group in Spijkerkwartier complained of pluvial flooding in the aftermath of the 2014 floods (Mijnspijkerkwartier, 2015a, 2015b). These interactions were initiated by citizens, but required a response from the authorities, with the Municipality of Arnhem responding to the campaigning group and visiting individual residents to offer help. These interactions concerning the green road parking areas and campaigning groups appeared organically and unexpectedly, but also had the benefit of being more adaptable and unconstrained by the administrative and legislative rules guiding public authorities.

These citizen-initiated activities had a snowballing effect, which led to more citizens taking action in pluvial FRM:

“The more initiatives you have, the more I think there will be. Sort of like a snowball effect, because then we see, wow, in that neighbourhood they’re all getting green roofs, and they’re decoupling their houses, and I want to do that too... So I think [citizen action is] becoming more and more strong” – GRO1, 2018

In the midst of these citizen-initiated actions, the municipality is in the process of reflecting on its existing role in local pluvial FRM. Interviewees from the umbrella organizations reported that different citizen initiatives working on FRM believed that the authorities should not fully withdraw from FRM, but should reflect on their position and on how to support citizen initiatives:

“The government is taking a step back, but they should look at what is the role of the government – how can they be helping while standing next to citizens?” – ACP1, 2018

Authorities’ perceptions of citizen roles and contributions

The research identified different perspectives held by authorities with regard to the emerging role of citizens in pluvial FRM. Policy documents and interviewees reported that the problem of pluvial flooding was so enormous that the municipality alone could not solve it (MUN2, 2018). Furthermore, representatives of the Municipality of Arnhem reported that the division of land ownership within the cities meant that other actors also needed to participate. In Arnhem North, only a small proportion of land is owned by the public sector: the private sector (including citizens) owns 93% (Arnhem-North Pluvial Flooding Approach, 2015). Authorities interviewed argued that they could not make significant changes to the privately owned land and that there

was a need for the landowners to be more active (e.g. MUN2, 2018). The perception that landownership is important and thus citizen involvement is needed may be behind the authority-initiated interactions focusing on neighbourhood redevelopment, encouraging greening (e.g. Operatie Steenbreek), and supporting the replacement of pavement by green tiles (e.g. Green Arnhem West).

Policy documents and interviewees also indicated that cost-cutting was a reason for increasing citizen involvement (MUN1, 2018; MUN3, 2018; MUN2, 2018). The economic crisis affected pluvial FRM and led to a more 'sober approach' with repairing and replacing sewers of poor quality being prioritized (Municipality Sewerage Plan, 2015). As part of this, citizens are expected to take good care of their property and to take measures to reduce pluvial flooding if appropriate (Water Management Plan, 2015).

4.5.4. Willingness and ability of citizens

In Arnhem, there is a risk in expecting different citizens to all be willing and able to contribute to local pluvial FRM in a similar way. There was a variation in the neighbourhoods with some having active and capable citizens who were willing and able to contribute to local pluvial FRM, while in others this did not happen (MUN1, 2018; MUN3, 2018; MUN2, 2018; CAN1, 2018; ACP1, 2018; GRO1, 2018). In some cases, citizens were interested in coming together at certain moments for small festivities (e.g. Easter and New Year's drinks), but not in coming together consistently to take part in sustained action for pluvial FRM (ACP1, 2018). Some citizens were annoyed at being asked for solutions; they believed that it was the municipality's problem, not theirs (MUN2, 2018):

"The information from the citizens is very useful and important, and we use that information, but after that, they think, 'I told you, it's your problem'" – MUN3, 2018.

Willingness to contribute can also be tightly connected to the ability to contribute. In Geitenkamp, when the comedians engaged with residents, they were not always successful, with some residents having more pressing issues in terms of 'getting through the week' and also having negative feelings towards the municipality, which limited their participation in FRM actions (MUN1, 2018). The incentivization of action through Operatie Steenbreek in Arnhem was not considered a success; very few citizens chose to get involved. They may have not known about the scheme, or may have chosen not to take action (MUN3, 2018). Also, urban greening is not always an option; some citizens are renting their home and cannot change their garden, so they are excluded (MUN3, 2018). However, the presence of residents with relevant expertise and a strong connection to the neighbourhood, besides making contributing 'fun' for citizens, can lead to more 'fertile grounds for [citizens] starting new projects' and being willing to contribute (ACP1, 2018; GRO1, 2018).

The growing expectation of greater citizen contributions to pluvial FRM needs to be coupled with an understanding that there will be variations in their willingness and ability to do so.

4.5.5. Insights beyond Arnhem

We focused on the city of Arnhem, but there are potential lessons for other urban contexts that traditionally also have a strong reliance on public authorities for FRM. The findings from the Arnhem case could be relevant to other contexts where citizen engagement complements formal urban planning and water management arrangements. For example, citizens in these contexts may be annoyed or unwilling to contribute to FRM as they may consider it to be solely a government responsibility. It can be recommended that public authorities first explore the local flood experiences of those affected (as in the post-flood walks in Arnhem) and then seek to identify and support the ideas and initiatives of local citizens, to encourage them to take on different roles and responsibilities in pluvial FRM. Furthermore, the creative and interactive approaches used in Arnhem to engage citizens in pluvial FRM can also be applied to other similar contexts.

The typology developed in this article (Table 4.1) has value beyond the Arnhem case in the identification of potential citizen roles and contributions in local pluvial FRM. It can also be used as a tool for encouraging a diverse range of citizen contributions in cities facing similar pluvial flooding problems as Arnhem. Our findings also provide insights for cities aiming to increase citizen engagement around other forms of flooding. For example, the insight that citizens have a relevant role in showcasing and increasing awareness of potential citizen FRM actions could be valuable in the context of fluvial FRM, where public authorities are seeing low citizen uptake of property-level protection and flood-proofing of homes. The knowledge-gatherer and knowledge-verifier roles identified here could also help public authorities better understand the nature and challenges of other forms of hazard events they are experiencing for the first time.

4.6. Conclusions

This article focused on the emerging role of citizens in local pluvial FRM in the Netherlands. Traditionally, citizen flood risk awareness in the Netherlands has been low (Hegger et al., 2017; Terpstra & Gutteling, 2008; Wehn et al., 2015), and this, together with pluvial flooding being seen as a ‘water nuisance’ and not a disaster, has led to limited citizen involvement in pluvial FRM. However, recent pluvial flood events and predictions of more extreme rainfall in the Netherlands have led to more attention to pluvial FRM, and in particular to the potential role of citizens.

This article contributes to wider FRM discussions by exploring the emerging roles and contributions of citizens in local pluvial FRM in the Netherlands. A typology based on the literature (physical action and resources; knowledge; advocacy activities) was developed to identify and analyze citizen contributions. Citizens contributed to physical action and resources with flood risk mitigation roles, although we did not see them playing a role in flood consequence reduction, which is an important part of flood resilience. Furthermore, knowledge gatherer, knowledge disseminator and knowledge verifier were prominent roles undertaken by citizens. They also played advocacy roles, although these were time-dependent and faded as time passed after the flood. An emergent approach to the data analysis enabled the identification of two further citizen roles that were not initially captured by the typology: showcasing (acting as trusted sources of knowledge and advocates for forms of property-level pluvial FRM) and experimenting (trying small-scale forms of pluvial FRM and taking risks that authorities could not take themselves).

The findings are also relevant in the context of public authorities trying to define a new role for themselves in the changing FRM landscape. We analyzed discussions of public authorities' interactions with and perceptions of the emerging citizen initiatives in FRM, which are closely connected to this challenge of defining their new role. Traditional, authority-initiated consultations were identified, where the authorities were able to control the scope, means and methods of interaction. However, more dialogic approaches were also found, where innovative practices (including the involvement of comedians) were used to encourage citizens to get involved in FRM and share their ideas.

The insights from Arnhem may act as inspiration for other urban contexts with a strong reliance on the government for FRM, and the typology developed here could be relevant for exploring and better understanding potential citizen roles in pluvial FRM and beyond. Authorities can create a dialogical space for citizen action, which complements traditional public authority roles. This allows space for the self-initiation of activities and visible actions by citizens that contribute to pluvial FRM and flood resilience. However, the willingness and ability of citizens to engage in pluvial FRM initiatives are both concerns that public authorities need to consider when embracing the approach where citizens have a greater role in FRM. Therefore, our research suggests that public authorities need to provide a space for citizens to play a supplementary role in local pluvial FRM and at the same time take into account variations in citizens' willingness and ability to contribute to local pluvial FRM and flood resilience.

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4.8. Appendix: Overview of Key Documents

In-text reference	Full reference
Water Management Plan, 2015	Waterschap Rijn en IJssel. (2015). <i>Waterbeheersplan 2016–2021</i> [Online]. Retrieved from https://www.wrij.nl/publish/library/22/waterbeheerplan_2016-2021_waterschap_rijn_en_ijssel.pdf
Municipality Sewerage Plan, 2015	Gemeente Arnhem. (2015). <i>Gemeentelijk Rioleringsplan 5: 2014 tot en met 2018</i> [Online]. Retrieved from http://geoi.arnhem.nl/gidsopenbareruimte/html/resources/o6/o6ED8E98-4887-432C-8BB0-2E1E220ADF23/GRP5_Definitief_vastgesteld_plan.pdf
Climate Adaptation in Arnhem, 2010	Slabbers, S., Klemm, W. and Verburg, A.S. (2010). <i>Klimaatadaptatie in de stad: Proeftuin Den Haag en Arnhem</i> [Online]. Retrieved from https://studylibnl.com/doc/637865/klimaatadaptatie-in-de-stad
Arnhem's Green Vision, 2018	Gemeente Arnhem. (2018). <i>Groenvisie 2017–2035</i> [Online]. Retrieved from https://www.arnhem.nl/Inwoners/wonen_en_milieu/Groenbeheer/groenbeheer2/Groenvisie_2017_2035.pdf
Arnhem Pluvial Flooding Action Plan, 2014	Gemeente Arnhem. (2014). <i>Actieplan Wateroverlast Stap 1</i> [Online]. Retrieved from http://klaver-arnhem.nl/files/pdf/ActieplanWateroverlastArnhem.pdf
Arnhem-North Pluvial Flooding Approach, 2015	Gemeente Arnhem. (2015). <i>Aanpak wateroverlast in Arnhem-Noord</i> [Online]. Retrieved from http://www.transvaalwijk.nl/documenten/Aanpak_wateroverlast_Arnhem-Noord.pdf
Municipality Letter, 2016	Gemeente Arnhem. (2016). <i>Onderwerp: Maatregelen wateroverlast</i> . Letter from the Municipality of Arnhem sent by the Alderman for Public Space on 6 June 2016.

Appendix Table 4.1: Overview of key documents referenced in the chapter

CHAPTER 5

Socio-spatial inequalities in flood resilience: Rainfall flooding in the city of Arnhem

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Abstract

This paper critically analyses socio-spatial inequalities associated with the shift towards flood resilience in flood risk management (FRM) and pays particular attention to the notion of 'living with floods' and its implications for citizens. Living with floods and the narrative of 'surviving and thriving' are emphasised within flood resilience literature, but such discussions often ignore the varying socio-spatial vulnerabilities and capacities of citizens. This paper undertakes an exploration of potential socio-spatial inequalities for flood resilience in the Dutch city of Arnhem, which has recently experienced rainfall flooding and is actively encouraging citizen action in FRM. The paper follows a mixed-methods approach that combines secondary data sources, semi-structured interviews, and a document analysis. Three forms of socio-spatial inequalities in flood resilience were identified in Arnhem: existing inequalities exacerbated by the shift, 'hidden' inequalities in vulnerability that are now relevant due to rainfall flood risk, and new inequalities in capacity to fulfil the responsibilities arising from the shift to 'living with floods'. The paper contributes to wider discussions on the shift towards flood resilience in FRM and helps city planners to consider the interactions between vulnerability and capacity in their different neighbourhoods when allocating public resources.

Keywords

Rainfall flooding; Flood resilience; Socio-spatial inequalities; Urban flood risk management; Water management; Urban governance; Arnhem, the Netherlands

5.1. Introduction

Cities are increasingly being targeted as sites to build disaster resilience with recent international initiatives including the UN Office of Disaster Risk Reduction's 'Making Cities Resilient' campaign, the Rockefeller Foundation's '100 Resilient Cities network' and 'Asian Cities Climate Change Resilience Network', and the annual 'Resilient Cities' global forum on urban resilience and adaptation⁶ (100 Resilient Cities, 2019; ICLEI, 2019; The Rockefeller Foundation, 2014; UNDRR, 2019). A pressing disaster risk for cities is rainfall flooding, which is expected to worsen further due to a combination of climate change, urbanisation and urban growth (EASAC, 2018; IPCC, 2014; Rosenzweig et al., 2018). Planners are increasingly acknowledging the risk of rainfall flooding and are aiming to make cities more flood resilient in preparation for potential flood events (Restemeyer, Woltjer, & van den Brink, 2015; Scott, 2013a).

The shift to resilience in flood risk management (FRM) is accompanied by a change in perspective from 'keeping water out' to 'living with floods' and minimising the consequences of flooding (De Bruijn, 2004; Liao, 2012; Scott, 2013a). Furthermore, flood resilience can be understood as a more strategic and holistic approach to FRM that goes beyond state-dominated FRM and towards governance approaches that include non-state actors in FRM (Forrest, Trell, & Woltjer, 2019; Meijerink & Dicke, 2008). The shift towards governance approaches is important as it means that FRM is no longer controlled solely by public authorities and space is in effect made for non-state actors, such as civil society and citizens, to have an increasingly important role in influencing FRM and by extension flood resilience (Forrest, Trell, & Woltjer, 2020; Nye, Tapsell, & Twigger-Ross, 2011).

The perspective change towards 'living with floods' and to an increasingly important role for non-state actors in FRM is resulting in a 'responsibilisation' of citizens in FRM (Begg, 2018; Butler & Pidgeon, 2011; Nye et al., 2011; O'Hare & White, 2018). This narrative requires citizens to 'survive and thrive' in the face of shocks (ARUP, 2014; Pendall, Foster, & Cowell, 2010), such as flood risk, whilst also taking action to manage the risk that they face. However, this requirement for citizens to 'survive and thrive' is problematic as it ignores the variation in societal characteristics of urban spaces (i.e. the socio-spatial) in how citizens are able to endure floods and manage their own flood risk. Citizens can have differing vulnerabilities and capacities to cope with flood events and to recover after floods as well as their capacity to take FRM actions that help prepare them for future floods and thus pursue flood resilience (O'Hare & White, 2018). These differing capacities are linked to socio-spatial variation and existing inequalities in attributes such as income, education, age, and access to support and services. Ignoring this socio-spatial variation

⁶ Launched by ICLEI – Local Governments for Sustainability, the World Mayors Council on Climate Change and the City of Bonn, Germany in 2010. Supporting 350 cities in 80 countries.

may not provide adequate support to the diverse range of citizens in cities – in essence entrenching and exacerbating existing socio-spatial inequalities. This variation represents a problem for local government: how can they pursue policies for flood resilient cities that take into account the socio-spatial variation of how citizens endure flooding and manage their own flood risk? The inequalities that already exist in society and the allocation of public resources for FRM raise the problem of how planners involved in FRM can identify potential issues of socio-spatial inequalities related to the socio-spatial variations.

This paper engages with the shift in FRM towards flood resilience and explores potential issues of socio-spatial inequality that arise from two key aspects associated with the flood resilience perspective of ‘living with floods’ and the implied greater role for citizens in FRM: i) the capacity of citizens to endure floods (i.e. socio-spatial vulnerability to floods, also referred to as exposure), and ii) the capacity of citizens to take action (i.e. to manage their flood risk).

Many countries in the world are facing increasing rainfall flood risks and are aiming to pursue strategies to make their cities more flood resilient. The Dutch city of Arnhem is an example of a city that has recently experienced rainfall flooding (van der Ploeg, 2018) and where the local government is attempting to actively engage citizens in preparing for future rainfall flooding (Bruinsma, 2019; Forrest et al., 2020). Arnhem’s rainfall-related FRM actions correspond with the aims of the Dutch ‘Delta Plan on Spatial Adaptation’ to adapt to predicted climate stresses and be more flood resilient (Bruinsma, 2019). This paper explores the potential for flood resilience approaches to lead to socio-spatial inequalities between different city neighbourhoods. The findings are expected to inform planners in the Netherlands and further afield about the relevance of considering and understanding socio-spatial inequalities before allocating their resources for pursuing flood resilience.

5.2. Understanding Flood Resilience

5.2.1. Resilience in FRM

The shift in FRM towards flood resilience necessitates greater analysis of the nebulous concept of ‘resilience’. The pursuit of resilience is becoming globally important with the Hyogo Framework for Action 2005–2015 and its successor, the Sendai Framework 2015–2030, emphasising resilience as part of the goal in dealing with disaster risk (UNISDR, 2015). However, the concept of resilience is dynamic, complex and multi-faceted, which makes it difficult to operationalise and implement in practice (Walker & Salt, 2012; Twigger-Ross et al., 2014; Coaffee & Clarke, 2015). The concept has evolved greatly from its “first serious use” in the engineering sciences (Alexander, 2013:2710) before later being built upon and reaching prominence in the environmental sciences through Holling’s (1973) research. It has been widely adopted by academics since then and has various meanings across the disciplines of engineering,

psychology, environmental sciences and social sciences (Alexander, 2013; Trell, Restemeyer, Bakema, & van Hoven, 2017). Therefore, this paper first interprets the concept of resilience for flooding before exploring potential socio-spatial inequalities associated with it.

In FRM, flood resilience focuses on reducing flood consequences and also speeding up the recovery from flooding (De Bruijn, 2004; Forrest et al., 2019; Restemeyer et al., 2015). This interpretation introduces an acceptance of flooding within FRM and the idea of living with floods (Liao, 2012; Scott, 2013a). It acknowledges that floods cannot always be prevented and that there needs to be an increase in urban “floodability” and the city’s ability to accommodate flooding (Liao, 2012:5). Following on from this, flood resilience approaches in practice often emphasise pre-flood measures to increase the capacity of urban areas and citizens to cope with and even accommodate flooding whilst minimising flood impacts. These measures include spatial planning approaches (e.g. ‘Room for the River’ in the Netherlands), flood-proofing new and existing buildings, and modifying the urban environment to accommodate excess water (Aerts et al., 2014; Liao, 2012; Restemeyer et al., 2015).

The shift to flood resilience opens up new roles and interactions for state actors and citizens in FRM. State actors have traditionally led FRM in the European context, but they cannot act alone to minimise flood consequences as this requires changes to the urban environment on both public and private land that need citizen support and cooperation (Trell & van Geet, 2019). Furthermore, state actors are not able to always be present to support recovery immediately after flood events, with citizens often being the first responders (Forrest et al., 2019). Overall, the flood resilience shift implies a greater role for citizens and subtly places additional responsibilities on the shoulders of citizens in FRM (Begg, 2018; Forrest et al., 2019).

5.2.2. Critiques of flood resilience

The burgeoning focus on flood resilience is not without critiques and concerns, especially with the underlying ‘resilience’ concept itself. Two relevant critiques to this paper’s argument are concerning the associated narrative shift towards that of survival (Anderson, 2015; Pendall et al., 2010) and the tension between resilience interpretations advocating stability or dynamism (Alexander, 2013; White & O’Hare, 2014).

Firstly, resilience has been described as moving away from a narrative of ‘stability and safety’ towards one where there is a growing range of threats and the focus is on ‘surviving and thriving’ in the face of shocks (Anderson, 2015; ARUP, 2014; Liao, 2012; Pendall et al., 2010). This perspective implies a greater role for citizens in enduring flooding and preparing for flood events. Self-reliance of citizens is thus seen as highly important and a description of the disaster-afflicted as ‘resilient’ can be used by the state to avoid responsibility to take action and provide support. Those affected by disasters are pushing back against being labelled as ‘resilient’ with a

call of “stop calling me resilient” (Kaika, 2017:95). This change in narrative has implications for citizens at the centre of these resilience efforts as they possess different levels of vulnerabilities and capacities, with some having higher levels and a better chance of ‘surviving and thriving’ than others.

Secondly, there is a critique on the interpretation and operationalisation of resilience and whether this then aims to achieve stability or dynamism (Alexander, 2013; White & O'Hare, 2014). This is important to critically consider as it can lead to i) not challenging underlying causes of disaster risk, and ii) rebuilding and maintaining previous inequalities. Resilience interpretations advocating stability, such as ‘engineering’ and ‘narrow’ resilience, aim to ‘bounce back’, which is “past-oriented” and may not address the underlying causes of disaster risk (Coaffee et al., 2018:407; Kaika, 2017; White & O'Hare, 2014). For example, definitions of resilience in practice may refer to the ‘maintenance, preservation and restoration’ of essential ‘functions and structures’ when recovering from a disaster event (e.g. ICLEI, 2019). In ‘bouncing back’ and ‘returning to normal’, these ‘stability’ interpretations of resilience can result in rebuilding and maintaining previous inequalities.

Alternatively, resilience can be interpreted as being more dynamic and seeking to challenge the underlying causes of disaster risk by advocating not simply ‘bouncing back’ but ‘bouncing forwards’ (Davoudi, 2012; Scott, 2013b; White & O'Hare, 2014). These interpretations of resilience pay more attention to addressing pre-disaster vulnerabilities and to improving societal conditions through incremental adaptation or more radical transformative shifts (Davoudi, 2012; Forrest et al., 2019; Liao, 2012; Twigger-Ross et al., 2014). Ecological interpretations describe external pressures (e.g. from a flood event) causing a system to move towards a new ‘normal’ and an ‘adaptation’ that is then maintained until further pressures. Conversely, evolutionary interpretations reject the existence of equilibria and understand cities as inherently unstable systems that are continuously changing as a result of dynamic pressures (Davoudi, 2012; Vale, 2014). This more active latter interpretation recognises that cities are experiencing both internal and external pressures that lead to changes, which result in an unpredictable and chaotic system (Davoudi, 2012). Evolutionary resilience interpretations also recognise that systems, such as cities, can maintain their function whilst reorganising themselves to better match the current conditions (Spaans & Waterhout, 2017) and demonstrate continuous ‘adaptability’. These ‘bouncing forwards’ interpretations offer opportunities to challenge existing inequalities and, through an evolutionary perspective, suggest reorganisation can occur. This reorganisation and embrace of change can allow inequalities to be addressed.

The paper attempts to engage with these critiques by critically examining the different levels of vulnerabilities and capacities of citizens and neighbourhoods to ‘survive’ as part of the resilience

narrative, in particular when it is implemented through FRM practice. The shift towards flood resilience in FRM raises two important issues that can potentially result in socio-spatial inequalities: i) differences in socio-spatial vulnerability and ii) a mismatch between responsibility and capacity.

5.3. Socio-spatial inequalities and rainfall flood resilience

5.3.1. Differences in socio-spatial vulnerability

In the context of living with floods, 'differences in socio-spatial vulnerability' describes the varying social characteristics of urban spaces that can affect citizens' ability to endure floods. Previous research identified socio-spatial variations, based upon differences in citizens' spatial surroundings (i.e. place vulnerability) and individual characteristics (i.e. individual sensitivity), that influence how citizens live with floods (e.g. England & Knox, 2016; O'Hare & White, 2018; Sayers, Penning-Rowsell, & Horritt, 2018; Walker & Burningham, 2011).

The physical flood risk that citizens are facing can be enhanced or reduced by changes to the natural and built environment (England & Knox, 2016) and can be understood as the vulnerability of places. For rainfall flooding, the local topography and land use are important determinants of flood risk exposure with sloped, impermeable pavements acting to guide excess rainwater towards lower-lying neighbourhoods. The amount of green/blue space can also be a neighbourhood characteristic that influences place vulnerability (England & Knox, 2016). The neighbourhood buildings, for example housing characteristics, the presence of mobile or temporary structures, and the amount of green space and paved surfaces can also influence the vulnerability of places to floods (England & Knox, 2016; Klimaateffectatlas, 2019; Sayers et al., 2018).

Even though places may have the same flood risk exposure, the sensitivity of inhabitants and their capacity to resist and survive the effects of rainfall flooding will vary within cities. FRM approaches that focus on addressing flood exposure may "unknowingly compound flood disadvantage" (O'Hare & White, 2018:393). Certain groups of people have been identified as having greater social vulnerability and sensitivity to flooding (England & Knox, 2016; Fielding, 2012; O'Hare & White, 2018). For example, the elderly, very young, and those with long-term illness or in receipt of personal care assistance may have greater sensitivity to flooding than others (Houston et al., 2011; Sayers et al., 2018; Tapsell, Penning-Rowsell, Tunstall, & Wilson, 2002).

5.3.2. Mismatch between responsibility and capacity

The second issue is that 'living with floods' normalises flood risk and encourages citizens to engage in FRM (O'Hare & White, 2018; Scott, 2013a). Citizens are increasingly taking greater

responsibility for managing their own flood risk as they become ‘flood risk managers’ (Butler & Pidgeon, 2011; Forrest, Trell, & Woltjer, 2017; O’Hare & White, 2018). This increase in responsibilities for citizens, and thus obligations around actions for the benefit of society, can be seen with individuals taking out personal flood insurance, mitigating their own flood risk and making their own properties more flood-resistant, and monitoring watercourses and providing updates to authorities in some countries (Begg, Ueberham, Masson, & Kuhlicke, 2017; Butler & Pidgeon, 2011; Forrest et al., 2017; Johnson & Priest, 2008). In some cases this can be seen as a transfer of responsibility from authorities to individual citizens (Begg, 2018). The capacity of individuals to prepare for flooding can be based on factors such as their financial resources to take actions and whether they own their home and are able to make physical changes to it (Thieken, Kreibichm, & Müller, 2007; Twigger-Ross et al., 2014). Furthermore, characteristics such as education levels can influence an individual’s ability to access information to prepare for flooding (Twigger-Ross et al., 2014).

In addition to individual citizens increasingly becoming flood risk managers, there is also a growing role being played by collectives of individual citizens in local FRM. These collectives, known as flood groups and community-based initiatives amongst other names (Forrest et al., 2019; Seebauer, Ortner, Babicky, & Thaler, 2019), are formed of citizens that engage in local FRM. These groups have attempted to target those who are vulnerable or work in neighbourhoods with higher place vulnerability to floods, helped to prepare citizens by raising flood risk awareness, and worked to mobilise citizens (Seebauer et al., 2019; Forrest et al., 2017). Academics have long argued that citizens should have a right to the city and be able to ‘make their voice heard’ to influence their city spaces (Harvey, 2008) and the involvement of communities has therefore also been described as “essential to addressing disadvantage” and inequalities in FRM (O’Hare & White, 2018:392). Alternatively, these citizen groups represent a cost-cutting opportunity for the local government as they enable the transfer of responsibilities for FRM to unpaid volunteers (Begg, 2018; Forrest et al., 2019). Individuals may be more likely to take FRM action if they have a strong attachment to their neighbourhood, are comfortable with talking to their neighbours, and are in neighbourhoods with strong social networks as well as active citizens (Cheshire, 2015; Mishra, Mazumdar, & Suar, 2010; Twigger-Ross et al., 2014).

5.3.3. Inequalities and allocation of public resources

The growing role played by citizen collectives has implications for the allocation of public resources in FRM. In climate adaptation/mitigation-related activities, public resources are often allocated to an organised collective (e.g. local renewable energy cooperatives; urban flood groups etc.) as opposed to individuals, which can result in differences between neighbourhoods that ‘take the initiative’ and act collectively and those that do not have the capacity to organise themselves. Therefore, the allocation of public funds for local FRM via citizen collectives could

perpetuate existing inequalities and privilege those more able to take action as opposed to those who are most at need, which could potentially decrease the overall resilience of a city.

State actors play a relevant role in allocating public resources to pursue FRM. However, resource allocation can potentially reduce the resilience of a city and create issues for equity, as the above illustrates, unless authorities identify and engage with resource allocation issues. Equity differs from equality as it does not simply describe the equal distribution of resources, but also analyses the normative dimension of this distribution such as “addressing unfair difference” (Wiles & Kobayashi, 2009: 580). This paper understands equality as a descriptive approach to difference, whereas equity is more political and related to policy aims and objectives. It is not always obvious when issues of inequity are present and it is not always the case that inequalities are automatically unjust and inequitable (Davoudi & Brooks, 2012).

5.3.4. Conceptual Framework

Socio-spatial inequalities can potentially be present in the shift to flood resilience in FRM and towards the requirement to ‘live with floods’. This shift raises two important issues that can potentially result in socio-spatial inequalities: differences in socio-spatial vulnerability and a mismatch between responsibility and capacity. Indicator categories were generated from the above discussions and are summarised in the conceptual framework (Fig. 5.1) in order to guide the data collection and analysis for this paper.

Figure 5.1: The potential issues for equality arising from the shift towards flood resilience in FRM (the lowest level shows potential indicators). (Source: Author)

5.4. Research Approach

5.4.1. Arnhem, the Netherlands

The Netherlands is an appropriate country to explore potential socio-spatial inequalities associated with the shift towards flood resilience in FRM. The Netherlands has undertaken a shift towards flood resilience in FRM through their focus on ‘spatial adaptation’ (e.g. the National Delta Plan on Spatial Adaptation) and on modifying the urban environment to accommodate future high-intensity rainfall events, which can also be seen as step towards increasing the urban area’s ‘floodability’. Dutch FRM professionals are also now recognising the increasingly urgent threat posed by rainfall flooding (e.g. van Luijtelaa, 2014; Langeveld, Stuurman, Schilling, & Dassen, 2013; H2O, 2016).

Figure 5.2: 1 in 100 rainfall flood risk in Arnhem (Data Sources: Centraal Bureau voor de Statistiek, 2019a; Centraal Bureau voor de Statistiek, 2019b; Kadaster, 2019; Klimaat-effectatlas, 2019. Created by Geodienst, University of Groningen)

Arnhem is selected for this research as the north of the medium-sized Dutch city is at risk of rainfall flooding (Fig. 5.2) and has experienced intense rainfall events that led to flooding in 2014, 2016 and 2017 (Bouwman, 2017; Gemeente Arnhem, 2015; van Alfen, 2018). Furthermore, the local government is considered to be a ‘leading municipality’ for undertaking rainfall FRM measures (van der Ploeg, 2018). The city is recognising the new threat posed by rainfall flooding

and planners have been taking action to adapt the urban environment areas and 'live with floods'. The city's approach to rainfall FRM was highlighted as a good example of the work done as a result of the national Delta Plan on Spatial Adaptation (Bruinsma, 2019). At the same time, Arnhem has relatively active citizens (Bruinsma, 2019) and there is evidence of citizens taking action to manage their own rainfall flood risk (Arnhem Climate Platform, 2019; Forrest et al., 2020).

5.4.2. Methodology

This paper followed a mixed-methods approach that utilised both quantitative indicators and qualitative semi-structured interviews in order to identify and explore potential socio-spatial inequalities associated with the shift towards flood resilience in FRM within Arnhem. Quantitative data provides comparable attributes between neighbourhoods, whilst qualitative data allows a 'thick description' and a more in-depth understanding 'on the ground' to be obtained.

The paper identified 16 indicators based on the literature review presented in Section 3 (Table 5.1) across the main categories of vulnerability of place, individual sensitivity, and the individual and neighbourhood capacities to prepare for flooding (identified in Fig. 5.1). These indicators were a mixture of census (e.g. percentage of individuals under 40 years old and over 75 years old) and survey data (e.g. involvement in civil society activities) obtained from the Municipality of Arnhem Data Portal and municipality policy documents.

The data for the quantitative indicators were collected at the neighbourhood scale in order to allow comparisons between different parts of the city of Arnhem and were also based upon data availability. Furthermore, the quantitative data were converted through a min-max normalisation to give each neighbourhood a relative score between 0 and 1. This score provides a "relative value in which multiple places can be compared" (Cutter, Ash, & Emrich, 2014:68) and is most appropriate for reaching the paper's aim.

Qualitative data, in the form of 8 semi-structured interviews (Table 5.2), were collected and analysed to gain a richer picture of the main categories. Interview data was recorded, transcribed verbatim and then coded in ATLAS.ti based upon the four categories identified in the literature (see Fig. 5.1). Additional themes that appeared in the interview transcripts were also emergently coded. The interviews were conducted with employees responsible for FRM in the Municipality of Arnhem and citizens involved in umbrella organisations for community activities and citizen initiatives, such as Arnhem Climate Platform (Arnhem Klimaatbestendig), Green Arnhem (Groen Arnhem), and Climate Active Neighbourhoods (AAN). These organisations identify and support community activities and citizen initiatives relating to

Category	Indicator	Data Source ⁷
Place Vulnerability		
Neighbourhood typology ⁸ and rainfall flooding	Vulnerability of neighbourhood characteristics to rainfall flooding	Semi-structured interviews
Previous experiences	Rainfall flooding experiences of neighbourhoods	Semi-structured interviews; Gemeente Arnhem (2014)
Individual Sensitivity		
Age (young and elderly)	% of individuals under 4 years old and above 75 years old	Gemeente Arnhem (2018a)
Health Status	% of individuals registered as disabled (those receiving WAO benefits) ⁹	Centraal Bureau voor de Statistiek (2018)
Income	% of individuals unemployed (those receiving WW employment benefits) ¹⁰	Centraal Bureau voor de Statistiek (2018)
	% of individuals on low income (in the lowest 20% income bracket)	Centraal Bureau voor de Statistiek (2016)
Housing	% of individuals in renting houses with low value ¹¹	Gemeente Arnhem (2019)
Individual capacities to prepare for flooding		
Financial Resources	% on high income (compared to Arnhem average)	Centraal Bureau voor de Statistiek (2016)
Home Ownership	% of individuals owning own home	Gemeente Arnhem (2019)
Educational Attainment	% of individuals with medium or high levels of education ¹²	Centraal Bureau voor de Statistiek (2017)
Making Voice Heard	Turnout in political elections ¹³	Gemeente Arnhem (2018b)
Neighbourhood capacities to prepare for flooding		
Social Cohesion	% Can go to neighbours for help	Semi-structured Interviews; Gemeente Arnhem (2017)
	% individuals will give help to their neighbours	
Neighbourhood Attachment	% individuals believing that they are partly responsible for the neighbourhood	
Active Citizens	% individuals active as volunteers	
	Involvement in improving neighbourhood	

Table 5.1: Indicators used for exploring inequalities in Arnhem (Source: Author)

climate change impacts, such as rainfall flooding, in Arnhem. Interviewees were asked about flood risk and the previous rainfall flood experiences of 2014; the current rainfall flood

⁷ The most recent data has been used for each indicator

⁸ Comprising 'Neighbourhood Land Use' and 'Green/Blue Space'

⁹ The number of people who receive an occupational disability (WAO) benefit under the Occupational Disability Insurance Act on January 1

¹⁰ The number of people receiving WW benefits under the Unemployment Act on January 1

¹¹ WOZ-value of less than €150,000 (WOZ refers to the Real Estate Valuation Act)

¹² Medium: 1 MBO 2, 3 or 4, HAVO, VWO, HBO-propedeuse; High; HBO, WO, postgraduate and PhD

¹³ 2018 City Council elections

vulnerabilities in neighbourhoods and the use of green/blue space to reduce them (place vulnerability); neighbourhoods at greater risk and the reasons why (individual sensitivity); and the capacity of individuals and neighbourhoods to organise themselves and to take action for FRM (individual and neighbourhood capacities to prepare for flooding).

Interviewee affiliation	Interviewee
Municipality of Arnhem	Interviewee Municipality Planner (2018)
Municipality of Arnhem	Interviewee Municipality Flood Risk Management Policy (interviewed in 2017 and 2018)
Municipality of Arnhem	Interviewee Municipality Urban Design (2018)
Green Arnhem	Interviewee Green Arnhem (2018)
Climate Active Neighbourhoods	Interviewee Climate Active Neighbourhoods (interviewed twice in 2018)
Arnhem Climate Proof	Interviewee Arnhem Climate Proof (2018)

Table 5.2: Interviewees (Source: Author)

Furthermore, policy reports and media articles were both identified through web-based searches and provided to the researchers by interviewees throughout the data collection period. Where relevant, analysis of these reports and articles are referenced in the following sections to help illustrate and contextualise the current FRM situation in Arnhem.

5.5. Socio-Spatial Inequalities in flood resilience

5.5.1. Place Vulnerability

‘Place vulnerability’ focused on exploring and comparing different factors influencing the vulnerability of neighbourhoods in Arnhem to flooding. The severest rainfall flooding event was in 2014 and led to neighbourhoods in Arnhem North being inundated with rainfall flooding, which caused transport disruption as well as affecting properties (Bruinsma, 2019; Gemeente Arnhem, 2015; van der Ploeg, 2018). Housing characteristics in Arnhem contributed to place vulnerability to flooding. Interviewees reported that those with “koekoek windows” (windows below ground level) or basement areas were at greater risk of rainfall flooding and also flooded in 2014 (Interviewee Municipality Planner). Windows in the basements acted as an entry point for rainwater flows (Interviewee Municipality FRM Policymaker).

The Centrum, Spijkerkwartier, Klarendal, and Schaarsbergen neighbourhoods were most affected by rainfall floods in 2014 (see Appendix 1) with rainwater flowing into homes from paved surfaces and parking areas, sports fields, overflowing sewers, and from higher parts of Arnhem

(Gemeente Arnhem, 2014; Fig. 5.3). Rainwater drains along the natural gradient of Arnhem North from higher-lying neighbourhoods southwards towards the lower-lying neighbourhoods (Fig. 5.3; e.g. Spijkerkwartier, Velperweg and Klarendal) with roads acting to speed up rainwater flows (Interviewee Climate Active Neighbourhoods).

The physical flood risk was increased in Arnhem North through previous changes to transport infrastructure and the urban environment (Fig. 5.3). Tunnels were identified as problematic locations where rainwater accumulated and became like ‘rivers’ (Interviewee Municipality Urban Design; Interviewee Green Arnhem). Furthermore, the presence of the elevated railway tracks directed the rainwater flow through the tunnel into the Spijkerkwartier neighbourhood (Interviewee Municipality Planner). The elevated railway tracks acted as a dike that trapped the water in the Velperweg neighbourhood, but protected the neighbourhood on the other side (Interviewee Municipality FRM Policymaker; Interviewee Municipality Planner). Additionally, culverting of the water drainage channel underneath the railway led to rainwater accumulation in the southern part of the Burgemeesterswijk/Hoogkamp neighbourhood (Interviewee Municipality Planner; Interviewee Climate Active Neighbourhoods).

Figure 5.3: Map showing flooded areas (dark blue) of Arnhem in 2014 (original source: Gemeente Arnhem, 2014) A: flooded tunnels; B: north-south rainwater flow; C: elevated railway track; D: culverted water drainage channel; E: flooded hospital; F: Spijkerkwartier flooded extensively; G: Schaarsbergen flooded extensively.

Neighbourhood typology impacted on place vulnerability to flooding in Arnhem. The narrow streets, cobbled paving, and lack of space for design interventions and greening as a FRM action made the older inner city neighbourhoods (e.g. the Centrum) more vulnerable to the rainfall flooding (Interviewee Climate Active Neighbourhoods; Interviewee Municipality FRM Policymaker; Interviewee Municipality Urban Design). Furthermore, the older areas had mixed sewage systems with pipe capacity shared between sewage water and clean rainwater, which leads to dirty water overflowing when capacity is overwhelmed (Interviewee Municipality FRM Policymaker).

Interviewees reported that the natural greenery of Arnhem was part of their FRM strategy to reduce physical flood risk by diverting rainwater flows towards green areas (Interviewee Municipality Planner; Interviewee Green Arnhem; Interviewee Municipality FRM Policymaker). For example, speed bumps were restyled and angled to direct rainwater flows towards green areas in response to the 2014 flood experiences where speed bumps allowed rainwater to accumulate and increased localised flood risk (Interviewee Climate Active Neighbourhoods; Interviewee Municipality FRM Policymaker):

“Arnhem is the city of parks...We have to use them as a backup system for these heavy rainfalls” – Interviewee Municipality FRM Policymaker, 2018

Overall, the data illustrates that the natural environment can increase place vulnerability through its natural topography as well as reduce place vulnerability through the presence of green areas for rainwater storage. The urban environment can increase place vulnerability by restricting possible design solutions in narrower and older inner city neighbourhoods. Furthermore, changes to the urban environment have increased place vulnerability to floods in Arnhem, for example, changes to transport infrastructure (e.g. elevated railway tracks, tunnels, and speed bumps) have enhanced rainfall flood risk.

5.5.2. Individual Sensitivity

‘Individual sensitivity’ focused on exploring and comparing the factors that influence the extent to which citizens in Arnhem’s neighbourhoods are able to live with floods. The quantitative indicators (Table 5.1) show that the neighbourhoods in Arnhem have different levels of individual sensitivity (Fig. 5.4; Appendix 2).

Figure 5.4: Radar Graph showing the cumulative score (out of 5) for the indicators of ‘individual sensitivity’ of Arnhem North’s neighbourhood. (Source: Author)

Geitenkamp was identified as the neighbourhood with the highest individual sensitivity to rainfall flooding and was identified as being a neighbourhood with high unemployment, low levels of education, and poorer diets (Interviewee Municipality FRM Policymaker). Arnhemse Broek, Presikhaaf West and Klarendal are three of the four neighbourhoods in Arnhem that were identified in the list of 40 problem neighbourhoods (‘De 40 wijken van Vogelaar’) by the Dutch Government in 2007 and associated with social problems and high unemployment (Interviewee Municipality FRM Policymaker). Interviewees also revealed that there were attempts to improve the Klarendal neighbourhood through urban development to remove ‘undesirable’ businesses and to promote the neighbourhood as a fashion centre (Interviewee Municipality FRM Policymaker; Interviewee Climate Active Neighbourhoods).

On the other hand, Burgemeesterswijk/Hoogkamp had the lowest score for individual sensitivity to flooding. This neighbourhood is a relatively prosperous neighbourhood with low levels of unemployment, and a low proportion of citizens receiving disability support, being on a low income or renting housing in low housing value brackets. The neighbourhoods with the lowest scores for individual sensitivity to flooding also had the lowest proportions of unemployment, low proportions of citizens in the lowest 20% of income bracket and for citizens renting housing in the lowest two housing value brackets.

Overall, the data illustrate variations in individual sensitivity to flooding across the neighbourhoods in Arnhem.

5.5.3. Individual capacity to prepare

'Individual capacity to prepare' focused on exploring and comparing the factors that influence the extent to which citizens in Arnhem's neighbourhoods are able to individually prepare for rainfall floods. The quantitative indicators (Table 5.1) show that the neighbourhoods in Arnhem have different levels of individual sensitivity (Figure 5.5; Appendix 3).

Figure 5.5: Radar Graph showing the cumulative score (out of 4) for the indicators of 'individual capacity to prepare' for Arnhem North's neighbourhood. (Source: Author)

The Burgermeesterswijk/Hoogkamp neighbourhood scored highly in terms of individual capacity to prepare for flooding with high proportions of citizens owning their own home, having high educational attainment, being in the top 40% income bracket, and having a high turnout in the City Council elections. On the other hand, Presikhaaf-West and Geitenkamp neighbourhoods had comparably low individual capacities to prepare for flooding.

Educational attainment relates to the knowledge that individuals have, which does not necessarily have to be FRM-related knowledge, in order for them to take FRM-related actions. Interviewees often related education levels of citizens to their capacity to take action (Interviewee Green Arnhem). The high and moderate scoring neighbourhoods generally had high educational attainment, although Schaarsbergen had relatively lower levels compared to these neighbourhoods.

The Spijkerkwartier and Centrum had high levels of educational attainment, but low levels of home ownership (perhaps due to their location near the city centre) and a low proportion of citizens in the top 40% income bracket. Higher home ownership shows the capacity to have financial resources to afford a house and capacity to modify the property in preparation for rainfall floods. Interviewees reported that citizens not owning their own home were reluctant and even unwilling to take FRM actions, such as installing green roofs and rain barrels (Interviewee Municipality FRM Policy; Interviewee Climate Active Neighbourhoods). This is because they were unsure about whether they were allowed to do this and, in some cases, afraid of whether the landlords (or housing companies) will charge them money to ‘repair’ and return the home to normal when they leave. Whilst it was not found in this research, low home ownership could also be beneficial for this indicator as a high proportion of social housing could be better ‘for taking action’ as individual property measures can be coordinated and undertaken together at the same time.

5.5.4. Neighbourhood capacity to prepare for flooding

‘Neighbourhood capacity to prepare for flooding’ focused on exploring and comparing the collective neighbourhood capacities that can support FRM actions (Figure 5.6; Appendix 4).

Figure 5.6: Radar Graph showing the cumulative score (out of 5) for the indicators of ‘neighbourhood capacity to prepare’ for Arnhem North’s neighbourhood. (Source: Author)

The Schaarsbergen neighbourhood scored highly for neighbourhood capacity to prepare for flooding with a high proportion of citizens active as volunteers, active for neighbourhood development, believing that they are partly responsible for the neighbourhood, and that say they can go to neighbours for help or will give help to their neighbour. On the other hand, the Centrum neighbourhood had the lowest score for neighbourhood capacity to prepare for flooding with low proportions active as volunteers or in neighbourhood development, believing that they are partly responsible for the neighbourhood, and that say they can go to neighbours for help or will give help to their neighbour.

Certain neighbourhoods (e.g. Schaarsbergen) had citizen initiatives active in greening their local area, thus indirectly contributing to pluvial FRM. There were also citizen initiatives focusing specifically on rainfall FRM. These included initiatives such as installing rain barrels in Velperweg and St Martins/Sonnbeek neighbourhoods, a green roof initiative in the Velperweg neighbourhood, greening of parking areas in the Heijenoord/Lombok neighbourhood, the climate cafes and climate carousels in the Klingelbeek neighbourhood, and gathering residents' views in preparation for interacting with local government in Velperweg and Spijkerkwartier neighbourhoods. These initiatives were based on neighbours working together to take FRM-related actions and can be related to attachment of neighbourhood (Interviewee Climate Active Neighbourhoods):

“I think it's because they feel involved with their own environment and their own neighbourhood – I think that's the most important reason they do it” – Interviewee Green Arnhem, 2018

The capacity of a neighbourhood to take action can be strengthened through the presence of local leaders who can take a leadership role and provide direction to the community (Forrest et al., 2017; Seebauer et al., 2019) with Olsson et al. (2006:1) labelling leadership and shadow networks (i.e. citizen initiatives in this case) as 'critical' for preparing “a system for change”. The presence of leaders was reported as being important in the citizen initiatives identified (Interviewee Arnhem Climate Proof). The leaders possessed FRM and related topic expertise in urban planning and landscape architecture (Interviewee Climate Active Neighbourhoods). The participants, especially in the rain barrel scheme, green roof initiative, climate cafes, and climate carousels had an awareness of the issues at hand (i.e. rainfall flooding and climate change adaptation), the time to engage in the topic, and the financial resources to participate. However, the reliance on a few individuals for leadership and expertise can threaten the longevity of these citizen initiatives:

“A lot of times, there are a few people who are doing all the work and if one falls out or there is some fallout, then your initiative is very vulnerable so I think that's the problem”

– Interviewee Green Arnhem, 2018

Overall, the data shows variations in neighbourhood abilities to prepare with attachment to neighbourhood and presence of citizen initiatives identified in quantitative and qualitative data. Furthermore, the presence of leadership and skills in neighbourhoods emerged from the semi-structured interviews.

5.5.5. Overlapping Vulnerabilities and Capacities

The four categories allowed comparisons between the unequal distribution of socio-spatial vulnerabilities and mismatch between responsibility and capacity for citizens in ‘living with floods’ in different neighbourhoods in Arnhem. Trends can be identified in terms of the relative position of where neighbourhoods were consistently scoring (Appendix 2 Quantitative data for individual sensitivity, Appendix 3 Quantitative data for individual capacity, Appendix 4 Quantitative data for neighbourhood capacity) and this becomes a problem when neighbourhoods have low scores in multiple categories that can then overlap.

The data reveals that certain neighbourhoods (e.g. Spijkerkwartier) had both high place vulnerability and high individual sensitivity suggesting that they will be strongly affected by rainfall flooding. On the other hand, the data also shows other neighbourhoods (e.g. Velperweg) had high place vulnerability, but also low individual sensitivity to floods suggesting that citizens here would be better able to ‘survive’ and live with floods. High individual sensitivity to flooding is not necessarily disadvantageous if the neighbourhood also has low place vulnerability to rainfall floods (e.g. Presikhaaf-Oost).

There is potentially a mismatch between the greater responsibility given to citizens and the capacity of citizens individually and collectively to live with floods in their neighbourhoods. The data reveals that certain neighbourhoods (e.g. Burgemeesterswijk/Hoogkamp) had both high individual and neighbourhood capacity to prepare for rainfall floods. Citizens in these neighbourhoods may therefore be able to accept the additional responsibilities given to them in the shift to flood resilience in terms of managing their own flood risk and ‘living with floods’. On the other hand, other neighbourhoods (e.g. the Centrum and Arnhemse Broek) had both low individual and neighbourhood capacity to prepare for rainfall floods. These neighbourhoods may find it more difficult to ‘survive’ and prepare themselves and work with their fellow citizens to live with floods.

5.6. Navigating the inequalities in Arnhem

5.6.1. Forms of socio-spatial inequalities in flood resilience in Arnhem

The research findings show that the potential socio-spatial inequalities in Arnhem can be understood as i) existing socio-spatial inequalities that could be exacerbated by the shift, ii) 'hidden' socio-spatial inequalities in vulnerability that have become relevant due to the rainfall flood risk, and iii) new socio-spatial inequalities in capacity to fulfil the responsibilities arising from the shift to living with floods.

Firstly, the research identified existing inequalities that were exacerbated by the shift towards living with floods relating to the differences in socio-spatial vulnerability and capacities between neighbourhoods. In Arnhem, neighbourhoods with a lower socio-economic status (i.e. low income, low home ownership, and high unemployment) were also less able to individually and collectively prepare for floods. In this way, increasing flood risk can also reinforce existing inequalities and represent a "double risk burden" (Fielding, 2012:492).

Secondly, 'hidden' inequalities that previously existed (but did not have any impact) were shown to become relevant due to the increasing rainfall flood risk. Rainfall flood experiences and the production of rainfall flood risk maps can bring to light risk inequalities that were previously not regarded as such. For example, the data shows that properties that are at the top of the hill and on sandy soils would logically have a lower risk of rainfall flooding than those at the bottom of the hill. These inequalities in topography have always existed, but only through the recent rainfall flood risk have they become relevant. Furthermore, changes to transport infrastructure over time (e.g. railways track elevation, tunnel creation, and speed bump installation) have also created 'hidden' inequalities in place vulnerability that have been exposed through recent rainfall floods in Arnhem.

Thirdly, new socio-spatial inequalities are arising in the capacity of citizens to shoulder the new responsibilities associated with this shift to flood resilience. It is not only the varying capacities of citizens to survive flooding and to prepare for flooding in Arnhem, but also the capacity of citizens to fulfil these new responsibilities. Potential mismatches between socio-spatial vulnerability and the capacities to take action can mean that neighbourhoods have high socio-spatial vulnerability, but low capacity to take action. In these neighbourhoods, it may be harder for citizens to fulfil their responsibilities to 'live with floods'. This can lead to inequalities between those who can fulfil the responsibilities to 'live with floods' and those who have trouble to 'survive and thrive' in this shift towards flood resilience.

5.6.2. Planners and Potential Resource Allocation Issues in Arnhem

City planners have a role in allocating public resources to living with floods and FRM in the form of funding as well as their knowledge and expertise. Potential issues of resource allocation are not only limited to the actions of city planners with the data suggesting that the actions of citizen collectives need to be considered in resource allocation. These issues of resource allocation are now explored based on the three forms of socio-spatial inequalities identified for flood resilience in Arnhem.

Firstly, the research identified existing socio-spatial inequalities that were exacerbated by the shift. There were attempts by city planners to address existing inequalities, for example the urban renewal of Klarendal as a fashion area. City planners also recognised the existing socio-spatial inequalities in Geitenkamp and explored opportunities to improve people's lives in addition to undertaking FRM actions. A partnership was formed between the municipality, housing associations, a local education centre and a health insurance company in order to support the neighbourhood. There was also an emphasis on employing local businesses in implementing FRM measures in order to keep public funding in the local area:

“There is a landscape bureau over there. So, they can do the drawings. And they can also design the streets, the green parts of it. And maybe there is also a small gardener over there who can deal with the planting. So it's not a big enterprise that does it, but a small one, and they get paid for it. So the money stays in the area” – Interviewee Municipality FRM Policymaker, 2018

Existing inequalities need addressing in flood resilience, as Vale (2014:192) argues, “resilience can only remain useful as a concept and as progressive practice if it is explicitly associated with the need to improve the life prospects of disadvantaged groups”. Therefore, planners engaged in FRM should also focus on capacity building to reduce existing inequalities alongside traditional FRM measures. This will require FRM planners to break through silos and collaborate with new partners, but also for other planners to recognise the connections between their policies and FRM in order to identify potential opportunities (e.g. through urban regeneration) that can both increase capacities and reduce place vulnerability.

The data showed that certain neighbourhoods in Arnhem had high place vulnerability and relatively high numbers of citizen initiatives that were able to mobilise themselves and attempt to influence their local milieu. However, other neighbourhoods with high place vulnerability were not showing signs of citizen initiatives. Citizen initiatives are able to mobilise local capacities as well as organise themselves to influence FRM decision-making and how FRM resources are allocated. It could therefore be that the uneven presence of citizen initiatives in

neighbourhoods is exacerbating existing inequalities: enabling neighbourhoods with relatively higher capacities to take action and influence local FRM, whilst neighbourhoods with relatively lower capacities are less able to take action and influence local FRM. Therefore, FRM planners need to assess the potential impacts of citizen initiatives on existing capacities and vulnerabilities when allocating resources.

Secondly, the research identified 'hidden' socio-spatial inequalities in vulnerability that have become relevant due to the rainfall flood risk. There were attempts by city planners to reduce the problems caused by topography and changes to transport infrastructure. For example, city planners are angling and restyling speed bumps to limit rainwater accumulation. The 'hidden' inequalities arising from topography and changes to transport infrastructure, both of which increase place vulnerability to rainfall floods, appeared to have activated citizen collectives to manage their own flood risk. These collectives responded to these previously hidden inequalities with activities that included trying to reduce place vulnerability through installing rain barrels and green roofs as well as advocating for changes to the urban environment. In this sense, both city planners and citizen initiatives have a role in actively identifying, challenging and attempting to address 'hidden' socio-spatial inequalities.

Thirdly, the research identified new socio-spatial inequalities in the capacity of citizens to fulfil the responsibilities arising from the shift to living with floods. There was evidence that city planners were prioritising neighbourhood areas for FRM actions based on their flood experiences in 2014 and the condition of their sewerage systems. The research did not find evidence that the capacities of citizens to live with floods were considered in prioritising neighbourhoods. This lack of consideration could lead to citizens being unable to fulfil their new responsibilities to live with floods, but this may only be realised during the next flood event. Therefore, there is a need for city planners to also assess citizen capacities when prioritising neighbourhoods for FRM actions.

Overall, the shift towards a resilience narrative of 'surviving and thriving' places greater attention on the role of city planners and the allocation of public resources. Planners need to consider which neighbourhoods are most affected by rainfall flooding (i.e. socio-spatial vulnerability) and least able to take action (i.e. individual and neighbourhood capacity) in order to identify those that most need their support. A recommendation from this paper is that city planners should prioritise and allocate public resources (e.g. time and energy of their employees) to capacity building and vulnerability reduction in these neighbourhoods. A second recommendation is that city planners focusing on FRM have to collaborate with other planners, break down silos with other authority departments, and collaborate with citizen initiatives as part of attempts to address the potential socio-spatial inequalities that can arise from the shift

towards living with floods. The four categories that this paper proposes, with some adaptations and tailoring to each specific city context, could be valuable for city planners navigating these inequalities by helping to identify and prioritise neighbourhoods that most need support.

5.6.3. Interpretations of Flood Resilience

The interpretation of flood resilience and whether it aims to achieve stability or dynamism (Alexander, 2013; White & O'Hare, 2014) can have implications for these socio-spatial inequalities. If planners choose an 'engineering' or 'narrow' interpretation of flood resilience that advocates stability and 'bouncing back' then they are choosing a past-oriented, business as usual approach. This could mean rebuilding flood damage and maintaining the status quo, which would ignore and potentially exacerbate existing and hidden socio-spatial inequalities. The Municipality of Arnhem's response to the 2014 floods was an acknowledgement of the need to 'live with floods', but very little (if any) new money was allocated to FRM and therefore it became mainly a 'make-do' attitude:

"We will try to solve the biggest issues but for sure there is always a risk and you have to live with it" – Interviewee Municipality FRM Policymaker, 2017

In Arnhem, there was also evidence of ecological interpretations of flood resilience that include dynamic responses that can lead to stability (a new equilibrium) until the next shock necessitates another dynamic response. This interpretation can be understood as 'adaptation' and saw the municipality attempting to pursue an aim of 'bouncing forwards' in rainfall FRM in response to the 2014 rainfall floods. For example, restyling speed bumps to divert rainwater towards green areas. These approaches can try to address previously 'hidden' socio-spatial inequalities relating to topography and changes in transport infrastructure.

There was some evidence of evolutionary interpretations of flood resilience, which recognise the continuously changing nature of the city and attempts to move towards 'adaptability' (as opposed to 'adaptation'). This 'adaptability' can be seen by the emergence of citizen initiatives in Arnhem that relate directly or indirectly to rainfall FRM. These initiatives emerged in response to local needs and their actions, in either supplementing local government actions or undertaking new actions that local government could not do, as new FRM actors. In this sense, these initiatives are part of a reorganising of the local FRM landscape whereby citizens are gaining responsibilities and becoming more able to manage their own flood risk and 'live with floods'. In doing so, citizens are receiving additional responsibilities, but those who are able to take action are building their own capacity to be flexible and adaptable.

5.6.4. From inequalities to inequities in pursuing flood resilience

The presence of inequalities does not necessarily result in inequities, which have a greater focus on the normative dimension of distribution (Davoudi & Brooks, 2012; Wiles & Kobayashi, 2009). The indicator-based model shows that the interactions between vulnerabilities and capacities can lead to potentially inequitable outcomes.

Hidden inequalities were found to be strongly related to interest and use of space. For example, the elevated railway track increased place vulnerability for one neighbourhood, but acted as a dike and protected the neighbourhood on the other side of the track, which had a relatively higher sensitivity to rainfall flooding. This means that whilst the elevated railway track was a form of hidden inequality, it may not have been a case of inequity when considering the benefits to the more sensitive neighbourhood that was protected. Furthermore, the elevated railway track benefitted commuters as the train network was unaffected by the flooding and continued to operate as normal. Therefore, there is a need to balance different societal interests and neighbourhood differences in making a decision on how to respond to these hidden inequalities within a city context. There is also a spatial connection between flood risk-enhancers in higher-lying neighbourhoods with tiled and impermeable surfaces and lower-lying neighbourhoods that are affected by additional rainwater and experience floods.

In Arnhem, there was a mismatch between citizens' responsibility to live with floods and their capacity to take action. This could be an issue of equity as not all citizens have the same conditions to 'survive and thrive' despite this being asked of them. The issue of equity is further complicated by the unequal presence of citizen initiatives that can help certain citizens and neighbourhoods to better live with floods, but are absent in other neighbourhoods that may have relatively high vulnerabilities or low capacities. In order to pursue more equitable flood resilience, city planners need to assess and account for neighbourhoods' socio-spatial vulnerability and capacity to meet the additional responsibilities for living with floods. However, there may be difficulties in ensuring that this is achieved in current planning practice, where there is no obligation to consider socio-spatial vulnerability and capacity as part of FRM plans and policies. Therefore, an obligation for authorities to identify, report and consider socio-spatial vulnerability and capacity should be made into a formal requirement for city FRM plans and policies. This policy recommendation would not only result in authorities being more transparent about their considerations of socio-spatial variation, but also make them more accountable for decisions that ignore those unable to live with floods. The increased transparency and accountability could also encourage policymakers and city planners to take pre-emptive action to identify and support citizens with high socio-spatial vulnerability and low capacity to live with floods. However, this is not the 'silver bullet' that can solve socio-spatial

inequalities and, if used within a context of state retreat, could lead to authorities shifting FRM responsibilities to civil society actors.

5.7. Conclusions

Rainfall flooding is a pressing disaster risk and a clear urban policy concern that is becoming increasingly urgent. FRM policy is increasingly turning towards flood resilience-based perspectives of 'living with floods' and an implied greater role for citizens in FRM. This paper focused on two critiques of flood resilience concerning the narrative shift towards survival (Anderson, 2015; Pendall et al., 2010) and the tension between advocating stability or dynamism (Alexander, 2013; White & O'Hare, 2014). The narrative of 'survive and thrive' associated with resilience (Anderson, 2015; ARUP, 2014; Pendall et al., 2010) means that there needs to be greater scrutiny and consideration of the different vulnerabilities and capacities that citizens have (individually and as a result of their neighbourhood) to 'survive and thrive'. Previous research has found a need to consider that not all citizens are affected by flooding in the same way nor do they have the same capacity to be flood resilient (O'Hare & White, 2018). This paper contributed to these discussions on resilience and inequalities by exploring potential issues of socio-spatial inequality that arise from the shift towards flood resilience and the implied greater role for citizens in the Dutch city of Arnhem. Three forms of socio-spatial inequalities were identified: existing inequalities that can be exacerbated, 'hidden' inequalities that can become relevant, and new inequalities that can be created in the shift towards 'living with floods'.

This paper has takeaways for policy and practice at both the city and international levels. At the city level, the research findings emphasise that city planners need to critically reflect on their pursuit of flood resilience and 'living with floods' by taking issues of socio-spatial inequality into account in their planning process. The first recommendation is that there should be a formal requirement for city planners to analyse and report inequalities around vulnerabilities and capacities, and for planners to have to consider these in their FRM policies and plans. Neighbourhoods with high vulnerability and low capacity should then be prioritised with public resources allocated to reduce vulnerabilities and to build the capacities of individuals and neighbourhoods. The greater emphasis on FRM planners to focus more on vulnerability reduction and capacity building can contribute to making citizens more adaptable in the face of increasing flood risk. Furthermore, a second recommendation is that FRM planners also need to identify and attempt to address existing and hidden inequalities by working with other planners, authority departments, and citizen initiatives. This means breaking through silos and collaborating with housing associations, educational centres and health organisations (and other actors) on FRM as done in Arnhem. As part of this, there is also a need for planners and policymakers in other fields, and with different responsibilities, to also recognise and

understand that their policy choices can also impact citizens' abilities to live with floods and can contribute to the socio-spatial inequalities identified in this paper.

Furthermore, the greater citizen role in flood resilience draws attention to the issue of varying vulnerabilities and capacities associated with 'living with floods' and the need to account for them when allocating resources in flood resilience policies. The involvement of communities has been described as "essential to addressing disadvantage" in FRM (O'Hare & White, 2018:392), but supporting citizen collectives with public resources can advantage the already advantaged if there is no assessment of whether these collectives are formed by those that are already more able to live with floods. Therefore, identifying and providing resources to existing citizen collectives in neighbourhoods that have high vulnerability and low capacity to act could be a good way to allocate public resources and enable public policy to support those who are most at risk from flooding. A third policy recommendation is for cities making flood resilience strategies and allocating public resources: it is important to recognise and consider citizen initiatives when taking a strategic city-based perspective and balancing the socio-spatial vulnerabilities within and between neighbourhoods and with different city users (e.g. commuters). In doing so, city resilience strategies can seek to challenge socio-spatial inequalities and not entrench them.

Furthermore, the categories identified in this paper are a helpful starting point for helping cities across the world to identify and raise awareness about socio-spatial inequalities 'hidden' in flood resilience strategies, but they should be further modified to account for place-specific characteristics such as informal settlements, urban natural areas and greenery, and cultural identities. For example, cities with informal settlements should include specific indicators for these in their categories as they may have implications for vulnerabilities (e.g. housing and health) and capacities (e.g. social capital and networks).

The paper also has takeaways for policy and practice at the international level. Cities across the world are facing increasing rainfall flood risks and are being encouraged by international initiatives to pursue strategies to increase their resilience to disasters (e.g. flood resilience). These international initiatives encouraging the pursuit of disaster resilience need to understand, identify and engage with the potential socio-spatial inequalities identified in this paper in order to help challenge the underlying contributors to flood damages and lead to more dynamic flood resilience interpretations that also improve societal conditions.

Overall, this paper provides a basis for the further exploration of socio-spatial inequalities of flood resilience and living with floods. The interactions of socio-spatial vulnerability and the mismatch of responsibility and capacity provides new insights into the difficulties associated with 'flood resilience' and the need to be critical of potential city flood resilience narratives in

practice that emphasise 'surviving and thriving' whilst ignoring the variation in socio-spatial characteristics of neighbourhoods within their cities.

5.8. References

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5.9. Appendix 1: Extent of 2014 Rainfall Flooding in Arnhem

Neighbourhood	Rainfall Flood Category					
	I	II	III	IV	V	VI
Spijkerkwartier	*	*	*	*		
Centrum	*	*	*		*	
Klarendal	*	*		*	*	
Schaarsbergen e.o.	*	*				
Velperweg e.o.		*	*	*	*	*
Burgemeesterswijk/Hoogkamp		*	*	*	*	*
Arnhemse Broek		*		*	*	*
Geitenkamp		*		*	*	
Monnikenhuizen		*		*	*	
Heijenoord/Lombok		*		*	*	
Klingelbeek e.o.		*		*		
Presikhaaf-West			*			
St.Marten/Sonsbeek			*			
Alteveer/Cranevelt			*			
Presikhaaf-Oost						

Appendix Table 5.1: Extent of 2014 Rainfall Flooding in Arnhem

Rainfall flooding in 2014 was categorised into four types by the Municipality of Arnhem: **I.** Rainwater that flows into the houses from the sewer; **II.** Rainwater that flows into the private area from the public road (and sometimes flows into homes); **III.** Rainwater that remains on main access roads for a long time; **IV.** Rainwater that remains on district access roads for a long time; **V.** Rainwater that remains on other roads for a long time; **VI.** Inundation from surface water (source: Gemeente Arnhem, 2014)

5.10. Appendix 2: Quantitative Data for Individual Sensitivity

Neighbourhood	Ranking	Individual Sensitivity (1 most sensitive)									
		Age (2019) (%) under 4, over 75	Age*	Disability (WAO) (2018) (%)	Disability* (WAO)	Unemployment (2018 WW applicants as % of population)	Unemployment (WW)*	Low Income (2016) (%)	Low Income*	Rental Housing in low WOZ homes (2019) (%)	Rental Housing in low WOZ homes*
Burgemeesterswijk/Hoogkamp	1	10.86	0.42	2.21	0.00	1.69	0.25	15.00	0.09	7.76	0.13
Velperweg e.o.	2	14.73	0.66	3.33	0.09	1.72	0.28	18.00	0.18	16.14	0.28
Schaarsbergen e.o.	3	9.52	0.33	14.77	1.00	1.38	0.00	18.00	0.18	1.33	0.00
Alteveer/Cranevelt	4	18.33	0.89	2.62	0.03	1.75	0.30	18.00	0.18	12.28	0.21
Klingelbeek e.o.	5	20.06	1.00	9.82	0.61	1.40	0.02	12.00	0.00	1.10	0.00
St.Marten/Sonsbeek	6	6.36	0.14	3.77	0.12	2.40	0.85	25.00	0.39	12.81	0.22
Heijenoord/Lombok	7	8.67	0.28	4.00	0.14	2.50	0.93	22.00	0.30	17.26	0.30
Presikhaaf-Oost	8	13.45	0.58	4.86	0.21	1.53	0.12	26.00	0.42	37.63	0.69
Monnikenhuizen	9	16.61	0.78	4.93	0.22	2.35	0.81	24.00	0.36	21.05	0.38
Spijkerkwartier	10	4.22	0.00	5.46	0.26	2.28	0.75	43.00	0.94	43.32	0.80
Arnhemse Broek	11	6.49	0.14	8.28	0.48	2.03	0.54	43.00	0.94	38.55	0.71
Klarendal	12	6.66	0.15	8.07	0.47	2.29	0.75	41.00	0.88	35.14	0.64
Centrum	13	5.08	0.05	6.75	0.36	2.25	0.72	42.00	0.91	46.90	0.86
Presikhaaf-West	14	12.27	0.51	6.45	0.34	1.98	0.50	38.00	0.79	44.55	0.82
Geitenkamp	15	9.43	0.33	9.81	0.61	2.58	1.00	45.00	1.00	54.13	1.00

Appendix Table 5.2: Quantitative data for neighbourhoods with the lowest (green) and highest (blue) individual sensitivity to rainfall flooding *min-max normalised values

5.11. Appendix 3: Quantitative Data for Individual Capacity

Neighbourhood	Ranking	Individual Capacity (1 most capable)								Turnout City Elections (%)	Turnout City Elections *
		Owning Home (2019) (%)	Owning Home *	Educational Attainment (2017) (%)	Educational Attainment *	High Income (top 40%) (2016) (%)	High Income (top 40%) *	High Income (top 40%) (2016) (%)	High Income (top 40%) *		
Burgemeesterswijk/Hoogkamp	1	72.24	1.00	87.00	0.94	54.00	1.00	73.50	1.00	1.00	1.00
Alteveer/Cranevelt	2	52.05	0.67	84.00	0.86	45.00	0.74	70.60	0.92	0.92	0.92
Velperweg e.o.	3	59.41	0.79	82.00	0.81	49.00	0.86	62.30	0.69	0.69	0.69
Klingelbeek e.o.	4	52.75	0.68	78.00	0.69	54.00	1.00	54.50	0.48	0.48	0.48
St. Marten/Sonsbeek	5	51.25	0.66	89.00	1.00	38.00	0.54	57.70	0.57	0.57	0.57
Schaarsbergen e.o.	6	66.67	0.91	72.00	0.53	49.00	0.86	49.30	0.34	0.34	0.34
Heijenoord/Lombok	7	56.85	0.75	84.00	0.86	39.00	0.57	50.40	0.37	0.37	0.37
Monnikenhuisen	8	37.28	0.43	70.00	0.47	36.00	0.49	49.10	0.33	0.33	0.33
Centrum	9	20.22	0.15	85.00	0.89	24.00	0.14	55.50	0.51	0.51	0.51
Spijkerkwartier	10	27.60	0.27	82.00	0.81	24.00	0.14	48.10	0.30	0.30	0.30
Presikhaaf-Oost	11	42.37	0.51	68.00	0.42	30.00	0.31	44.80	0.21	0.21	0.21
Klarendal	12	29.73	0.31	67.00	0.39	24.00	0.14	42.40	0.15	0.15	0.15
Arnhemse Broek	13	26.18	0.25	61.00	0.22	23.00	0.11	38.70	0.04	0.04	0.04
Geitenkamp	14	11.01	0.00	53.00	0.00	19.00	0.00	45.00	0.22	0.22	0.22
Presikhaaf-West	15	19.31	0.14	53.00	0.00	21.00	0.06	37.10	0.00	0.00	0.00

Appendix Table 5-3: Quantitative data for neighbourhoods with the highest (green) and lowest (blue) individual capacity *min-max normalised values

5.12. Appendix 4: Quantitative Data for Neighbourhood Capacity

Neighbourhood	Neighbourhood Capacity (1 most capable)										
	Ranking	Active as volunteers (2017) (%)	Active as volunteers*	Active for neighbourhood improvement (2017) (%)	Active for neighbourhood improvement*	Believe they are partly responsible for the neighbourhood (2017) (%)	Believe they are partly responsible for the neighbourhood*	Can go to neighbours for help (2017) (%)	Can go to neighbours for help*	Will give help to neighbour (2017) (%)	Will give help to neighbour*
Schaarsbergen e.o.	1	42	1.00	35	1.00	91	1.00	66	0.95	50	0.83
Heijenoord/Lombok	2	41	0.95	32	0.87	89	0.94	62	0.86	51	0.87
Alteveer/Cranevelt	3	42	1.00	33	0.91	85	0.81	68	1.00	46	0.65
Velperweg e.o.	4	42	1.00	34	0.96	84	0.78	56	0.72	48	0.74
Klingelbeek e.o.	5	35	0.67	32	0.87	84	0.78	63	0.88	47	0.70
Burgemeesterswijk/ Hoogkamp	6	39	0.86	27	0.65	78	0.59	63	0.88	48	0.74
Monnikenhuizen	7	34	0.62	26	0.61	80	0.66	60	0.81	54	1.00
Klarendal	8	30	0.43	19	0.30	77	0.56	39	0.33	43	0.52
Geitenkamp	9	32	0.52	19	0.30	67	0.25	47	0.51	43	0.52
Presikhaaf-Oost	10	32	0.52	17	0.22	59	0.00	46	0.49	42	0.48
Arnhemse Broek	11	30	0.43	15	0.13	68	0.28	37	0.28	37	0.26
Spijkerkwartier	12	33	0.57	21	0.39	69	0.31	25	0.00	32	0.04
Presikhaaf-West	13	31	0.48	19	0.30	60	0.03	36	0.26	36	0.22
St.Marten/Sonsbeek	14	21	0.00	14	0.09	79	0.63	42	0.40	35	0.17
Centrum	15	26	0.24	12	0.00	65	0.19	28	0.07	31	0.00

Appendix Table 5.4: Quantitative data for neighbourhoods with the highest (green) and lowest (blue) neighbourhood capacity *min-max normalised values

CHAPTER 6

Conclusions: The Rise of
Civil Society in Governing
Local Flood Resilience

6.1. Introduction

This PhD thesis explored two important and ongoing shifts in flood risk management (FRM): the emerging role of civil society and the turn towards resilience and greater emphasis on ‘living with floods’. These two interlinked shifts have been taking place in a context of increasing flood risk and a recognition that FRM approaches relying only on flood hazard control are inadequate and unsustainable. Recent FRM approaches are thus also emphasising the relevance of reducing the consequences of flooding and pursuing flood resilience. However, there are still questions regarding the ‘rise of civil society in governing flood resilience’ and this PhD thesis explored these through three research aims.

The first research aim of this PhD thesis was to understand the emerging role of civil society in local FRM and the associated implications for the division of roles and responsibilities with public authorities in governing local FRM. Previous research has begun to explore the shift in the division of responsibility for FRM (e.g. Butler & Pidgeon 2011; Johnson & Priest, 2008; Meijerink & Dicke, 2008) and the growing role of civil society in local FRM (e.g. Edelenbos et al., 2017; Geaves & Penning-Rowsell, 2015; Seebauer et al., 2018; Thaler & Priest, 2014). This PhD thesis extended and added to these discussions by focusing on identifying the roles and contributions of civil society actors in FRM and how these actors are organised (Research Question 1). The growing role of civil society also has implications for authority-citizen interactions in FRM. There is a growing body of FRM and climate change adaptation research that focuses on co-production between citizens and authorities (e.g. Mees et al., 2016; Mees et al., 2018) as well as moving “from citizen participation to government participation” (Edelenbos et al., 2017; Mees et al., 2019:198). There are potential FRM benefits in having a more active civil society, but this depends on how public authorities interact with these citizens and whether or not they are ‘defensive’ towards these new actors engaging in the FRM landscape (Edelenbos et al., 2017). This PhD thesis further extended these discussions by exploring the interactions between civil society and public authorities as well as the ways in which authorities are redefining their own roles and governance approaches in FRM (Research Question 2).

The second research aim of this PhD thesis was to interpret the concept of ‘resilience’ for FRM and to explore how civil society can influence ‘flood resilience’ in practice. There are challenges with the ‘resilience’ concept and critiques of its vague and ambiguous nature as well as the lack of a unifying theory (e.g. Coaffee et al., 2018; De Bruijn, 2004; Parker, 2020). The breadth of potential interpretations, in part due to its application across many different disciplines (Alexander, 2013), has led to confusion in practice and to practitioners focusing on more static and engineering perspectives of resilience as opposed to those embracing change (De Bruijne, Boin & Van Eeten, 2010; White & O’Hare, 2014). There has been limited research investigating the interlinkages between the growing civil society role and ‘resilience turn’ in FRM. There are

notable exceptions (including McEwen et al., 2017 and McEwen et al., 2018) and these identify specific community capacities (e.g. local knowledge) that civil society can potentially access to increase local flood resilience. This PhD thesis contributed to these discussions by further exploring and clarifying the concept of resilience in the context of the rising importance of civil society in FRM through ‘community resilience to flooding’ and ‘local level flood resilience’ (Research Question 3). In doing so, the PhD thesis contributed to discussions on how civil society actors, through their capacities, influence flood resilience.

The third research aim of this PhD thesis was to critically investigate issues of fairness and socio-spatial inequalities that may potentially arise as a result of the shifts towards a greater civil society role and towards resilience in FRM. These two shifts are often framed as being unquestionably desirable and positive. For example, citizens are argued to be empowered by having a greater role in FRM and can develop their ‘stewardship’ (e.g. Shelfaut et al., 2011), and the turn to resilience in FRM can be seen as a way to increase the ability of citizens to ‘survive and thrive’ in the face of dangerous and changing future flood conditions (ARUP, 2014; Pendall, Foster & Cowell, 2010). Conversely, there are critiques that the increasing responsibilities taken on by civil society are being used by the government to retreat from its duties and focus on cost-cutting as opposed to empowering citizens (e.g. Begg, 2018; White & O’Hare, 2014). Furthermore, the turn to resilience ignores the inherent spatial variation and unequal distribution of vulnerabilities and capacities of citizens to ‘survive’ flooding and to take FRM actions (e.g. O’Hare & White, 2018). This PhD thesis contributed to these discussions by critically investigating potential issues of fairness and socio-spatial inequalities that arise when civil society actors play a greater role in local FRM and when pursuing flood resilience in practice (Research Question 4).

This PhD thesis explored the ‘rise of civil society in governing flood resilience’ in the FRM context of England and the Netherlands. Both of these countries are actively encouraging and seeing evidence of a growing civil society role in local FRM. Furthermore, both countries are shifting towards flood resilience approaches¹⁴ and developing strategies that aim to reduce flood consequences as well as flood risk. This PhD thesis collected data in both countries with a specific focus on the Upper Calder Valley in England and the city of Arnhem in the Netherlands.

This chapter draws the previous chapters together to address the three research aims by answering the associated four research questions identified in this PhD thesis relating to: civil society actor roles and contributions to FRM as well as how they are organising themselves

¹⁴ For example, ‘Making Space for Water’ (2005), the ‘25 Year Environment Plan’ (2018) and the Draft National Flood and Coastal Erosion Risk Management Strategy for England (2019) in England and the ‘Room for the River’ programme (2006), Multi-Layered Safety Approach (2008), and Delta Plan on Spatial Adaptation (2018) in the Netherlands.

(section 6.2.); citizen-authority interactions and how authorities are redefining their own roles and governance approaches in the context of FRM (section 6.3.); interpreting resilience in the context of flooding and exploring how civil society actors, and their capacities, potentially influence flood resilience (section 6.4.); and the potential implications of the two shifts in FRM in terms of issues of fairness and socio-spatial inequalities (section 6.5.). After addressing each of these research questions, this chapter will present and discuss the overarching conclusions of the PhD thesis (section 6.5). Finally, recommendations for policymakers and planners (section 6.6) will be presented as well as future research avenues that should be further explored in connection to the findings of this PhD thesis and final remarks on the value of flood resilience (section 6.7).

6.2. The Role of Civil Society in Local Flood Risk Management

The first research question began by analysing (1) civil society's existing role and potential contributions to FRM, before proceeding to explore (2) how these civil society actors are organised to take such roles and make these contributions to FRM. This is especially relevant in the context of national programmes such as 'Big Society' in England and the 'Participation Society' in the Netherlands, which have encouraged a greater role for civil society in contributing to solving local challenges by volunteering their time and efforts (Verhoeven & Tonkens, 2013).

6.2.1. Civil Society Roles and Contributions to Local Flood Risk Management

This PhD thesis identified civil society contributions to FRM in the form of physical actions and resources (e.g. Geaves & Penning-Rowsell, 2015), knowledge (e.g. O'Brien et al., 2014; McEwen & Jones, 2012), and advocacy activities (e.g. Neill & Neill, 2012; Roth & Warner, 2007; Thaler & Priest, 2014) in England, the Upper Calder Valley, and Arnhem (See Table 6.1).

This PhD thesis then extended these research findings and identified three additional important roles that civil society undertook in the context of local FRM: 1) The 'knowledge intermediaries' role in England and the Netherlands (Chapters 2, 3 and 4): civil society gathered local knowledge (e.g. of the local context in the Upper Calder Valley and video evidence of flood experiences in Arnhem) that supported policymakers in decision-making and the development of flood modelling. Citizens also acted as knowledge disseminators for raising flood risk awareness in the Upper Calder Valley as well as raising awareness of the potential FRM actions that individuals could take for their own property in the Upper Calder Valley and in Arnhem. 2) The 'citizen activation' role in England and the Netherlands (Chapters 2, 3 and 4): flood groups in England played an important role in activating local citizens and neighbours to be more aware of their own flood risk and to take greater responsibility for taking protective or flood risk reduction measures. Citizen collectives in Arnhem did not work on raising flood risk awareness, but played an important role in encouraging fellow citizens to undertake activities that could reduce flood

Physical Action and Resources				
Mitigating Risk	Reducing Consequences	Creating and accessing resources	Providing resources	Experimenting
Installed rain barrels and green roofs (A); Greened parking area (A); Created temporary water storage areas (E); Created community flood plans (E); Created and supported flood warning systems (E); Cleared out ditches (E); Implemented natural flood defences and tree-planting (UC); Erected temporary flood gates and barriers (UC)	Provided clean-up equipment in Flood Stores (E) (UC); Formed community support networks to help vulnerable people during a flood (E); restored utilities and services immediately after a flood (UC); helped to remove flood debris and clean flood-contaminated buildings (UC); provided psychological support post-flood (UC)	Accessed funds to support scheme to install rain barrels (A); Accessed cheaper materials by purchasing at scale (A); Set up and maintained Flood Stores (E) (UC); Set up online 'flood fund' (UC); Set up schemes to raise funds in anticipation of next flood event (UC); Created and supported flood warning systems with authorities (E); Took part in authority competitions and schemes (A)	Accessed community funds for installation of rain barrels (A); Provided flood insurance help (E); Undertook community fundraising for flood mitigation and recovery measures (E) (UC); Attracted funding for property level protection measures (E); Accessed local community funds (E) (UC)	Tried small-scale forms of pluvial FRM (A); Set up Flood Hubs (UC)
Knowledge				
Gathering knowledge	Verifying/updating existing knowledge	Providing knowledge to authorities and citizens		
Took photos and videos and uploaded them to social media (A); Surveyed fellow residents to gather local ideas (A); Gathered ideas and opinions through online flood platform (A); checked river gauges and river monitoring (E); identified watercourse blockages and obstructions (E)	Uploaded photos and videos used to verify authority flood models (A); Knowledge inputs corrected authority data on previous flooding and helped fill existing knowledge gaps (E)	<u>To Authorities:</u> Provided neighbourhood renewal ideas (A); Provided ideas, knowledge and potential FRM solutions (A); Shared local knowledge and data on the local area, drainage systems, past flood experiences, rainfall data, river and road ownership, and 'pinch points' to watch during heavy rainfall (E) (UC) (A); Reported river blockages and conducted village sewer surveys (E); Shared real-time flood experiences (UC); <u>To Citizens:</u> Shared flood risk warnings and information on floods and FRM with local citizens and businesses (E); Created community flood plans (E)		
Advocacy Activities				
Campaigning for authorities to change FRM approach		Raising awareness of flood risk and of potential citizen actions		
Complained after pluvial flooding (A); Directly challenged authorities' FRM suggestions (A); Attended a council meeting (A); Wrote an open letter to authorities (A); Used the online platform to organise campaigning (A); Developed flood attenuation ponds (E); Objected to planning applications (E); Objected (and forced changes) to new building developments that would increase flood risk (E); Encouraged FRM to appear in land use plans (E); Lobbied decision-makers to invest money into their communities to protect them against flooding (E)		Encouraged citizens to buy rain barrels (A); Ran Climate Carousels (A); Ran morning walks (A); Publicised potential citizen actions in the local newspaper (A) (E); Used online flood platform to keep residents updated (A); Started education initiatives on current and future flood risk for citizens and schools (E); Handed out leaflets (E) (UC); Produced YouTube videos and an online training module, and provided personalised flood plans with contact information (E); Created flood group websites (UC); Served as a reminder to local people of past flooding and of the current flood risk (E) (UC); Encouraged the installation of property-level protection measures and the modification of properties to reduce damages from flooding (UC); Showcased potential citizen actions (A); Created and ran flood risk sessions in a water museum (A)		
Sources: Forrest, Trell & Woltjer, 2017; Forrest, Trell & Woltjer, 2019; Forrest, Trell & Woltjer, 2020. (A) = Arnhem; (UC) = Upper Calder Valley; (E) = Other locations in England				

Table 6.1: Overview of civil society contributions to local FRM identified in this PhD thesis and based upon the typology developed in Chapter 4. (Source: Author)

risk, such as urban greening. Previous literature already describes how changes in FRM are leading to greater expectations of citizens becoming more active flood risk managers (e.g. O'Hare & White, 2018) and this thesis identifies civil society actors as indeed taking a greater role in activating citizens to engage in FRM and to be more responsible for their own flood risk.

3) The 'flood risk management innovators' and 'experimenters' role in England and the Netherlands (Chapters 3 and 4): civil society organised themselves to solve a flood problem, for example, setting up novel flood hubs in the immediate aftermath of floods in the Upper Calder Valley and innovating to rapidly respond to the flood disaster (Chapter 3). Citizen collectives also tried out novel small-scale forms of pluvial FRM and took risks that authorities were not able to take themselves by experimenting with new pluvial FRM technologies in Arnhem (Chapter 4). Several of the identified initiatives in both countries were active in seeking out funding for their pluvial FRM experiments. For example, Treesponsibility and flood groups in the Upper Calder Valley experimented with tree planting and the installation of 'leaky dams' along the valley (Chapter 3) and a neighbourhood group experimented with green car parking in Arnhem (Chapter 4).

Civil society actors took on additional responsibilities through their contributions, for example, by taking a key role in the immediate flood response and recovery in England (Chapter 3) and taking actions on their own property to reduce flood risk in the Netherlands (Chapter 4). These actors also replicated the tasks of authorities, such as clearing out watercourses (Chapter 2) and disseminating flood risk warnings (Chapter 3) in England. This afforded civil society actors the ability to exploit potential opportunities to influence local FRM. For example, the creation of the Much Wenlock Neighbourhood Plan by a local flood group (with advice from local authorities) afforded a new opportunity for civil society to influence local FRM in a way that they could not previously achieve. This neighbourhood plan offered the opportunity for the local flood group to determine guidelines for local planning and development that, after a local referendum, became policy that local authorities had to adhere to (Chapter 2). In this way, civil society was able to influence local FRM and create a legal document (the neighbourhood plan) that prioritised their FRM concerns.

In England, the community-based and voluntary nature of the civil society groups meant that they could take actions that authorities could not undertake themselves. For example, flood groups were able to access specific community funds that were not available to the local authorities (Chapter 2). Furthermore, their close personal relationships with local residents and their working relationships with authorities meant that the flood groups were able to act as knowledge intermediaries and communicate local knowledge and flood risk warnings between authorities and citizens. These established relationships meant that authorities were comfortable in sharing their flood risk warnings in the knowledge that they would be

communicated accurately and not sensationalised (Chapter 2). At the same time the community also trusted the flood groups to provide reliable flood risk information and warnings (Chapter 3).

Previous research has identified that civil society actors can play an important role as first responders during a flood event (e.g. Masterson et al., 2014). This PhD thesis illustrates that civil society actors not only have a critical role during flooding, but also deliver relevant contributions before, during and after a flood event (Chapter 3). The PhD thesis found that civil society actors undertook actions on their own in the absence of the authorities during flooding: flood group members and flood wardens were sources of flood knowledge and emergency responders during flooding in England (Chapter 3). These civil society actors were present in flood-affected areas that were cut-off from neighbouring areas due to the floods and took a coordination role during the flood response when authorities were unable to. In the Netherlands, civil society actors also played a role when there was no imminent flood event by initiating FRM actions on privately owned land in a way that could not be done by the authorities. For example, local residents created more neighbourhood-specific pluvial FRM solutions by working together to purchase, install and maintain green roofs as a citizen collective in Arnhem (Chapter 4). Authorities are not always able to develop these more tailored and neighbourhood-specific pluvial FRM solutions due to their limited resources when compared with the number of neighbourhoods in their remit.

6.2.2. Organisation of Civil Society Actors

The PhD thesis identified different ways that civil society actors organised themselves when contributing to FRM. Previous research has identified civil society's involvement in FRM as being formal and organised through citizen initiatives such as flood groups (Seebauer et al., 2018) as well as being informal and rapidly assembled 'spontaneous volunteers' (Cabinet Office, 2019a; Cabinet Office, 2019b; O'Brien et al., 2014). The ways in which civil society actors organise themselves can influence their ability to take action to address local flood problems and understanding how they organise themselves can support future efforts to promote civil society engagement in FRM.

This PhD thesis identified several organisational forms of civil society actors including both formal and spontaneous citizen contributions to FRM (Chapters 2, 3 and 4). The most prominent civil society actors contributing to FRM in England were 'flood groups', which were formed by local citizens in response to recent flood events (also identified by Geaves & Penning-Rowsell, 2015). The number of flood groups has been increasing partly due to recent experiences of significant flooding as well as government actions, such as the 'Flood Resilience Community Pathfinder Scheme 2013-2015' that provided resources for community actions and flood groups,

and efforts by the National Flood Forum (a national charity) to stimulate the establishment of further flood groups (Geaves & Penning-Rowsell, 2015; McEwen et al., 2018; Seebauer et al., 2018). Flood groups are a relatively new phenomenon in FRM and therefore this PhD thesis developed a working definition for these civil society actors:

“A flood group is primarily made up of a group of individuals with a personal interest in local flood issues who frequently meet with one another in specific flood group meetings to discuss flood-related issues in a specific geographical area. In addition to meeting, a flood group is often involved in action and/or advocacy on flood-related issues in their local area. Importantly, the individuals comprising a flood group form a shared identity that arises from having been affected by a shared flood event, by having a shared local flood source and/or a shared local geographical area at risk of flooding” – Chapter 2, from Forrest et al., 2017

For the Netherlands, this PhD thesis identified relevant civil society actors that contributed to local FRM. These were extensions of existing local resident organisations (e.g. working groups of Neighbourhood Platforms), connected to larger-scale city-level organisations (e.g. Green Arnhem), and existing citizen collectives. This PhD thesis also identified instances of local residents coming together to create informal citizen collectives and collaborate specifically on local FRM actions (Chapter 4).

Furthermore, the findings of this PhD thesis show that citizens in both countries have organised themselves and created certain processes and structures in order to achieve their desired aims and contribute to FRM in a specific way. For example, flood groups in Much Wenlock and the Upper Calder Valley (England) created communication structures to communicate between members, disseminate flood warnings to citizens, and to interact with fellow residents. These structures included telephone trees to convey flood risk information internally and websites to publicly display flood warnings and provide flood advice. Another example is the creation of ‘flood stores’ by flood groups. These flood stores contained equipment to help local citizens, such as sandbags, road signs (to warn drivers of flooding), and cleaning supplies to help the post-flood recovery. The flood groups came up with the idea of these flood stores, secured funding and permission to place them, and created protocols for the maintenance and opening of these flood stores. In the Netherlands, civil society actors also organised themselves through pre-existing ‘neighbourhood platforms’ in Arnhem that encouraged residents to take actions through ‘climate cafes’ and used morning walks to provide inspiration for innovative green measures that can reduce potential pluvial flooding, as well as working with like-minded neighbours to install green roofs and rain barrels (Chapter 4).

These processes and structures were also improvised and developed rapidly in response to changing flood conditions. For example, flood groups in the Upper Calder Valley created novel 'flood hubs' in response to flooding and were a mixture of flood group members (who had not been flooded) and rapidly assembled spontaneous volunteers (Chapter 3).

In both England and the Netherlands, key community members and local leaders were identified in this PhD thesis as being important in the formation and activities of civil society actors in FRM. These key community members and local leaders have been identified as being important in disaster management with Thornley et al. (2015) identifying them as 'community infrastructure' in promoting community resilience in disasters. This PhD thesis identified them as being important in community resilience to flooding because of their expertise (e.g. organising skills), ability to access different social networks, and desire to put time and effort into local FRM (Chapters 2, 3, 4 and 5). However, this PhD thesis also found that civil society actors are also vulnerable if these key community members and local leaders reduce their participation or withdraw completely (Chapter 5).

The activeness of civil society appeared to be dependent on the extent of flooding (as identified previously by Geaves & Penning-Rowsell, 2015), although this PhD thesis also found that this changed over time due to active forgetting and apathy as well as being dependent on the 'immediate' flood risk (Chapters 2, 3, and 4). Time and place were identified by this PhD thesis as being important in the organisation of flood groups in England: flood groups changed in response to local flooding with citizens choosing involvement immediately after the flood events (Chapter 2 and Chapter 3), but involvement reduced after a prolonged period of time with no flooding with signs of active forgetting and apathy towards flood risk (Chapter 3). Place was important in civil society contributions with flood groups members having strong relationships with their local place and community (Chapter 3). In both England and the Netherlands, willingness to contribute was also important and there was a distinction identified for the motivations for citizens to contribute with fear of future flooding being a driver for those in flood groups in England (Chapter 2 and Chapter 3) whereas those in Arnhem were not connecting their activities to fear of future flooding, but instead to the 'fun' of taking action to improve their neighbourhoods (Chapter 5).

6.3. Citizen-Authority Interactions

The emerging civil society role and contributions in FRM has implications for the traditional governance arrangements for managing flood risk. In answering research question 1, this PhD thesis found that civil society actors took on additional responsibilities in local FRM by replicating the traditional tasks of public authorities and by undertaking activities that could not be done solely by public authorities. This emerging civil society role in the local FRM

landscape may therefore lead to changes in the distribution of tasks and responsibilities between public authorities and civil society. In answering the second research question, this PhD thesis identified five forms of authority-citizen interactions as well as focusing on how these authorities are redefining their own roles and governance approaches in the context of FRM, in addition to the importance of resources and maintaining flexibility in these authority-citizen interactions.

6.3.1. Five Forms of Interaction

This PhD thesis identified five different forms of authority interactions with civil society and the roles that these authorities are holding: 1) traditional, authority-initiated approaches, 2) creating opportunities for citizen engagement, 3) working in collaboration with civil society, 4) authorities providing additional support, and 5) authorities integrating civil society activities into formal plans and processes. These five different forms range from command-and-control approaches to water management by public authorities (Pahl-Wostl, 2009) to more facilitative forms of governance (Mees et al., 2019).

The traditional, authority-initiated consultations were identified in Arnhem with public authorities first deciding on potential FRM measures and then presenting citizens with a selected range of options. These interactions were relatively one-way and citizens were limited in their ability to determine the scope of their involvement, the method of interaction or the potential contributions that they wanted to achieve (based on Edelenbos et al., 2017). Public authorities also consulted flood groups in England (see Figure 6.1) on proposed plans and documents.

The second form was the use of more dialogic approaches where public authorities attempted to create opportunities for citizen engagement. For example, public authorities employed comedians to go door-knocking in Arnhem in order to encourage citizens to voice frustrations and share ideas for local FRM. In this example, the public authorities attempted to encourage citizens to think about FRM and to facilitate the sharing of FRM ideas using the comedians.

A third form was of public authorities working in collaboration with civil society in forms of co-production (as previously identified by Mees et al., 2018). Authorities in England shared physical (e.g. meeting rooms and physical spaces), financial (e.g. providing small loans), and knowledge (e.g. sharing staff expertise) resources with flood groups and asked civil society for input in designing and drafting FRM plans (see Figure 6.1). There was variation in processes of decision-making and goal-setting between the examples of collaboration: in some cases, authorities determined a goal and then engaged with civil society to try to achieve this goal, for example, the Environment Agency in England wanted flood wardens to report high river levels to their regional offices. In this example, the authorities provided resources and worked in collaboration with civil society to achieve their own aims. A contrasting form of collaboration was with flood

groups where the County Council shared their expertise with flood groups and provided them with financial resources (from the national Pathfinder Scheme), but the flood groups determined their own goals and contributions to FRM.

Figure 6.1: Overview of interactions between public authorities (County Council, Local/Parish Council, and Environment Agency) and flood groups in England (Source: Chapter 2; Forrest et al., 2017)

The fourth form was of authorities providing additional support to civil society actors beyond their formal responsibilities. For example, this PhD thesis found evidence of public authorities in England going beyond their assigned duties to support flood group formation (for example the Pathfinder Scheme in Chapter 2). Public authorities in England were also found to be creating formal structures (i.e. neighbourhood coordinators) post-flood to support flood groups and try to reduce the pressure (i.e. bureaucracy) for volunteers (Chapter 3).

A fifth form of interaction was of authorities integrating civil society contributions into formal plans and processes. This PhD thesis identified that civil society actors were able to respond rapidly and more flexibly than authorities in some cases (see 6.2.1) and they were able to develop context-specific (in terms of place and flood conditions) solutions in response to the problems they were facing. This was most evident during and immediately after a flood. Citizen-organised flood hubs were formed in the Upper Calder Valley and these were responsive to the local needs in the immediate aftermath of flooding (Chapter 3). This PhD thesis found that public authorities in the Upper Calder Valley recognised the value of flood hubs as a source of local

support in a flood event and, instead of attempting to replicate or take over these forms of organisation, integrated them into their own formal emergency plans (Chapter 3). Authorities learnt of the role of the flood hub, recognised their value (especially in the immediate aftermath of flooding and in the absence of authorities), and integrated the 'flood hub' into their formal emergency plans. This interaction is recognition by authorities that civil society can take beneficial actions that they are unable to also match and, instead of attempting to replicate these contributions, the authorities are transferring the responsibility for these actions to civil society. In the Netherlands, authorities in Arnhem identified photos and videos of the 2014 flood event and then used this to support their flood modelling efforts (Chapter 4). In this case, the authorities also did not attempt to replicate the contributions of civil society, but instead identified and integrated them into their formal FRM processes (i.e. flood modelling).

6.3.2. Resources and Flexibility

These five forms of interaction centred on the authority-citizen relationship and two key considerations of resources and flexibility emerged across the different cases. Firstly, authorities played different roles in the five forms of interaction and there were differences in the amount of resources that they needed to commit in these interactions. The first two forms of interaction required relatively low time investment by authorities as they either followed their normal consultation processes (form 1) or created an opportunity that was outsourced to other actors (i.e. comedians) (form 2). However, the third and fourth forms may be relatively more resource intensive for public authorities and there may be a limit to the number of flood groups or civil society actors that they can support after which it may become unsustainable for public authorities. The fifth form of interaction required fewer authority resources as they avoided the need for authority to experiment themselves and allowed the authority to integrate successful solutions developed by civil society actors into their formal plans and processes (e.g. 'flood hubs' in the Upper Calder Valley) whilst not engaging in less successful solutions (e.g. the greening of car parking areas in Arnhem).

Secondly, civil society actors can act more flexibly and in a more responsive manner in contributing to FRM than traditional authorities and this may be lost due to the form of interaction utilised. For example, the neighbourhood coordinators provided support for flood groups, but this also meant that simple purchasing actions (e.g. buying materials) had an extra layer of inflexible bureaucracy as flood groups needed to go through the official coordinators and this slowed down the speed that local flood groups could take action (Chapter 3). Furthermore, the flood hubs' activities arose through spontaneous volunteers and local leaders and were able to quickly respond to the sudden flood damage and disruption that arose in the Boxing Day floods. Whilst the formalising of flood hubs into emergency plans can make it easier to use certain buildings in the future for flood response/recovery, it may also create additional

rules and obligations that need to be followed in future flood emergencies. These additional restrictions may hinder the ability of civil society actors to respond rapidly to changing flood conditions.

6.4. Interpreting Resilience

The third research question explored both the interpretation of resilience in the context of flooding as well as how civil society actors, and their capacities, potentially influenced flood resilience. Policymakers and planners are increasingly pursuing ‘resilience’ in practice and seek to make people and places ‘more resilient’ as they aim to fulfil internationally defined targets relating to the Sustainable Development Goals (e.g. Goal 11 and Goal 13¹⁵) as well as the Sendai Framework for Disaster Risk Reduction (2015-2030). Despite the increasing prominence of the resilience concept, the concept has been critiqued as being vague with some interpretations of resilience omitting key questions such as: resilience of what, to what and for whom? (Carpenter et al., 2001; Davoudi, 2012; Lebel et al., 2006). The vagueness can also create confusion when applying the concept in practice as ‘resilience’ has been interpreted to mean both resisting change and aiming to return ‘back to normal’ as well as embracing change and ‘bouncing forwards’ through incremental adaptation or transformation (Alexander, 2013; Davoudi, 2012; Hegger et al., 2016; Liao, 2012; Twigger-Ross et al., 2014). These differences in interpretation can lead to difficulties in consistently understanding the concept of resilience in the context of flooding and this lack of a unifying theory is part of the problem with resilience (Disse et al., 2020; Parker, 2020). Therefore, this PhD thesis first interpreted the resilience concept in the context of flooding and then explored the potential ways that civil society can potentially influence flood resilience.

The PhD thesis identified and developed two interpretations of resilience in the context of flooding: 1) community resilience to flooding, which places community capacity and capitals at the heart of the analysis; and 2) local level flood resilience, which has place and time as central to the analysis.

6.4.1. Community Resilience to Flooding

The first interpretation of resilience in the context of flooding that this PhD thesis explored was ‘community resilience to flooding’. Previous research has identified the ability of communities to work together to solve a problem and their potential contributions to community resilience to disasters (e.g. Cutter et al., 2008; Masterson et al., 2014; Norris et al., 2008). This PhD thesis extended this work by specifically focusing on flooding and developing an understanding of

¹⁵ Goal 11: Make cities inclusive, safe, resilient and sustainable; Goal 13: Take urgent action to combat climate change and its impacts

community resilience to flooding at the local level in the English context (Chapter 2). This concept utilised the idea of ‘community capacity’, which is the “sum of the individual and organisational capacities within a community” and their collective ability to achieve “community goals” (Masterson et al., 2014:36). The PhD thesis drew on and adapted the capacities proposed by Cutter et al. (2008) and Norris et al. (2008) in order to outline four different forms of socio-spatial capitals that together comprise community capacity (See Figure 6.2): the community’s social connectedness (social capital), the spatial planning and physical characteristics in the community (natural/built environment capital), the capacities of individuals (human capital), and the economic resources available in communities (economic capital).

Figure 6.2: Community resilience to flooding conceptualised as four networked socio-spatial capitals (Source: Chapter 2; Forrest et al., 2017)

This PhD thesis further extended previous research by Cutter et al. (2008) and Norris et al. (2008) by using this framework as a foundation to explore the potential influence of a specific actor (in this case, flood groups, a civil society actor in England) on these community capitals. Flood groups were predominantly contributing to expanding social capital of their communities by strengthening social networks and connections with the authorities. Flood groups also contributed to human capital by identifying and supporting vulnerable residents as well as by increasing flood risk awareness. However, the small-scale nature of flood groups meant that their influence on the natural and built environment capitals was restricted to smaller, less resource-intensive activities, which were strongly dependent on the local context and limited by resource availability. More extensive activities such as greening of urban areas or advancing water-sensitive urban design were relatively ignored by the flood groups interviewed and surveyed in England (Chapter 2). This was also true for their ability to influence economic capital within communities as the flood groups’ financial resources were dependent on their fundraising ability (Chapter 2). Overall, flood groups were able to influence community resilience to flooding by supporting and developing certain socio-spatial capitals in the community, but there were limitations based upon their own resources.

6.4.2. Local Level Flood Resilience

The second interpretation of resilience in the context of flooding that this PhD thesis explored was 'local level flood resilience'. In order to explore this interpretation, which relates strongly to the characteristics of resilience, this PhD thesis identified three mainstream perspectives of resilience characteristics from previous research: engineering resilience, ecological resilience, and evolutionary resilience (Hegger et al., 2016; Liao, 2012; McClymont et al., 2019; Twigger-Ross et al., 2014; Zevenbergen, Gersonius & Radhakrishnan, 2020). These three perspectives conceptualise resilience as being bounce-back and a 'return to normal' (i.e. engineering resilience), bouncing forwards and 'returning to a new normal' (i.e. ecological resilience), or continuously changing as opposed to reaching a stable 'normal' (i.e. evolutionary resilience) (ibid). This PhD thesis interpreted these three perspectives in the context of flooding and combined parts of these definitions to develop its own interpretation for local level flood resilience: the interpretation that was developed considers civil society contributions to local flood resilience as focusing on withstanding and then recovering from flooding in the traditional engineering perspective of resilience. Furthermore, the interpretation also integrates aspects of ecological and evolutionary resilience to also consider the potential for civil society contributions to cause changes in place, as opposed to the local level focusing on "returning to normal," in the form of adaptation and transformation. This interpretation focused more on the activities undertaken by multiple civil society actors and how these potentially influenced local level flood resilience. Resilience in the context of flooding was understood across time and by looking at three time points (before, during, and after the flood) the PhD thesis was able to extend previous research by not only providing a single snapshot of resilience, but providing empirical evidence of how flood resilience changes over time and in relation to a flood event. Furthermore, this interpretation of resilience understood place as being central and therefore focused on the relationship between resilience characteristics and the specific place-based qualities (in terms of the socio-spatial environment: both people/social environment and physical environment) present.

This PhD thesis extended previous research on resilience in the context of flooding by collecting empirical evidence of how different civil society actors in England contribute to the three dominant perspectives of resilience characteristics (Chapter 3). Previous research has highlighted that there may be a short-term focus on bounce back approaches instead of more transformative, longer-term thinking in practice (Davoudi, 2012; Twigger-Ross et al., 2014; White & O'Hare, 2014). This PhD thesis identified civil society contributions that focused on engineering perspectives of bouncing back from the flood and returning to normal (e.g. the creation and flood stores to recover from flood damages) as well as ecological perspectives of incremental adaptation (e.g. the creation of 'Watermark', a scheme that provided an economic

safety net to local businesses). Furthermore, this PhD thesis identified civil society contributions that aligned with evolutionary perspectives and aimed for a transformation of perceptions and social networks. Overall, this interpretation of resilience in the context of flooding allowed the analysis of how civil society contributions related to the three mainstream perspectives of resilience characteristics in a specific place during three time periods in relation to the flood event.

These two interpretations of resilience in the context of flooding and the frameworks developed in this PhD thesis provide a foundation for understanding the contributions of civil society to flood resilience. However, it is also important to highlight the limitations and considerations associated with these interpretations. Firstly, the frameworks themselves are simplifications of reality that need to be tailored to the specific context and flood risk histories of the place before being used. For example, the capitals for community resilience to flooding in a context with a strong indigenous tradition may need to be amended to include indigenous knowledge as its own form of capital. In addition to the need to consider place, it is also important to account for time and how the civil society actor(s) being analysed change over time. Time is somewhat omitted in the community resilience to flooding framework, but is captured by the framework on local level flood resilience. Furthermore, the frameworks may need to be amended depending on relevant factors that emerge in the course of the analysis. For example, the second framework did not initially capture power dynamics and issues of representation, but these emerged as relevant factors and were included later in the data analysis. Secondly, the term ‘community’ has often been romanticised and can refer to individuals within certain geographical areas, with specific political or religious beliefs, or other shared interests. The findings of this PhD thesis highlight the need for critical attention to be paid to the extent that the ‘community’ can be fully represented by civil society actors (also a critique by Coates, 2015 and Wilson, 2012).

6.5. Fairness and Equality

The fourth research question of this PhD thesis focused on the potential implications of the growing civil society role and the resilience turn in FRM in terms of issues of fairness and socio-spatial inequalities. The issue of flood risk is “inherently unfair” (Johnson, Penning-Rowsell & Parker, 2007:387) with socio-spatial variation in flood risk exposure. Whilst the involvement of communities has been described as “essential to addressing disadvantage” in FRM, the ability and willingness of citizens to be involved in FRM may privilege those who already possess relatively strong capacities to deal with flooding (O’Hare & White, 2018:392). For example, cohesive communities with high social capital are better able to mobilise their views on issues and influence planners and planning decisions (Aldrich & Crook, 2008), which can allow more influential communities to extend their privileged status in influencing FRM at the expense of their fellow, less-active citizens who are unable to mobilise themselves to the same extent. The

resilience turn in FRM also raises potential issues of equality with the resilience concept's prevailing narrative being one of aiming to 'survive and thrive' in the face of shocks (ARUP, 2014; Pendall et al., 2010). Research question 3 identified the importance of socio-spatial capacities (i.e. relating to social, economic and human capitals as well as natural/urban environment capital) in influencing resilience in the context of flooding, but these are unequally distributed across space with citizens having differing vulnerabilities and capacities to cope with flood events, to recover after floods, as well as to take FRM actions that help prepare them for future floods, and thus pursue flood resilience (O'Hare & White, 2018).

The PhD thesis identified the emerging role of civil society and the resilience turn in FRM as resulting in 1) issues of representation and exclusion, and 2) potential socio-spatial inequalities

6.5.1. Representation and Exclusion

This PhD thesis identified issues of fairness, concerning representation and exclusion within civil society actors, linked to both shifts in FRM. Research question 3 highlighted the issue of representation when it critiqued the often-romanticised nature of the term 'community' and questioned its specific meaning when many different forms of 'community' with different common attributes and interests exist within the same spatial boundaries. Previous research has discussed membership of flood groups (as done by Geaves & Penning-Rowell, 2015) and research question 4 of this PhD thesis goes beyond this by specifically focusing on how the membership of civil society actors influenced the fairness of their FRM contributions.

The membership of flood groups in England was explored (Chapter 2) and it was found that they did not always represent the full community in their local area. It was found that there was a higher proportion of older individuals and retirees in these flood groups. This was explained by the amount of time needed to participate in these civil society actors and associated volunteer fatigue (Chapter 3). This led to the unintentional marginalisation of those with families or full-time careers who found it difficult to attend meetings and participate fully, whereas older individuals and retirees were able to contribute more time for these activities (Chapter 2). This is problematic as it means that certain voices are excluded from the discussions and that decision-making may be done considering only the perspective of those present. Authorities interviewed were aware that the flood groups may not include everyone in the local area and their needs as they may not be in the same social networks or may choose not to engage (Chapter 3). These issues of representation between the civil society actors and the local residents may have also been responsible for certain disagreements between them regarding the siting of flood stores, with the perspectives of the flood group not always matching those of the local residents (Chapter 3). Therefore, these civil society actors were not made to be representative of the local area, but more 'self-selected' and containing those with the time and enthusiasm to participate.

Previous research has found that resilience policies may not necessarily benefit all community groups equally (Fainstein, 2015; Wilson, 2012) as well as potentially leading to certain groups being excluded by planners (Davoudi, 2012) and the presence of “powerful community voices” potentially leading to the exclusion of other local voices (Rydin, 2016). Therefore, it is important to monitor whether the rise of civil society in governing flood resilience is leading to the exclusion of a wider variety of voices. The PhD thesis identified examples of individuals becoming excluded from flood groups due to differences of opinion. For example, some flood group members were critical of the role of authorities in previous flood events and this led to tensions within the group and with the authorities. The critical members did not agree with the direction of the flood group and decided to leave. Whilst this was beneficial for consensus-building within the flood group and collaboration efforts with local authorities, it was problematic as it marginalised certain individuals at-risk from flooding and in effect excluded them from contributing to the flood group (Chapter 2).

This PhD thesis also identified examples of civil society actors recognising the potential problems with representation and trying to take action to involve as many citizens as possible in their decision-making and activities. For example, the Bodenham flood group in England created a network of ‘community representatives’ as a way to be representative of citizens. These individuals were responsible for representing specific local neighbourhoods as well as communicating their messages through specifically-created local websites, social media profiles, and newsletters (Chapter 2).

Furthermore, this PhD thesis specifically explored the presence of local leaders/key community members and their impacts on the issue of representation. In contrast to the benefits of these individuals in the formation and activities of civil society actors in FRM (previously discussed in research question 1), the PhD thesis also identified examples where local leaders and key community members had negative impacts on representation and exclusion (Chapter 2). The PhD thesis found that internal tensions and conflicts between different local leaders/key community members in the same flood group or between local leaders/key community members and more peripheral flood group members can have negative repercussions for the flood group as a whole. For example, in one case the tensions over who decided which FRM activities are undertaken and who is able to participate led to the creation of a separate flood group (Chapter 2).

6.5.2. Socio-spatial Inequalities

This PhD thesis investigated the potential socio-spatial inequalities that could arise from these two shifts in FRM. Recently there have been arguments that FRM policy and investment needs to take pre-existing socio-spatial vulnerability into account in England (England & Knox, 2016)

and Scotland (Kazmierczak et al., 2015). Previous research has identified social variation in flood risk exposure with previous research identifying certain groups of citizens, such as those who are poorer and in a lower social class (e.g. England & Knox, 2016; Fielding, 2012; Fielding, 2018), being more vulnerable to flooding. Furthermore, there is a spatial aspect of both vulnerability and capacities that can be based upon topography as well as access to services and facilities. These vulnerabilities and capacities can be understood as being ‘socio-spatial’ and the two shifts in FRM can lead to socio-spatial inequalities arising.

This PhD thesis identified three forms of socio-spatial inequality that arise from pursuing flood resilience: 1) existing socio-spatial inequalities that could be exacerbated by the shift, 2) ‘hidden’ socio-spatial inequalities in citizens’ vulnerability that have become relevant due to the rainfall flood risk, 3) new socio-spatial inequalities in citizens’ capacity to fulfil the responsibilities arising from the shift to living with floods.

This PhD thesis found that some citizens were not engaging with this narrative of living with flood risk and were not becoming more involved in FRM. The PhD thesis identified citizens who chose not to engage in civil society FRM actions, were reluctant and even unwilling to take property-level FRM measures, or were willing up to a certain point and then believed that it was the authorities’ responsibility after that (Chapters 3, 4 and 5). For example, the PhD thesis found evidence that citizens purposely avoided dealing with flood risk or did not want to admit having been flooded due to fears about the negative impacts on property prices and flood insurance policies (Chapter 2), as well as actively forgetting or showing apathy towards the risk of flooding (Chapter 3). This was summed up by one interviewee in the Upper Calder Valley as a “somebody else will sort it out” attitude and these citizens were not taking up their new responsibility to ‘live with flood risk’. In essence, these citizens were (knowingly or not) rejecting the ‘survive and thrive’ and ‘living with flood risk’ narratives of flood resilience by choosing not to engage in this shift towards accepting that flooding cannot always be prevented and that there needs to be a greater focus on reducing flood consequences. In choosing not to take up responsibilities to reduce their own flood risk and potential flood consequences, they were still subscribing to the perspective that the authorities are solely responsible for managing flooding by controlling the flood hazard (i.e. protection approaches) and preventing flooding of any sort.

6.6. Overall Conclusions

6.6.1. Pursuing Resilience

The term ‘resilience’ seems firmly embedded within international objectives (e.g. the Sustainable Development Goals and the Sendai Framework) as well as being commonly used in national, regional, city and local plans and strategies. There have been critiques of the vagueness and multiple interpretations of the resilience concept (e.g. engineering, ecological and evolutionary)

as well as tensions between its focus on stability and maintaining the status quo or adaptive capacity, transformation and dynamism (Alexander, 2013; Parker, 2020; White & O'Hare, 2014). The various interpretations of resilience have led to confusion and made it difficult to operationalise in practice (Coaffee et al., 2018; De Bruijne et al., 2010). Consequently, there are calls for a common understanding of resilience that can then be applied in practice (e.g. Disse et al., 2020; Parker, 2020), but also a recognition of the benefits of having multiple interpretations of the resilience concept and that the concept is influenced by the social context (Hutter & Kuhlicke, 2013; McClymont et al., 2019). Despite these tensions, the resilience concept is firmly embedded in policymaking and planning where it will likely remain for the foreseeable future and has been described as “more than a short-lived notion and it appears that FRM researchers cannot avoid addressing it” (Fekete, Hartmann & Jüpner, 2019:1). Therefore, it is necessary for academics to critically approach resilience and to support its theoretical development as well as its operationalisation in practice.

This PhD thesis contributes to the development of a common understanding of resilience, but also points to the need to tailor this to the specific context and include relevant place-based issues. This PhD thesis contributes to this aim by developing frameworks on community resilience to flooding (Chapter 2), local level flood resilience (Chapter 3), identifying socio-spatial inequalities arising from flood resilience (Chapter 5), and a typology for civil society contributions to FRM (Chapter 4). These frameworks and discussions in the PhD thesis are relevant in developing a common understanding of resilience that can be of use to international objectives and national plans and strategies.

This PhD thesis also points to the need for the understanding of the resilience concept to be tailored to be place-specific and incorporate place-based contexts and processes. The PhD thesis contributes to this by developing the frameworks based on common understandings of resilience from the literature, but then tailoring these to the specific context that they are to be applied in. The qualitative research approach used in the PhD thesis supports the identification of place-based issues as well as the multiple place-specific interpretations of resilience already in practice.

Overall, the PhD thesis contributes to unpacking the resilience concept through its findings on i) time, and ii) the local level.

Resilience and Time

Time matters in resilience, but its influence on resilience interpretations varies depending on the perspective applied. Engineering perspectives of resilience focus on the speed and time taken to recover after a disaster event and, in ‘returning to normal’, are past-oriented and may not address the underlying causes of risk (Coaffee et al., 2018; Kaika, 2017; Liao, 2012). Conversely,

ecological and evolutionary perspectives of resilience are more future-oriented with an acknowledgement of the need to respond to changing conditions (Liao, 2012; Zevenbergen et al., 2020). However, evolutionary perspectives are more dynamic than ecological perspectives by emphasising continuous change over time and the importance of adaptive capacity (Zevenbergen et al., 2020). Resilience has been conceptualised through distinct time phases within adaptive cycles (Davoudi, 2012; Disse et al., 2020; McClymont et al., 2019) and through a focus on attributes such as robustness, adaptation and transformation (Davoudi, Brooks & Mehmood, 2013; Folke et al., 2010; Restemeyer et al., 2015). These attributes are inherently time-based and represent short-term, medium-term and long-term perspectives to responding to the same shock.

This PhD thesis contributed to these discussions by exploring civil society contributions to flood resilience before, during and after a flood event. The PhD thesis found evidence that civil society were supporting different resilience attributes that ranged from resisting change and robustness (e.g. installing and erecting property-level flood protection), to allowing some incremental changes to the existing system and adaptation (e.g. greening spaces), and even embracing deeper transformational changes that restructure and reorganise the status quo (e.g. creating flood groups and flood hubs). These attributes could potentially interact, for example, short-term robustness measures (e.g. advocating the building of permanent flood barriers) can affect or even limit medium-term adaptation measures (e.g. accepting water on land) as well as long-term transformation processes (e.g. learning and responding to flood risk).

The PhD thesis raises critical questions over the rise of civil society in governing flood resilience over time. Civil society roles and contributions were dynamic, pervasive and influenced by the immediacy of flood danger. There was an intense initial response to the flood event, but interest and contributions by civil society diminished over time due to apathy, active forgetting, or lack of further flooding. These issues raise questions around the character of civil society contributions to resilience and their longevity and sustainability. Furthermore, authority-citizen interactions can change over time, especially whether authorities resist or embrace involvement, which can have implications for the governance of flood resilience. Therefore, the PhD thesis points to the need to not only understand how the nature and attributes of resilience change over time, but also how the governance of resilience and the actors pursuing resilience change over time.

Resilience and the local level

Resilience is affected by decisions at different scales, but there is a growing emphasis on pursuing resilience at the local level (Coaffee, 2013) with a growing emphasis on citizens and communities. Especially relevant are discussions on citizen and community contributions to local level

resilience through place-based capacities (e.g. Cutter et al., 2008; Norris et al., 2008). These discussions pay particular attention to the capacity of citizens to take collective action to achieve “community goals” or to solve a specific problem (Masterson et al., 2014:36). This capacity, also referred to as community competence or community capacity, is of particular interest as it suggests the ability to adapt to changing conditions and can be linked to evolutionary perspectives of resilience

This PhD thesis contributed to these discussions with its focus on capacities in understanding resilience in the context of flooding. The PhD thesis used the lens of community capacity (Chapter 2) as well identifying civil society capacities and contributions to FRM (Chapters 3 and 4). There was evidence of civil society encountering flood risk problems and using their local knowledge and expertise to find solutions. This was supported by the presence of local leaders, the ability to learn, and to improvise and create novel behaviours (e.g. setting up floods hubs in the Upper Calder Valley and experimenting with greening in Arnhem). Therefore, the PhD thesis findings suggest that civil society have not just adapted and occupied a new stable state to deal with flooding (i.e. following an ecological perspective of resilience), but also have the ability to adapt to changing conditions (i.e. adaptive capacity as suggested by evolutionary perspectives of resilience).

This PhD thesis identifies the importance of identifying, incorporating and harnessing place-based capacities that exist at the local level for flood resilience. However, the PhD thesis also found that these capacities are not equally distributed across the local level and therefore, there is also a need to focus on capacity building in neighbourhoods, communities and individuals.

6.6.2. Responsibility in Disaster Resilience

The PhD thesis has relevance in wider discussions of responsibility¹⁶ relating to disaster risk management and resilience. In disaster risk management there is an ongoing shift from central authority to individuals and the growing acceptance of ‘shared responsibility’ amongst multiple actors to manage disaster risk (Lukasiewicz, Dovers & Eburn, 2017; McLennan & Handmer, 2012; Scolobig et al., 2015). In FRM, the sharing of responsibility amongst multiple actors is seen as a “key tenet” in managing flood risk (Henstra et al., 2018:4; Johnson & Priest, 2008; Priest, 2019). In both disaster risk management and FRM, the exact balance between the state and citizens is unclear and contested with concerns of the government ‘retreating’ from its existing responsibilities (Begg, 2018; Geaves & Penning-Rowsell, 2015; Lukasiewicz et al., 2017). These discussions surrounding responsibility are also relevant for resilience, which has been used in

¹⁶ Responsibility can be understood as having a duty to take or to be accountable for a certain action. Lukasiewicz et al. (2017) classifies them as legal obligations, voluntarily assumed, or imposed by social expectations.

government policies to encourage the transfer of responsibility for risk from the state and to non-state actors and the “responsible citizen” (Coaffee, 2013:335; Welsh, 2014).

This PhD thesis contributes to these wider discussions regarding shared responsibility in disaster risk management and in resilience through its focus on civil society’s role and the division of responsibilities with authorities. The PhD thesis found indications of local government retreating (e.g. in relying on voluntary flood groups to maintain local watercourses), but also of them going beyond their assigned duties to support civil society (e.g. by providing additional time and expertise to support the flood groups). Furthermore, the PhD thesis found that civil society actors were able to contribute in ways that public authorities were not able to do on their own, for example, by acting as first responders to flooding and by taking action on their own private property. Furthermore, the growing importance of technology (e.g. social media to store and share flood experiences, flood warnings, and as a means to mobilise fellow citizens to erect property-level flood protection measures to reduce flood consequences) can lead to civil society voluntarily assuming responsibilities for FRM that were not previously possible. The PhD thesis findings suggest that the division of responsibility between authorities and civil society is changing, which is due to an increase in the potential range of responsibilities necessary for pursuing flood resilience, as well as the ability for non-state actors to contribute to reducing consequences, compared to traditional flood defence approaches that focus on hazard control. The change in responsibility, towards shared responsibility between authorities and civil society, presents several challenges that have been identified in this PhD thesis.

Firstly, civil society is a broad term and there are issues of representation that need to be further explored, especially their membership and ability to marginalise or exclude fellow citizens. Furthermore, the PhD thesis found that civil society actors are not equally distributed across city neighbourhoods nor is their location based upon the need for civil society actors to take actions. Some neighbourhoods, communities, and citizens will not have the same capacity to ‘survive and thrive’ or willingness to fulfil these new responsibilities (Chapter 5). Therefore, shared responsibility will need divisions of responsibility between authorities and civil society to be place-based and linked to vulnerabilities and capacities as well as presence of civil society actors. The absence of civil society may mean that authorities have to take a greater part of the shared responsibility for flood resilience.

Secondly, there needs to be a willingness of authorities to embrace shared responsibility by also being willing to “question existing arrangements, and...relinquish responsibility to citizens” (Scolobig et al., 2015:210). As part of relinquishing responsibility, there also needs to be a transfer of power and resources to civil society (Begg, 2018). The PhD thesis identified authorities willing to work with civil society, but this may only be in the form of traditional, authority initiated

interactions. In order to achieve shared responsibility with a relinquishing of responsibility and transfer of power and resources, there needs to be a reflection by society on which responsibilities can (and should) be transferred to civil society and citizens, and how authorities can position themselves to potentially support civil society in undertaking their new responsibilities – not only for flood resilience, but for other forms of disaster resilience as well.

Thirdly, if authorities and civil society reach an agreement over shared responsibilities, wherein authorities relinquished some responsibilities to civil society and provided appropriate power and resources, then questions will still remain over the nature of their pursuit of resilience: namely, their choice between stability and dynamism. Welsh (2014:21) questions the potential choices of citizen action produced by existing institutions and suggests that they may opt to “maintain the status quo rather than conceive of challenging it”. Shelfaut et al. (2011:830) also question whether lay people would be empowered to control their own actions or would be more akin to only implementing “higher-level decisions”. This PhD thesis identified examples of civil society choosing to maintain the status quo (e.g. flood groups creating flood stores to recover back to normal after a flood) as well as actively challenge it (e.g. citizens complaining and challenging authorities and FRM policy in Arnhem).

Furthermore, formalising or agreeing a division of shared responsibility between authorities and civil society may lead to instances where civil society may not wish to challenge authorities on the structural causes of flood risk or take risks to try new ideas. For example, actors that gain power may resist changes or only allow minor changes in order to retain their power as opposed to allowing more fundamental changes and transformations (Handmer & Dovers, 1996). Therefore, ‘shared responsibility’ may be appealing, but it is not clear whether it will lead to transformational change or an entrenching of the status quo, albeit done by civil society and not authorities.

6.7. Policy Implications and Recommendations

The PhD research findings have implications for practice and there are important recommendations for policymakers and practitioners at the local and national levels. The local level implications and recommendations focus on how local authorities can position themselves in the context of an emerging civil society role in FRM as well as the pursuit of flood resilience. The national level implications and recommendations focus on policies and research agendas that guide FRM policies across England and the Netherlands.

The Local Level

Recommendation 1: Understand the Resilience Interpretation Used

The PhD thesis recognises the ambiguous nature of resilience and identified three main perspectives (engineering, ecological, and evolutionary; Chapter 3) with each of these perspectives having a different impact in aiming for flood resilient places. Therefore, it is important to understand these perspectives and the implications of a resilience interpretation that is resisting change or embracing change. The former encourages maintaining the status quo, whereas the latter allows the opportunity to challenge pre-flood vulnerabilities, risks and power relations. The findings of this PhD thesis suggest that there needs to be elements of resisting the floods (e.g. property-level protection), but also of embracing change (e.g. creating temporary water storage areas or changing perceptions of flood risk).

Recommendation 2: Vulnerabilities and Capacities need to be considered in FRM plans and policies

The PhD thesis identified the importance of considering socio-spatial vulnerabilities and capacities to avoid maintaining or creating socio-spatial inequalities in the shift to flood resilience (Chapter 6). These vulnerabilities and capacities need to be considered as relevant input for FRM policymaking and resilience policies in addition to technical analyses of flood risk. Therefore, there should be formal requirements for planners to collect data on place-based vulnerabilities and capacities and to consider these when developing FRM and flood resilience plans and policies.

Recommendation 3: Civil society contributions need to be identified at the local level

The PhD thesis identified a range of different civil society contributions to FRM (see Table 6.1; Chapters 2, 3 and 4). Table 6.1 can act as a foundation for recognising citizen contributions to FRM that are occurring at the local level and for identifying potential opportunities to pursue flood resilient places. Furthermore, the framework (Figure 6.3) used in the Upper Calder Valley can offer lessons and inspiration regarding the various roles and contributions that were identified in which civil society were able to influence local level flood resilience over time. The identification of these roles and contributions can inspire citizen action in other urban areas in England as well as cities (including Arnhem) and towns in other countries that have experienced severe rainfall flooding or are likely to experience it in the future.

Figure 6.3: Potential civil society contributions to FRM (Source: Chapter 3; Forrest et al., 2019).

Recommendation 4: Authority-civil society interactions should take into account civil society representativeness

The PhD thesis explored authority-civil society interactions to understand the forms that they take (Chapters 2 and 4). The forms of interaction identified go beyond traditional, authority initiated consultations to interactions that: create opportunities for citizen engagement, work in collaboration with civil society, have authorities providing resources for civil society actors to take their own actions, and integrate existing civil society activities into formal plans and processes. However, the PhD thesis also explored issues of fairness in civil society contributions to FRM (Chapters 2, 3 and 5) and identified instances where civil society groups may not be representative of local citizens and may be potentially marginalising and excluding individual or groups of citizens. Therefore, in addition to identifying civil society contributions to FRM, it is necessary to be aware of issues of representation in the pursuit of flood resilient places and communities. The PhD thesis recommends that authorities support civil society actors, during authority-civil society interactions, to be aware of potential issues of representation and to support civil society actors to avoid marginalising or excluding citizens.

Recommendation 5: Civil society needs to be supported without compromising their context-specific contributions and the ways they choose to operate

The PhD thesis identified civil society contributions to FRM that were context-specific and that authorities were supporting (Chapters 2, 3 and 4). However, the PhD thesis also found that authority support and the formalisation of civil society contributions can unintentionally

impede these contributions. For example, authorities creating additional support for flood groups may potentially create additional rules or obligations for volunteers that mean that volunteers become frustrated or change the way that they have been operating (e.g. additional bureaucratic processes for accessing money to purchase equipment; Chapter 3). Therefore, it is recommended that planners and FRM practitioners consider how best to create an inclusive governance structure that supports civil society without compromising their contributions or creating additional rules or obligations that may impede civil society contributions to FRM.

Recommendation 6: Existing infrastructure needs to be assessed for its impact on flood risk in the context of worsening flood risk conditions

The PhD thesis identified the potential for ‘hidden’ socio-spatial inequalities that become relevant due to increasing risk from rainfall flooding (Chapter 5). Proposed infrastructure developments consider flood risk and authorities can raise this as an issue during the planning stage. However, existing infrastructure may inadvertently increase flood risk in ways that only become clear during a flood. For example, speed bumps allowing floodwater accumulation and a heightened railway track acting as a dike and blocking floodwater in Arnhem (Chapter 5). Therefore, both existing and proposed infrastructure developments need to be considered in light of a predicted increase in the intensity and frequency of flooding in the future.

Recommendation 7: FRM policies and practice need to extend beyond their siloes to build capacities

The PhD thesis identified socio-spatial variation in vulnerability and capacities relating to flooding within urban areas and recommends that FRM planners collaborate with disciplines beyond their own FRM siloes in addressing this variation (Chapter 5). Capacity building at the neighbourhood and individual scales can be enhanced by breaking down siloes and working with authority staff from different departments (e.g. health, spatial planning, water management, education, social welfare, environmental issues etc.). Flood-related vulnerabilities can also be reduced by working across departments as part of a more holistic approach. These potential benefits could extend to increased social capital and connectedness, an enlarged set of capacities within neighbourhoods that can be harnessed by civil society actors, as well as more pleasant neighbourhood environments that could increase citizens’ place attachment and their desire to take actions to prevent potential flood consequences. If there is available funding, then this could be achieved by the creation of a ‘Flood Resilience’ or ‘Climate Resilience’ Officer who works beyond the FRM silo and with other authority departments to draw attention to the need to build capacities for flood resilience.

Recommendation 8: FRM resource allocation needs to prioritise neighbourhoods and households with high vulnerability and low capacity

The PhD thesis identified both the contributions of civil society to making places more flood resilient as well as the socio-spatial variation of urban areas that can lead to neighbourhoods with high vulnerability and low capacity to deal with floods (Chapters 2, 3, 4 and 5). Civil society actors can improve both vulnerability to floods and capacity to prepare for floods. Therefore, this thesis recommends authorities prioritise public resources and support for civil society actors to engage in capacity building and vulnerability reduction in neighbourhoods¹⁷ with low capacities and high vulnerability in the context of flooding. However, civil society actors are unequally distributed across all neighbourhoods. Where they are absent, the authorities may need to take a greater top-down role to support these neighbourhoods and households and/or to stimulate civil society in these low capacity-high vulnerability neighbourhoods.

The National Level

Recommendation 1: Create a national fund for supporting civil society contributions to FRM

The PhD thesis has identified the roles and contributions that civil society can make to local FRM. The local recommendations above encourage authorities to support them, but this can be challenging when local authority resources are already stretched and there is limited additional support available. However, there are opportunities at the national level to also support civil society contributions.

There are already examples of national support funds available for civil society and these could be adapted to also support civil society contributions to FRM. For example, the National Emergencies Trust was recently established in 2017 to provide financial support for community foundations and local charities to take action during domestic disasters in the UK (National Emergencies Trust, 2020a). This charity (independent of the state) was active in distributing funds during the COVID-19 pandemic and sought funds from members of the public, corporate donors, charitable trusts, community fundraising, and government funding programmes (National Emergencies Trust, 2020b). The National Emergencies Trust could also be adapted to provide support for civil society contributions to FRM by being a central (and trusted) source for donations, and by using their existing partnership network to quickly distribute funds across the UK. However, the national fund focuses on immediate relief, supplementary support, and future support for domestic disasters (National Emergencies Trust, 2020b), but not on

¹⁷ This capacity building and vulnerability reduction may be needed at a neighbourhood level (e.g. to increase community competence), but also aimed at specific households.

preparatory actions that civil society can also contribute to in FRM. Therefore, the creation of a new national fund may be best for England and the rest of the UK. This new national fund could take a flood resilience perspective that explicitly focuses on time with support provided for civil society contributions before, during and after floods. The financial support could be delivered through the National Flood Forum, an existing charity that already supports communities in FRM, and their countrywide network of flood groups.

6.8. Further Research and Final Remarks

Overall, this PhD thesis offers three suggestions for future research on civil society and resilience in FRM.

Firstly, this PhD thesis focused on the growing role of civil society and the resilience turn in FRM. These two important and ongoing shifts were explored in similar contexts (i.e. two countries experiencing shifts to flood resilience and greater citizen action, as well as growing pluvial flood risks) in order to extend existing knowledge relating to flood resilience, civil society, and fairness and equality. The PhD thesis findings can be used as learning points and inspiration regarding the roles and contributions of civil society in areas where flood risk is similar in nature and urgency. However, the PhD did not explicitly aim to undertake a systematic comparison between England and the Netherlands: this could be a focus for future research. The research findings from this PhD thesis can be extended in future research by systematically drawing comparisons between England and the Netherlands in order to identify potential policy transfers and the likelihood that these can occur between these two countries. This could be beneficial for reciprocal knowledge exchange focusing on the role and contributions of civil society when there is an imminent flood risk in England in contrast to the Dutch case where the focus was more on spatial adaptation.

Secondly, the PhD thesis identified and developed two interpretations of resilience in the context of flooding (community resilience to flooding and local level flood resilience). These interpretations are appropriate for the focus of this PhD research, but a potential third interpretation can be identified when reflecting over the PhD research project: an ‘experiential’ interpretation, which is formed “gradually on the basis of experiences that actors have had over the course of time” (Klijn & Koppenjan, 2016:76). Experiential flood resilience would therefore be based on the perceptions of those involved in local FRM and be context-dependent. Exploration of ‘experiential flood resilience’ may be useful to identify and compare how different civil society actors and local authorities understand resilience. This could be done across a large context in order to gather as many perspectives as possible before comparing them with theoretical interpretations of the resilience concept. This could be beneficial as a first step in addressing the confusion in practice caused by the broad range of resilience interpretations in

theory as identified by De Bruijne et al. (2010). A second step could then be to use these experiential interpretations of flood resilience to help guide future FRM practice at the local level. Therefore, exploring and analysing experiential interpretations of local flood resilience held by FRM actors could be an avenue for future research into bridging the theory-practice gap and reducing the confusion in practice.

Thirdly, civil society and citizens are becoming increasingly ‘responsibilised’ with greater responsibility being placed on the “responsible citizen” in disaster risk management, FRM, and government policies on resilience (Coaffee, 2013:335; Lukasiewicz et al., 2017; O’Hare & White, 2018). However, there are additional costs for civil society and citizens in recognising that flooding cannot always be prevented. These costs can come from taking actions to reduce the potential consequences (e.g. through urban greening, rain barrels and property-level protection measures etc.), as well as dealing with the actual consequences when floods do occur (e.g. recovering and adapting properties after floods etc.). These measures to reduce the potential consequences of flooding as well as the damage caused by actual flooding need to be paid for. The responsibility for taking action is being transferred to non-state actors, but critical questions remain over who should pay, and how they should pay, for these additional costs.

Authorities could be responsible for these costs and recover them through general taxation where everybody contributes irrespective of flood risk or through a specific tax on only those at-risk of flooding. However, this raises further issues of fairness and justice, especially for areas and households that have only recently become at-risk of flooding through predictions of more intense and frequent extreme rainfall events. The perceived creation of a new tax may also be politically undesirable. Furthermore, households may be at-risk of flooding through no fault of their own due to flood risk being exacerbated by actors upstream or through past planning choices that are now causing flood risk problems (e.g. the raising of the train track in Arnhem). Therefore, the issue of who should pay for flood resilience is unclear.

Perhaps there is even a case to follow a ‘polluter pays’ principle whereby those creating the flood risk should compensate those affected by flooding, which may assign more responsibility and accountability to private developers who build new developments without appropriate sustainable urban drainage systems or in ways that increase flood risk. In England, this could be more strongly linked to the granting of planning permission as well as adapting existing planning tools (e.g. Section 106 Agreements and the Community Infrastructure Levy) so that private developers are paying for flood resilience measures as part of their development costs. The PhD thesis identifies the need for authorities to provide appropriate resources in the transfer of responsibilities for FRM to civil society as well as identifying the need for capacity building in order to pursue flood resilience. Future research needs to go further and explore how these

resources can be provided to civil society and try to grapple with the academic and political question of who should pay, and how should they pay, for flood resilience.

In terms of final remarks of the PhD thesis, it seems apt to comment on the negative connotations increasingly being associated with flood resilience and with communities resisting being called 'resilient' (e.g. Davoudi, 2018). Kaika (2017:98) goes further and argues that the best that resilience can do is to simply "vaccinate people and environments alike so they are able to take larger doses of inequality and environmental degradation in the future". These negative connotations of flood resilience are especially pertinent in England, where the National Flood Forum has publicly expressed reservations over the use of 'resilience' in the Environment Agency's (2019) Draft National Flood and Coastal Erosion Risk Management Strategy for England (NFF, 2019). These concerns are that being described as 'resilient' is used to leave flood-affected citizens to take action on their own with their resilience being an excuse for government inaction as well as the concept being used to blame those who are 'not resilient'. The growing role of civil society and the resilience turn in FRM have been framed within a context of cost-cutting and government retreat, in a neoliberal context that emphasises the individual as being responsible. Therefore, is it surprising that there are negative connotations surrounding flood resilience and being called 'resilient'?

In response to these important concerns about flood resilience, I suggest that our understanding of resilience in the context of flooding needs to remove the emphasis from outdated 'bounce back' interpretations: maintaining the status quo in long-term recovery efforts is past-oriented and unsustainable in that it will lead to the same outcome when flooding happens again. Instead, there needs to be greater focus on 'bouncing forward' interpretations of resilience in FRM, although recognising the difference between ecological and evolutionary perspectives of the term. Ecological perspectives focus more on having 'adapted' and moved to a new stable state, whereas evolutionary perspectives focus more on the capacity to adapt to changing conditions. This latter focus on the capacity to adapt is important and part of the need to critically approach the 'survive and thrive' narrative and recognise that not all neighbourhoods, communities or citizens are facing the same risk or have the same capacity to 'live with floods'. Not all citizens are able to fulfil the responsibilities associated with flood resilience and civil society actors are not present in all neighbourhoods to provide support, which means that there is a role for planners to take action on capacity building. There is already a growing focus on achieving multiple benefits from flood resilience projects, but there needs to be a greater focus on building community cohesion and placed-based capacities.

The rise of civil society in governing flood resilience has challenges, but also much potential and promise in dealing with the increasingly urgent societal problem of urban flooding.

6.9. References

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APPENDICES

English summary

Nederlandse samenvatting

About the author

Acknowledgements

English summary

Research Background

Flooding is an increasingly urgent societal problem that affects urban areas worldwide. Flood events can cause severe disruption to key services, damage infrastructure, and have significant impacts on citizens. These impacts include damage to homes and businesses, physical health problems from contaminated floodwater, mental health problems such as post-traumatic stress disorder, and even fatalities. Furthermore, climate change, continued population growth, and urbanisation are expected to lead to an increase in flood events and flood risk exposure in the future.

This PhD thesis identifies two important and ongoing shifts in flood risk management (FRM): 1) the emerging role of civil society, and 2) the turn towards resilience and greater emphasis on 'living with floods'. Firstly, there is recognition that the state cannot manage flooding alone and that civil society actors are increasingly important in contributing to FRM. Civil society is taking a greater FRM role in many countries, but there are still questions over the nature of their role, their contributions, and their influence on governance arrangements. Secondly, there is a growing realisation that not all flooding can be prevented and there is a shift towards focusing on reducing the consequences of flooding and pursuing flood resilience. This interpretation moves away from traditional 'resistance'-based perspectives in FRM focusing on 'keeping water out' and relying on large engineering solutions towards 'living with floods' and more holistic perspectives in FRM, which includes a diversification of FRM approaches.

This PhD thesis explores these two important and ongoing shifts by focusing on 'the rise of civil society in governing flood resilience' in England and the Netherlands. These two countries are chosen as they are both exploring new approaches to manage flood risk and are encouraging civil society to take a more active role in local FRM. Furthermore, flooding is an increasingly pressing risk for both countries as they have both recently experienced flood events and their flood risk is predicted to increase in the future.

Research Design

There are three research aims that structure and guide this PhD thesis:

Research Aim 1: Understanding the emerging role of civil society in local FRM and the implications for both authorities and civil society in terms of the division of roles and responsibilities in governing local FRM

Research Question 1: What are the roles and contributions of civil society actors in local FRM and how are these actors organised?

Research Question 2: How are public authorities interacting with these emerging civil society actors and how are these authorities redefining their own roles and governance approaches to local FRM?

Research Aim 2: Interpreting the concept of ‘resilience’ for FRM and exploring how civil society can influence ‘flood resilience’ in practice

Research Question 3: How can resilience be interpreted in the context of flooding and how do civil society actors, and their capacities, influence flood resilience in practice

Research Aim 3: Critically investigating issues of fairness and socio-spatial inequalities that may potentially arise as a result of the emerging civil society role and the paradigm shift towards flood resilience in local FRM

Research Question 4: What potential issues of fairness and socio-spatial inequality arise when civil society actors play a greater role in local FRM and when pursuing flood resilience in practice?

The PhD thesis used multiple complementary methods to collect data and answer the four research questions (these are elaborated upon in Chapters 2, 3, 4 and 5). Qualitative forms of data collection methods used throughout Chapters 2, 3, 4 and 5 included semi-structured interviews, site observations, and policy document analyses. Walking interviews were also used to collect data in Chapter 3. Furthermore, data was collected from local websites and social media of local citizen groups contributing to FRM (Chapters 3 and 4), as well as media reports retrieved through Lexis Nexis (Chapters 3, 4 and 5). Quantitative data was retrieved from official surveys and censuses administered by the Municipality of Arnhem and organisations such as the Dutch Statistics Office (Centraal Bureau voor de Statistiek) for Chapter 5. Surveys were also created in Qualtrics to collect a mixture of qualitative and quantitative data in Chapter 2.

The Rise of Civil Society in FRM (Research Aim 1)

Governance arrangements for FRM have been changing with non-state actors taking an increasing role and undertaking FRM responsibilities that traditionally rested with the government. In the context of both England and the Netherlands, there are ongoing discussions about the shift from the state to civil society in FRM. The shift is especially evident at the local level where citizens are organising themselves and working together in community groups, citizen collectives and citizen initiatives to deal with the increasing risk of flooding. However,

there is limited research into the nature of civil society actors in FRM and this PhD thesis sought to address this through Research Questions 1 and 2.

For Research Question 1, the roles and contributions of civil society in FRM as well as how they are organised were explored in Chapters 2, 3 and 4. The PhD thesis identified contributions of civil society to FRM and categorised them as relating to i) physical actions and resources (e.g. reducing consequences and mitigating risks), ii) knowledge (e.g. collecting data and providing information to authorities and citizens), and iii) advocacy activities (e.g. campaigning and raising awareness) in England, the Upper Calder Valley, and Arnhem (Table 6.1.).

The PhD thesis identified three additional important roles that civil society undertook in the context of local FRM (Section 6.2.):

- 1) The 'knowledge intermediaries' role in England and the Netherlands (Chapters 2, 3 and 4): civil society gathered local knowledge that supported policymakers in decision-making and the development of flood modelling.
- 2) The 'citizen activation' role in England and the Netherlands (Chapters 2, 3 and 4): civil society played an important role in activating citizens to be more aware of their own flood risk and to take actions that could reduce flood risk (e.g. urban greening and property-level flood protection).
- 3) The 'flood risk management innovators' and 'experimenters' role in England and the Netherlands (Chapters 3 and 4): civil society rapidly responded to flood events with new ideas (e.g. flood hubs in Chapter 3) and took risks by experimenting with new pluvial FRM technologies (Chapter 4).

Furthermore, the PhD thesis identified several organisational forms of civil society actors including flood groups in the Upper Calder Valley (Chapters 2 and 3) and citizen collectives in Arnhem (Chapter 4). Key community members and local leaders were identified as being important in the formation and activities of these voluntary groups. It was also found that the activity levels of these groups changed over time with an intense initial response in the aftermath of flood events that then decreased in the absence of further flooding through active forgetting and apathy.

For Research Question 2, the PhD thesis explored the position of public authorities in the context of the emerging role of civil society actors and the associated governance implications (Chapters 2, 3 and 4). The PhD thesis (Section 6.3.) identified five different forms of authority interactions with civil society and the roles that these authorities are holding: 1) traditional, authority-initiated approaches, 2) creating opportunities for citizen engagement, 3) working in collaboration with civil society, 4) authorities providing additional support, and 5) authorities

integrating civil society activities into formal plans and processes. These five different forms range from command-and-control approaches to water management by public authorities to more facilitative forms of governance. The availability of resources for authorities to invest in these interactions as well as preserving the flexibility of civil society in these interactions were identified as important factors.

Interpreting Resilience and Exploring the Influence of Civil Society (Research Aim 2)

The term ‘resilience’ has become increasingly prominent in policy discourse within urban planning, disaster risk management, and climate change adaptation. At an international level, the United Nations (UN) targets “strengthening resilience” in pursuing Sustainable Development Goals 11 and 13 and the UN Office for Disaster Risk Reduction has embraced resilience for disasters through the Hyogo Framework for Action (2005-2015) and the Sendai Framework for Disaster Risk Reduction (2015-2030). In the literature, the ‘resilience’ concept has been broadly understood as reducing the consequences of floods and has been interpreted through three difference perspectives: engineering, ecological, and evolutionary. However, the ambiguous concept of resilience is broadly applied in many disciplines and needs to be interpreted specifically in the context of flooding. For Research Question 3, the PhD thesis developed two interpretations of resilience in the context of flooding and then applied them to understand how civil society can influence flood resilience in practice.

The first interpretation that was developed and applied in this PhD thesis was ‘community resilience to flooding’, which places community capacity and capitals at the heart of the analysis (Chapter 2). This was based on ‘community capacity’ and its four constituent socio-spatial capitals: social capital (i.e. the community’s social connectedness), natural/built environment capital (i.e. the spatial planning and physical characteristics in the community), human capital (i.e. the capacities of individuals), and economic capital (i.e. the economic resources available in communities). This interpretation was used as a framework to explore the potential influence of flood groups on community resilience to flooding in England (Chapter 2). The PhD thesis identified flood groups as predominantly contributing to expanding social capital of their communities by strengthening social networks and connections with the authorities. Flood groups also contributed to human capital by identifying and supporting vulnerable residents as well as by increasing flood risk awareness. However, the small-scale nature of flood groups meant that their influence on the natural and built environment capitals was restricted to smaller, less resource-intensive activities, which were strongly dependent on the local context and limited by resource availability.

Furthermore, the PhD thesis developed a framework to interpret local level flood resilience that incorporates the engineering, ecological, and evolutionary perspectives of resilience (Chapter 3). This interpretation understood resilience across time and extended previous research by not only providing a single snapshot of resilience, but providing empirical evidence of how flood resilience changes over time and in relation to a flood event (before, during, and after the flood). Furthermore, this interpretation of resilience understood ‘place’ as being central and therefore focused on the relationship between resilience characteristics and the specific place-based qualities present. This PhD thesis identified civil society contributions to flood resilience that focused on engineering perspectives of ‘bouncing back’ from the flood and ‘returning to normal’ (e.g. the creation of flood stores to recover from flood damages) as well as ecological perspectives of incremental adaptation (e.g. the creation of ‘Watermark’, a scheme that provided an economic safety net to local businesses). Furthermore, the PhD thesis identified civil society contributions that aligned with evolutionary perspectives and aimed for a transformation of perceptions and social networks.

Fairness and Equality (Research Aim 3)

It is important to recognise that disaster situations occur when natural hazards expose the underlying vulnerabilities and weaknesses of social systems. Flood disasters are not solely a product of the natural flood hazard: they are socially constructed and exacerbated by urban design and planning choices (e.g. placement of green spaces and housing) and underlying vulnerabilities in social systems (e.g. social and environmental injustices). Flood risk can be described as ‘inherently unfair’ with unequal distributions of flood risk exposure, capacities and authority support. The acknowledgement of this inherent unfairness and the inequalities connected to flooding and FRM provides the inspiration for this PhD thesis to identify and investigate potential issues of fairness and equality that can emerge from the rise of civil society in governing flood resilience.

For Research Question 4, the PhD thesis identified issues of fairness related to representation and exclusion within civil society actors (Chapters 2 and 3). Flood groups did not always represent their wider community with certain voices being more present (e.g. older individuals and retirees) and others being marginalised or excluded during flood group decision-making. The PhD thesis also identified examples of civil society actors recognising these issues of fairness and trying to increase their representative ability, for example, by creating a network of ‘community representatives’ in one flood group (Chapter 2). Key community members and local leaders could also have negative impacts on representation and exclusion with tensions emerging over deciding flood group activities and who is able to participate (Chapter 2).

Furthermore, the PhD thesis analysed socio-spatial inequalities associated with the shift towards flood resilience in FRM and paid particular attention to the notion of ‘living with floods’ and its implications for citizens. Living with floods and the narrative of ‘surviving and thriving’ are emphasised within flood resilience literature, but such discussions often ignore the varying socio-spatial vulnerabilities and capacities of citizens. The PhD thesis also explored socio-spatial inequalities in pursuing flood resilience by developing a mixed-methods approach to analyse neighbourhood place vulnerability, individual sensitivity, and neighbourhood and individual capacity in Arnhem (Chapter 5). Three forms of socio-spatial inequality were identified: 1) existing socio-spatial inequalities that could be exacerbated by the shift towards living with floods, 2) ‘hidden’ socio-spatial inequalities in citizens’ vulnerability that have become relevant due to the rainfall flood risk, and 3) new socio-spatial inequalities in citizens’ capacity to fulfil the responsibilities arising from the shift to living with floods.

Pursuing Resilience and Shared Responsibility

Addressing the research aims led to two broader conclusions on pursuing resilience and of the shift towards shared responsibility (Section 6.6.).

Firstly, the PhD thesis contributes to the development of a common understanding of ‘resilience’ in disaster management by developing frameworks on community resilience to flooding (Chapter 2) and local level flood resilience (Chapter 3), identifying socio-spatial inequalities arising from flood resilience (Chapter 5), and creating a typology for civil society contributions to FRM (Chapter 4). These frameworks and discussions on a common understanding of ‘resilience’ can be useful in achieving international objectives (e.g. the Sustainable Development Goals and the Sendai Framework) and developing national plans and strategies. The PhD thesis also points to the need to tailor this common understanding of resilience to the specific context and recognise the importance of identifying, incorporating and harnessing place-based capacities that exist at the local level for flood resilience. However, the PhD thesis also found that these capacities are not equally distributed across the local level and therefore there is a need to focus on capacity building in neighbourhoods, communities and individuals.

Secondly, the PhD thesis advances wider discussions regarding shared responsibility in disaster risk management and in resilience through its focus on civil society’s role and the division of responsibilities with authorities. In both disaster risk management and FRM, the exact balance between the state and citizens is unclear and contested. The PhD thesis found indications of local government retreating from its existing responsibilities (e.g. in relying on voluntary flood groups to maintain local watercourses), but also of them going beyond their assigned duties to support civil society (e.g. by providing additional time and expertise to support the flood groups). Furthermore, the PhD thesis found that civil society actors were able to contribute in

ways that public authorities were not able to do on their own, for example, by acting as first responders to flooding and by taking action on their own private property. The growing importance of technology in FRM (e.g. social media to store and share flood experiences, communicate flood warnings, and as a means to mobilise fellow citizens to erect property-level flood protection measures to reduce flood consequences) can lead to civil society voluntarily assuming responsibilities in FRM that were not previously possible.

In order to reach this 'shared responsibility' there needs to be a dialogue and agreement between authorities and civil society over the shared responsibilities and interpretation of flood resilience. Furthermore, there needs to be a willingness of authorities to relinquish and transfer responsibilities in combination with commensurate power and resources. There may still be potential problems in reaching this 'shared responsibility'. For example, it may reduce civil society's willingness to pressure authorities to consider alternate perspectives and ideas as well as to challenge authorities over inadequate FRM progress (e.g. advocacy activities). The newly empowered civil society actors may also be unrepresentative and act to maintain their own privilege and power as opposed to being more inclusive and representing the diversity of views within their communities. Therefore, the operationalisation of 'shared responsibility' in FRM is not as simple as it sounds and requires further research and attention.

Advancing Civil Society-based Flood Resilience

The increasing flood risk in urban areas globally means that there will be more citizens experiencing flooding, being at risk of flooding or knowing someone affected by flooding. Civil society and authorities are increasingly recognising this greater risk and are now questioning how they can manage their flood risk and become more flood resilient.

The PhD research findings have implications for practice and there are important recommendations for policymakers and practitioners (Section 6.7.). The PhD thesis identifies the roles and contributions of civil society in flood resilience and that it is important for policymakers and practitioners to recognise their diverse and place-based contributions. In some cases, civil society can contribute in ways that authorities cannot and it is important to be aware of how authorities are able to offer support and interact with civil society.

Furthermore, the PhD research findings advocate being mindful of the interpretation of resilience in the context of flooding and realising that resilience interpretations need to be tailored to the local conditions and place-based attributes. Past-oriented, bounce back interpretations of resilience will only reproduce the same weakness and vulnerabilities that existed before the flood and should be challenged. Interpretations have to focus on becoming adaptable (as opposed to having 'adapted') and transforming places. There is already a growing

focus on achieving multiple benefits from FRM and flood resilience projects, but this also needs to be extended further in order to place a greater focus on building community cohesion and the place-based capacities of neighbourhoods and citizens. Additionally, flood resilience policies need to consider vulnerabilities and capacities as well being aware of the potential for socio-spatial inequalities in 'living with floods'. Part of this can be achieved by authorities working across siloes, being mindful of FRM resource allocation, and ensuring that they pay attention to fairness when pursuing flood resilience in practice (see Section 6.7.).

Overall, the rise of civil society in governing flood resilience has challenges, but also much potential and promise in dealing with the increasingly urgent societal problem of urban flooding.

Nederlandse samenvatting

De opkomst van ‘civil society’ in het besturen van overstromingsveerkracht

Onderzoeksachtergrond

Overstromingen zijn een steeds urgenter maatschappelijk probleem dat wereldwijd stedelijke gebieden treft. Overstromingen kunnen ernstige verstoringen van belangrijke diensten veroorzaken, de infrastructuur beschadigen en aanzienlijke gevolgen hebben voor burgers. Deze gevolgen omvatten schade aan huizen en bedrijven, fysieke gezondheidsproblemen door vervuild overstromingswater, mentale gezondheidsproblemen zoals posttraumatische stressstoornis en zelfs dodelijke slachtoffers. Bovendien zullen klimaatverandering, aanhoudende bevolkingsgroei en verstedelijking naar verwachting leiden tot een toename van overstromingen en blootstelling aan overstromingsrisico's in de toekomst. Onder overstroming wordt in dit proefschrift ook wateroverlast als gevolg van (hevige) regenval verstaan.

Dit proefschrift identificeert twee belangrijke en aanhoudende verschuivingen in overstromingsrisicobeheer (ORB): 1) de opkomende rol van de ‘civil society’ en 2) de omkeer naar veerkracht met een nadruk op ‘leven met overstromingen’. Ten eerste wordt erkend dat de staat overstromingen niet alleen kan beheersen en dat actoren uit de civil society steeds belangrijker zijn in hun bijdrage aan ORB. De civil society speelt in veel landen een groeiende rol voor ORB, maar er zijn nog steeds vragen over de aard van hun rol, hun bijdragen en hun bestuurlijke implicaties. Ten tweede groeit het besef dat niet alle overstromingen voorkomen kunnen worden en dat er een verschuiving plaatsvindt naar het verminderen van de gevolgen van overstromingen en het streven naar overstromingsveerkracht. Deze interpretatie wijkt af van traditionele op ‘weerstand’ gebaseerde perspectieven in ORB, gericht op ‘water buiten houden’ en vertrouwen op grote technische oplossingen, maar kiest in plaats daarvan voor ‘leven met overstromingen’ en meer holistische perspectieven in ORB, waaronder een diversificatie van ORB-benaderingen.

Dit proefschrift onderzoekt deze twee belangrijke en aanhoudende verschuivingen door te focussen op ‘de opkomst van civil society in het besturen van overstromingsveerkracht’ in Engeland en Nederland. Deze twee landen zijn gekozen omdat ze allebei nieuwe benaderingen verkennen om overstromingsrisico's te beheersen en de civil society aanmoedigen om een actievere rol te spelen bij lokaal ORB. Bovendien vormen overstromingen een steeds groter wordend risico voor beide landen, aangezien deze recentelijk te maken hebben gehad met

overstromingen en de verwachting is dat hun overstromingsrisico en risico's voor regenwateroverlast in de toekomst zullen toenemen.

Onderzoeksopzet

Er zijn drie onderzoeksdoelen die dit proefschrift structureren en leiden:

Onderzoeksdoel 1: Inzicht verkrijgen in de opkomende rol van de civil society bij lokaal ORB en de implicaties voor de verdeling van rollen en verantwoordelijkheden met de overheid bij het besturen van lokaal ORB

Onderzoeksvraag 1: Wat zijn de rollen en bijdragen van actoren uit de civil society bij ORB en hoe zijn ze georganiseerd?

Onderzoeksvraag 2: Wat is de positie van de overheid in de context van de opkomende rol van actoren uit de civil society en wat zijn de implicaties voor het bestuur?

Onderzoeksdoel 2: Het interpreteren van het concept 'veerkracht' voor ORB en onderzoeken hoe de civil society 'overstromingsveerkracht' in de praktijk kan beïnvloeden

Onderzoeksvraag 3: Hoe wordt veerkracht geïnterpreteerd in ORB en hoe kunnen actoren in de civil society overstromingsveerkracht in de praktijk beïnvloeden?

Onderzoeksdoel 3: Het kritisch onderzoeken van eerlijkheid en sociaalruimtelijke ongelijkheden die mogelijk kunnen ontstaan als gevolg van de opkomende rol van de civil society en de paradigmaverschuiving naar overstromingsveerkracht

Onderzoeksvraag 4: Welke potentiële problemen van rechtvaardigheid en sociaalruimtelijke ongelijkheden doen zich voor wanneer de civil society een grotere rol speelt in lokale ORB en wanneer wordt gestreefd naar overstromingsveerkracht in de praktijk?

Het proefschrift maakt gebruik van meerdere complementaire methoden om gegevens te verzamelen en de vier onderzoeksvragen te beantwoorden (deze worden uitgewerkt in de Hoofdstukken 2, 3, 4 en 5). Kwalitatieve vormen van gegevensverzamelingsmethoden die in de Hoofdstukken 2, 3, 4 en 5 zijn gebruikt, omvatten semi-gestructureerde interviews, locatieobservaties en analyses van beleidsdocumenten. In Hoofdstuk 3 werden ook 'wandel-interviews' gebruikt om gegevens te verzamelen. Verder werden gegevens verzameld van lokale websites en sociale media van lokale burgergroepen die een bijdrage leverden aan ORB (Hoofdstukken 3 en 4), evenals mediaberichten die via Lexis Nexis werden opgehaald (Hoofdstukken 3, 4 en 5). Kwantitatieve gegevens zijn verkregen uit officiële enquêtes en tellingen die worden beheerd door de gemeente Arnhem en organisaties zoals het Centraal

Bureau voor de Statistiek voor Hoofdstuk 5. Er zijn ook enquêtes gemaakt in Qualtrics om een mix van kwalitatieve en kwantitatieve gegevens te verzamelen voor Hoofdstuk 2.

De opkomst van de civil society in ORB (Onderzoeksdoel 1)

De bestuursregelingen voor ORB zijn aan het veranderen, en hierbij gaan niet-overheidsactoren een steeds belangrijkere rol spelen en ORB-verantwoordelijkheden op zich nemen die traditioneel bij de overheid berusten. Zowel in Engeland als in Nederland zijn er discussies gaande over de verschuiving van de staat naar de civil society in ORB. De verschuiving is vooral zichtbaar op lokaal niveau, waar burgers zich organiseren en samenwerken in gemeenschapsgroepen, burgercollectieven en burgerinitiatieven om het toenemende risico op overstromingen en regenwateroverlast het hoofd te bieden. Er is echter weinig onderzoek naar de aard van actoren uit de civil society bij ORB en dit proefschrift tracht dit aan te pakken via onderzoeksvragen 1 en 2.

Voor Onderzoeksvraag 1 werden de rollen en bijdragen van de civil society bij ORB en hoe deze georganiseerd zijn onderzocht in de Hoofdstukken 2, 3 en 4. In het proefschrift werden de bijdragen van de civil society aan ORB geïdentificeerd en gecategoriseerd als gerelateerd aan i) fysische acties en middelen (bijv. vermindering van gevolgen en beperking van risico's), ii) kennis (bijv. verzamelen van gegevens en verstrekken van informatie aan autoriteiten en burgers), en iii) belangenbehartiging (bijv. campagne voeren en bewustmaking) in Engeland, de Upper Calder Valley en Arnhem (Tabel 6.1.).

Het proefschrift identificeerde drie aanvullende belangrijke rollen die de civil society op zich nam in de context van lokale ORB (paragraaf 6.2.):

- 1) De rol van 'kennisintermediairs' in Engeland en Nederland (Hoofdstukken 2, 3 en 4): de civil society verzamelde lokale kennis die beleidsmakers ondersteunde bij de besluitvorming en de ontwikkeling van overstromingsmodellering.
- 2) De rol van 'burgeractivering' in Engeland en Nederland (Hoofdstukken 2, 3 en 4): de civil society speelde een belangrijke rol bij het activeren van burgers om zich meer bewust te worden van hun eigen overstromingsrisico en om maatregelen te nemen die het overstromingsrisico konden verminderen (bijv. stedelijke vergroening en bescherming tegen overstromingen op eigendomsniveau).
- 3) De rol van 'innovators op het gebied van overstromingsrisicobeheer' en 'experimenteerders' in Engeland en Nederland (Hoofdstukken 3 en 4): de civil society reageerde snel op overstromingen met nieuwe ideeën (bijv. 'Flood hubs' in Hoofdstuk 3) en nam risico's door te experimenteren met nieuwe pluviale OBR-technologieën (Hoofdstuk 4).

Verder identificeerde het proefschrift verschillende organisatievormen van actoren uit de civil society (bijv. 'Flood Groups'), waaronder overstromingsgroepen in de Upper Calder Valley (Hoofdstukken 2 en 3) en burgercollectieven in Arnhem (Hoofdstuk 4). Belangrijke leden van de gemeenschap en lokale leiders werden geïdentificeerd als belangrijk bij de vorming en activiteiten van deze vrijwilligersgroepen. Er werd ook vastgesteld dat de activiteitsniveaus van deze groepen in de loop van de tijd veranderden met een intense eerste reactie in de nasleep van overstromingen die vervolgens afnam in de afwezigheid van verdere overstromingen door actief vergeten en apathie.

Voor Onderzoeksvraag 2 onderzocht het proefschrift de positie van overheidsinstanties binnen de context van de opkomende rol van actoren uit de civil society en de daarmee samenhangende implicaties voor het bestuur van overstromingsveerkracht (Hoofdstukken 2, 3 en 4). Het proefschrift (Paragraaf 6.3.) identificeerde vijf verschillende vormen van autoriteitsinteractie met de civil society en de rollen die deze autoriteiten vervullen: 1) traditionele, door autoriteiten geïnitieerde benaderingen, 2) het creëren van kansen voor burgerbetrokkenheid, 3) samenwerken met de civil society, 4) autoriteiten die aanvullende ondersteuning bieden, en 5) autoriteiten die activiteiten van de civil society integreren in formele plannen en processen. Deze vijf verschillende vormen variëren van command-and-control-benaderingen van waterbeheer door de overheid tot meer faciliterende vormen van bestuur. De beschikbaarheid van middelen voor autoriteiten om in deze interacties te investeren, evenals het behouden van de flexibiliteit van de civil society bij deze interacties, werden als belangrijke factoren geïdentificeerd.

Veerkracht interpreteren en de invloed van de civil society onderzoeken (Onderzoeksdoel 2)

De term 'veerkracht' is steeds prominenter geworden in het beleidsdiscours binnen planologie, rampenrisicobeheer en klimaatadaptatie. Op internationaal niveau richten de Verenigde Naties (VN) zich op 'versterking van de veerkracht' bij het nastreven van Duurzame Ontwikkelingsdoelstellingen 11 en 13 en het VN Office for Disaster Risk Reduction heeft de veerkracht bij rampen omarmd via het Hyogo Framework for Action (2005-2015) en de Sendai Framework for Disaster Risk Reduction (2015-2030). In de literatuur wordt het concept 'veerkracht' beschreven als het verminderen van de gevolgen van overstromingen en wordt het geïnterpreteerd vanuit drie verschillende perspectieven: technisch, ecologisch en evolutionair. Het brede concept van veerkracht wordt echter toegepast in veel disciplines en moet specifiek worden geïnterpreteerd in de context van overstromingen en regenwateroverlast. Voor Onderzoeksvraag 3 ontwikkelde het proefschrift twee interpretaties van veerkracht in de context van overstromingen en regenwateroverlast en paste deze vervolgens toe om te begrijpen hoe de civil society veerkracht tegen overstromingen in de praktijk kan beïnvloeden.

De eerste interpretatie die in dit proefschrift werd ontwikkeld en toegepast, was 'overstromingsveerkracht van de gemeenschap', waarbij de capaciteit en het kapitaal van de gemeenschap centraal stonden in de analyse (Hoofdstuk 2). Dit was gebaseerd op 'gemeenschapscapaciteit', bestaande uit vier vormen van sociaalruimtelijk kapitaal: sociaal kapitaal (d.w.z. de sociale verbondenheid van de gemeenschap), natuurlijk / gebouwd omgevingskapitaal (d.w.z. de ruimtelijke ordening en fysieke kenmerken in de gemeenschap), menselijk kapitaal (d.w.z. de capaciteiten van individuen) en economisch kapitaal (d.w.z. de economische middelen die beschikbaar zijn in gemeenschappen). Deze interpretatie werd gebruikt als een raamwerk om de mogelijke invloed van overstromingsgroepen op de veerkracht van de gemeenschap voor overstromingen in Engeland te onderzoeken (Hoofdstuk 2). In het proefschrift werd vastgesteld dat overstromingsgroepen voornamelijk bijdragen aan het vergroten van het sociaal kapitaal van hun gemeenschappen door het versterken van sociale netwerken en verbindingen met autoriteiten. Overstromingsgroepen hebben ook bijgedragen aan het menselijk kapitaal door kwetsbare bewoners te identificeren en te ondersteunen en door het bewustzijn van overstromingsrisico's te vergroten. Door het kleinschalige karakter van overstromingsgroepen bleef hun invloed op natuurlijk gebouwde omgevingskapitaal echter beperkt tot kleinere, minder arbeidsintensieve activiteiten. Over het algemeen waren de activiteiten van de overstromingsgroepen sterk afhankelijk van de lokale context en beperkt door de beschikbaarheid van middelen.

Bovendien ontwikkelde het proefschrift een raamwerk om de overstromingsveerkracht op lokaal niveau te interpreteren, dat de technische, ecologische en evolutionaire perspectieven van veerkracht verenigt (Hoofdstuk 3). Het raamwerk dat daarmee ontstond, begrijpt veerkracht dat kan veranderen met de tijd, terwijl eerder onderzoek veerkracht vooral interpreteerde als momentopname. Dit onderzoek leverde empirisch bewijs voor hoe de overstromingsveerkracht onder invloed van tijd verandert in relatie tot een overstroming (voor, tijdens en na de overstroming). Bovendien focuste deze interpretatie van veerkracht nadrukkelijk op 'plaats' als centraal thema, en daarom is deze interpretatie gericht op de relatie tussen veerkrachtkenmerken en de aanwezige specifieke 'plaats-gebonden' kwaliteiten.

Dit proefschrift identificeerde de bijdragen van de civil society aan overstromingsveerkracht die zich concentreerden op technische perspectieven van 'terugveren' van de overstroming en 'terugkeren naar normaal' (bijv. Het creëren van 'overstromingsopslagplaatsen' om te herstellen van overstromingsschade), evenals ecologische perspectieven van incrementele aanpassing (bijv. van 'Watermark', een regeling die een economisch vangnet bood aan lokale bedrijven). Bovendien identificeerde het proefschrift bijdragen van de civil society die in lijn waren met evolutionaire perspectieven en gericht waren op een transformatie van percepties en sociale netwerken.

Eerlijkheid en gelijkheid (Onderzoeksdoel 3)

Het is belangrijk om te erkennen dat rampsituaties zich voordoen wanneer natuurlijke gevaren de onderliggende kwetsbaarheden en zwakheden van sociale systemen blootleggen. Overstromingen zijn niet alleen een product van het natuurlijke overstromingsgevaar: ze zijn sociaal geconstrueerd en worden verergerd door keuzes op het gebied van stadsontwerp en planning (bv. plaatsing van groene ruimtes en huisvesting) en onderliggende kwetsbaarheden in sociale systemen (bv. sociale en ecologische onrechtvaardigheid). Overstromingsrisico's kunnen worden omschreven als "inherent oneerlijk" met ongelijke verdeling van blootstelling aan overstromingsrisico's, capaciteiten en overheidssteun. De erkenning van deze inherente oneerlijkheid en de ongelijkheden die verband houden met overstromingen en ORB vormt de inspiratie voor dit proefschrift om mogelijke kwesties van eerlijkheid en gelijkheid te identificeren en te onderzoeken die kunnen voortvloeien uit de opkomst van civil society bij het beheersen van overstromingsveerkracht.

Voor Onderzoeksvraag 4 identificeerde het proefschrift thema's van eerlijkheid met betrekking tot vertegenwoordiging en uitsluiting binnen actoren uit de civil society (Hoofdstukken 2 en 3). Overstromingsgroepen vertegenwoordigden niet altijd hun bredere gemeenschap, omdat bepaalde stemmen meer aanwezig waren (bijv. ouderen en gepensioneerden) en andere werden gemarginaliseerd of uitgesloten tijdens de besluitvorming over overstromingsgroepen. Het proefschrift identificeerde ook voorbeelden van actoren uit de civil society die deze kwesties van eerlijkheid erkennen en trachten hun representatieve vermogen te vergroten, bijvoorbeeld door het creëren van een netwerk van 'vertegenwoordigers van de gemeenschap' in één overstromingsgroep (Hoofdstuk 2). Belangrijke leden van de gemeenschap en lokale leiders kunnen ook een negatieve invloed hebben op vertegenwoordiging en uitsluiting, doordat er spanningen ontstaan over het beslissen over de activiteiten van overstromingsgroepen en over wie er kan deelnemen (Hoofdstuk 2).

Verder analyseerde het proefschrift sociaalruimtelijke ongelijkheden die verband houden met de verschuiving naar overstromingsveerkracht in ORB en besteedde bijzondere aandacht aan het begrip 'leven met overstromingen' en de implicaties ervan voor burgers. Leven met overstromingen en het narratief van 'overleven en floreren' worden benadrukt in de literatuur over overstromingsveerkracht, maar in dergelijke discussies wordt vaak voorbijgegaan aan de verschillende sociaalruimtelijke kwetsbaarheden en capaciteiten van burgers. Het proefschrift onderzocht ook sociaalruimtelijke ongelijkheden bij het nastreven van overstromingsveerkracht door een aanpak met gemengde methoden te ontwikkelen om de kwetsbaarheid van de individuele en buurtgevoeligheden alsook de individuele en buurtcapaciteit in Arnhem te analyseren (Hoofdstuk 5). Er werden drie vormen van sociaalruimtelijke ongelijkheid geïdentificeerd: 1) bestaande sociaalruimtelijke ongelijkheden die kunnen worden verergerd

door de verschuiving naar leven met overstromingen, 2) 'verborgen' sociaalruimtelijke ongelijkheden in de kwetsbaarheid van burgers die relevant zijn geworden vanwege het overstromingsrisico van regenval, en 3) nieuwe sociaalruimtelijke ongelijkheden in het vermogen van burgers om de verantwoordelijkheden te vervullen die voortvloeien uit de verschuiving naar leven met overstromingen.

Streven naar veerkracht en gedeelde verantwoordelijkheid

Het aanpakken van de onderzoeksdoelen leidde tot twee bredere conclusies over het streven naar veerkracht en de verschuiving naar gedeelde verantwoordelijkheid (paragraaf 6.6.).

Ten eerste draagt het proefschrift bij aan de ontwikkeling van een algemeen begrip van 'veerkracht' bij rampenbeheersing door kaders te ontwikkelen voor de overstromingsveerkracht van de gemeenschap (Hoofdstuk 2) en de overstromingsveerkracht op lokaal niveau (Hoofdstuk 3), het identificeren van sociaalruimtelijke ongelijkheden als gevolg van overstromingsveerkracht (Hoofdstuk 5), en het creëren van een typologie voor bijdragen van de civil society aan ORB (Hoofdstuk 4). Deze kaders en discussies over een gemeenschappelijk begrip van 'veerkracht' kunnen nuttig zijn bij het bereiken van internationale doelstellingen (bijv. De Sustainable Development Goals en het Sendai Framework) en bij het ontwikkelen van nationale plannen en strategieën. Het proefschrift wijst ook op de noodzaak om dit algemene begrip van veerkracht aan te passen aan de specifieke context en het belang te erkennen van het identificeren, integreren en benutten van plaatsgebonden capaciteiten die op lokaal niveau bestaan voor overstromingsveerkracht. Uit het proefschrift bleek echter ook dat deze capaciteiten niet gelijkmatig verdeeld zijn over het lokale niveau en dat er daarom aandacht moet komen voor capaciteitsopbouw in buurten, gemeenschappen en individuen.

Ten tweede bevordert het proefschrift bredere discussies over gedeelde verantwoordelijkheid bij rampenrisicobeheer en veerkracht door de focus op de rol van de civil society en de verdeling van verantwoordelijkheden met autoriteiten. Zowel bij rampenrisicobeheer als bij ORB is de exacte balans tussen staat en burgers onduidelijk en betwist. In het proefschrift werden aanwijzingen gevonden dat de lokale overheid zich terugtrok van haar bestaande verantwoordelijkheden (bijv. door te vertrouwen op vrijwillige overstromingsgroepen om lokale waterlopen te onderhouden), maar ook dat ze verder gingen dan hun toegewezen taken om de civil society te ondersteunen (bijv. door extra tijd en expertise te bieden aan de overstromingsgroepen). Bovendien ontdekte het proefschrift dat actoren uit de civil society in staat waren om bij te dragen op manieren die de overheid niet alleen kon, bijvoorbeeld door op te treden als eerstehulpverleners bij overstromingen en door actie te ondernemen op hun eigen privéterrein. Het groeiende belang van technologie in ORB (bijv. sociale media om overstromingservaringen op te slaan en te delen, waarschuwingen voor overstromingen en als

een middel om medeburgers te mobiliseren om beschermingsmaatregelen op eigendomsniveau op te zetten om overstromingsgevolgen te verminderen) kan ertoe leiden dat de civil society vrijwillig verantwoordelijkheden op zich neemt in ORB die voorheen niet mogelijk waren.

Om deze ‘gedeelde verantwoordelijkheid’ te bereiken, moet er een dialoog en overeenstemming zijn tussen de autoriteiten en de civil society over de gedeelde verantwoordelijkheden en interpretatie van waterveiligheid. Bovendien moet er bereidheid van de autoriteiten zijn om verantwoordelijkheden op te geven en over te dragen in combinatie met evenredige macht en middelen. Er kunnen nog steeds potentiële problemen zijn bij het bereiken van deze ‘gedeelde verantwoordelijkheid’. Het kan bijvoorbeeld de bereidheid van de civil society verminderen om druk uit te oefenen op autoriteiten om alternatieve perspectieven en ideeën in overweging te nemen en om autoriteiten aan te spreken op onvoldoende vooruitgang van ORB (bijv. belangenbehartiging). De nieuw gemachtigde actoren uit de civil society kunnen ook niet representatief zijn en handelen om hun eigen privileges en macht te behouden, in plaats van inclusiever te zijn en de diversiteit van standpunten van hun lokale burgers te vertegenwoordigen. Daarom is de operationalisering van ‘gedeelde verantwoordelijkheid’ in ORB niet zo eenvoudig als het klinkt en vereist dit verder onderzoek en aandacht.

Bevorderen van op de civil society gebaseerde overstromingsveerkracht

Het toenemende overstromingsrisico in stedelijke gebieden wereldwijd betekent dat er meer burgers zullen zijn die te maken krijgen met overstromingen, het risico lopen op overstromingen of iemand kennen die door overstromingen is getroffen. De civil society en de autoriteiten erkennen dit grotere risico steeds meer en vragen zich nu af hoe ze hun overstromingsrisico kunnen beheersen en beter bestand kunnen worden tegen overstromingen.

De bevindingen van het promotieonderzoek hebben implicaties voor de praktijk en er zijn belangrijke aanbevelingen voor beleidsmakers en mensen in de praktijk (paragraaf 6.7.). Het proefschrift identificeert de rollen en bijdragen van de civil society in de overstromingsveerkracht en dat het belangrijk is voor beleidsmakers en mensen in de praktijk om hun diverse en plaatsgebonden bijdragen te erkennen. In sommige gevallen kan de civil society een bijdrage leveren op een manier die autoriteiten niet kunnen en is het belangrijk om te weten hoe autoriteiten ondersteuning kunnen bieden en kunnen communiceren met de civil society.

Bovendien pleiten de bevindingen van het promotieonderzoek voor aandacht voor de interpretatie van veerkracht in de context van overstromingen, in het besef dat interpretaties van veerkracht moeten worden afgestemd op de lokale omstandigheden en plaatsgebonden kenmerken. Op het verleden gerichte, terugkerende interpretaties van veerkracht zullen alleen

dezelfde zwaktes en kwetsbaarheden reproduceren die bestonden vóór de overstroming en moeten worden aangevochten. Interpretaties moeten gericht zijn op het aanpasbaar worden (in tegenstelling tot ‘aangepast’) en het transformeren van plaatsen. Er is reeds een groeiende focus op het behalen van meerdere voordelen van ORB- en overstromingsveerkrachtprojecten, maar dit moet ook verder worden uitgebreid door meer aandacht te besteden aan het opbouwen van gemeenschapscohesie en de plaatsgebonden capaciteiten van buurten en burgers. Bovendien moet bij het overstromingsveerkrachtbeleid rekening worden gehouden met kwetsbaarheden en capaciteiten, en moet men zich ook bewust zijn van het potentieel voor sociaalruimtelijke ongelijkheden in ‘leven met overstromingen’. Een deel hiervan kan worden bereikt door dat autoriteiten, die in silo's werken, rekening houden met de toewijzing van ORB-middelen en ervoor zorgen dat ze aandacht besteden aan eerlijkheid bij het streven naar overstromingsveerkracht in de praktijk (paragraaf 6.7.).

De opkomst van de civil society bij het regelen van overstromingsveerkracht brengt uitdagingen met zich mee, maar ook veel potentieel en is veelbelovend bij het aanpakken van het steeds urgenter wordende maatschappelijke probleem van stedelijke overstromingen en regenwateroverlast.

About the author

Steven Ashley Forrest (1990) has been undertaking his PhD research at the Department of Spatial Planning and Environment in the Faculty of Spatial Sciences, University of Groningen. He has conducted fieldwork in England and the Netherlands as well as taking several courses on research design and methods. Prior to his PhD, Steven worked as a consultant at Collingwood Environmental Planning (London) where he focused on flood resilience, climate change, and energy projects. He also holds a Master's Degree in 'Disasters, Adaptation and Development' from King's College London and a Bachelor's Degree in 'Biology with Science Communication' from Royal Holloway University of London.

Teaching was an important part of the PhD journey for Steven and he was granted an extension to be a coordinator for the 'Dilemmas in Infrastructure Planning' and 'Comparative Research and Planning Practice' (CRPP) 2018-19 MSc courses alongside Professor Jos Arts and Dr Elen-Maarja Trell. Before this, Steven had previously worked with Dr Elen-Maarja Trell to develop, coordinate and teach a course on 'An Introduction to Resilience in Spatial Planning' at Tallinn University as well as being an active part of the CRPP course. He has also been a guest lecturer, a supervisor for the 'Introduction to Academic Research' Bachelor course, and has successfully supervised 7 MSc thesis projects during 2014-2019.

Steven actively participates in many extra activities and during his PhD he was a Co-Founder of MindMint (a PhD research communication organisation), on the organising committee for the Young Academics Conference 2018 on 'Navigating Change: Planning for societal and spatial transformations' (in Groningen), a GOPHER committee member (2016/17), and a member of the PhD Day Programmes team (2016). He also won the inaugural 'Sustainable Society Impact Award 2016' with his 60 second Lego video explaining his PhD research. During his time as a PhD researcher, Steven presented parts of his research on 'the rise of civil society in governing flood resilience' at international conferences and workshops in the UK, the Netherlands, USA, Sweden, Brazil, Italy, and the Czech Republic as well as at a PhD Summer Course in Iceland.

Steven is currently a post-doctoral researcher and foreign expert on flood risk management at the Faculty of Social and Economic Studies, J. E. Purkyne University (Czech Republic). In this position, he is working to develop and test a board game incorporating flood risk management and urban planning for use with students and practitioners in the Czech Republic and the Netherlands. This game is both educational and exploratory: it aims to provide an immersive game environment where players can critically ask 'who pays for and who benefits from flood resilience?'

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Steven Forrest

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