Perceptions and practices of flood risk management:
A case study of flood risk governance in High River, Alberta

by

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Abstract

Flooding is a major problem across Canada, causing more property damage than any other hazard, and is expected to increase in severity due to climate change. Alberta's 2013 floods—one of the most expensive natural disasters in Canada's history—revealed the vulnerability of the province to such events. Floods are natural and only become disasters when they damage built structures. Vulnerability to flooding disasters arises from social arrangements—specifically, how we think about (frame) flooding and how that translates into practices about how and where we live. To date, these sociopolitical dimensions have been underexamined in Alberta.

In this dissertation I identify the ways that individuals and institutions influence (socially construct or produce) vulnerability to flooding risks and damages as a way to better understand and possibly alter these patterns. I provide a rich understanding of the complexities of flood risk governance that create challenges for policymakers and the implementation of policies through practices. I achieve this by analyzing the role of *flood risk governance*—the ways in which stakeholders make decisions, implement them, and interact with one another—in influencing vulnerability to such disasters. I ask how perceptions of, and practices related to, flooding are shaped by sociopolitical factors. I examine flood risk governance through a case study of High River, the community most severely impacted during the 2013 floods in Alberta. Town leaders plan to continue its growth and development, despite its location in a flood hazard area and long history of flooding. Extreme disasters and subsequent responses of this nature make ideal case studies by providing opportunities to investigate deeper social forces that increase vulnerability to disaster risks and damages but are hidden in everyday affairs.

In this qualitative case study I gathered data from four main sources: interviews, observations, policy documents, and media articles. I analyzed the data through the threaded situation analysis (TSA) approach that I developed by drawing on the theoretical frameworks of social practice-based approaches and frame/framing analysis. A *situation* arises when actors, structure/context, and practices come together in an arrangement specific to a time and place.

The most significant theme from my findings is that the dominant culture of economic development suppresses socioecological flood risk governance, resulting in a lack of regulations to restrict building in flood-prone areas. The push for development also perpetuates the dominance of structural mitigation, such as dams and dikes, at the expense of nonstructural measures, such as social mitigation (e.g., regulation and relocation) and natural mitigation (e.g., Room for the River approach). Economic benefits, as a result, have been concentrated among a small number of stakeholders while the risks and costs of flooding are spread to the rest of society. However, these practices appear economically profitable only if social and environmental costs are externalized and decision-makers are not held responsible. Such contradictions in Alberta's pro-development and anti-regulation culture combined with the rate of human-induced "natural" disasters contribute to a socially, environmentally, and economically unstable condition that, when triggered by an atmospheric event, can climax into a perfect storm.

Although the TSA approach moves away from typical practice-based approaches, it provides a way to study practices in addition to other factors that are key for understanding governance, such as actors and their interactions. I contribute to practice-oriented studies by developing and elucidating new practice routes of *suppressing* and *languishing*, which provide insight into how some practices became dominant over others and also capture deliberate and wilful attempts by actors to influence practices. Applying the TSA approach may prove valuable

in providing a deeper understanding of the nuances, contestation, and varied experiences related to risk management. These insights are necessary to understand the governance challenges for reducing disaster risks and damages.

This research contributes to scholarship in disaster sociology and environmental sociology that emphasizes the need to understand and, subsequently, intervene in the social production of flooding risks and their continued proliferation. In terms of practical contributions, the study reveals that transformation requires changes in the balance of power in two seemingly disparate yet related areas: among stakeholders who constitute flood risk governance and between humans and nature.

Keywords: flooding, flood risk governance, High River, Alberta, Canada, threaded situation analysis approach, TSA, environmental sociology

Preface

This thesis is an original work by Eva Angelyna Bogdan. The research projects, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board. The project, “Flooding Discourse: Perceptions and Practices of Flood Management in Alberta and the Netherlands,” No. Pro00055258, was approved initially on March 10, 2015, and then updated on December 15, 2016, to include research in the Netherlands.

Inspirational Quotes

"If climate change is a shark, then water is its teeth."

—James P. Bruce, expert on climate and water

"The wars of the last century have been on oil. The wars of the next will be on water."

—Ismail Serageldin, former vice president of the World Bank

"Our lives begin to end the day we become silent about things that matter."

—Martin Luther King, Jr.

"Follow your bliss."

—Joseph Campbell, *Power of Myth*

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The University of Alberta's Department of Sociology has been key to supporting my initiatives and funding applications. Also, many faculty, administrative staff, and peers in the Department who helped to improve my academic journey and quality of life.

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Chapter 1: Introduction

"Floods are 'acts of God,' but flood disasters are largely acts of man." (White, 1945, p. 2)

Gilbert White's (1945) astute and still-relevant observation on flood disasters has long echoed in my mind. White, a geographer who is considered the father of floodplain management, laid bare the root of the problem with flooding and at the same time revealed the source for strengthening resilience: human–nature interactions.[1] His research was the foundation for a paradigm shift in disaster management, and its relevance continues to challenge thinking about flood risk governance. Whereas natural disasters were traditionally thought to be caused by nature, disasters are a result of *human nature*.[2] So-called natural disasters,[3] including flooding, [4] are triggered by atmospheric or geological events, but they are ultimately social phenomena because vulnerabilities to disasters and the extent of damages are shaped by how a society interacts with nature, such as where we build our homes and how we manage our natural resources.[5] Hence, flooding is not a simple high-water hydrologic event but rather a particularly wicked socioecological problem.

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[1] *Resilience* is "the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions" (Intergovernmental Panel on Climate Change [IPCC], 2012, p. 563).

[2] The term human nature refers to human decisions and activities and is used to contrast with nature in terms of the natural environment.

[3] Disasters are characterized as such because they are larger scale than crises or emergencies (IPCC, 2012). The term *disaster* from this point on refers to natural rather than technological (e.g., nuclear) or intentional disasters (e.g., terrorism), unless specified otherwise.

[4] Oxford Dictionaries defines flooding as "the covering or submerging of normally dry land with a large amount of water" ("Flooding," 2019, para. 1).

[5] Although not yet commonly used, the term socio-natural hazard is gaining popularity: It captures "circumstances in which human activity is increasing the occurrence of certain hazards beyond their natural probabilities" (UNISDR, 2009, pp. 27–28).

By wicked, I mean that the causes and consequences of flooding disasters are embedded in complex sociopolitical contexts involving diverse stakeholders with conflicting values and interests regarding public safety, property rights, and economic security. As a result of their complexity, wicked problems do not have single, definitive solutions; instead, they require provisional solutions (Rittel & Webber, 1973). How these solutions are formulated, however, depends on how the problem is framed and by whom, as some stakeholders are included while others are excluded (Rittel & Webber, 1973). The competing perceptions (or frames) and demands of stakeholders can overwhelm decision-makers and deadlock policy solutions. Hence, responding to wicked problems requires an understanding of their social, cultural, political, economic, and geographical contexts.

Flooding is the most costly and common hazard in Canada, with most of the damages occurring in the western prairie provinces of Alberta, Saskatchewan, and Manitoba between 2005 and 2014 (Office of the Parliamentary Budget Officer, 2016). Scholarly literature on sociopolitical aspects of flood risk management in Canada has focused on the chronic flooding in Manitoba and the more recent flooding occurring in Ontario. Despite the frequency of flooding in Alberta, there is limited peer-reviewed scholarship on the social dimensions of flooding disasters in this province (cf. Grimes, Goos, Little, & Shannon, 2007; Haney & McDonald-Harker, 2016). Alberta has unique sociopolitical characteristics: a boom-and-bust, carbon-based economy;[6] a well-entrenched pro-industry political climate favouring business-as-usual strategies for dealing with socioenvironmental issues (Clare, Krogman, & Caine, 2013); and a pro-development culture that is not conducive to enforcing regulations (Davidson & MacKendrick,

[6] Alberta has the world's third largest crude oil reserves and is home to the largest oil sand operations (Government of Alberta, 2019). Alberta's oil sands contributed approximately 9.3% of Canada's total greenhouse gas (GHG) emissions in 2014, which is about 0.1% of global GHG emissions (Government of Canada, 2016).

2004). These sociopolitical characteristics, along with the province's geographical features, have made Alberta more vulnerable to disaster risks[7] and damages, earning the label "ground zero" (McGillivray, 2016, para. 2) for catastrophic losses in Canada.

Alberta's 2013 floods—one of the most expensive natural disasters in Canada's history—revealed the vulnerability of the province to such events, which are predicted to intensify due to (anthropogenic) climate change. The damages of the 2013 flood were estimated at over $5 billion[8] in property and infrastructure damage impacting 125,000 people in 30 communities and resulted in five deaths (Alberta Emergency Management Agency, 2015). High River was the municipality hardest hit by massive flooding on June 20, 2013 (see Figure 1.1). Although precariously situated due to flooding, High River's location was strategically chosen by settlers.

In the early 1880s settlers were drawn to the High River area by the ford crossing of the Highwood River, the ideal conditions for ranching, and the scenic view of the Rocky Mountains (Knupp, 1982). The location selected for the establishment of the Town of High River[9] was, however, not ideal for long-term settlement as its hydro-geological characteristics have made it prone to flooding, with over 10 major floods occurring between 1894 and 2013 (Knupp, 1982). Prior to the settlers' arrival, people of the Blackfoot Nation would move from the Highwood river valley to the escarpment when the chinook winds came and melted the snow, sometimes resulting in spring floods. They called the valley *Aapattohsspitsii*, "the place of high trees along

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[7] *Disaster risk* is "the likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions" (IPCC, 2012, p. 558). Simplified, risk is a function of hazard and vulnerability.

[8] All financial estimates pertaining to Canada are in Canadian currency (CAD) unless specified otherwise.

[9] *Town* (capitalized) refers to the official municipal designation and the municipal government whereas *town* (lowercased) refers to the town in general.

running water" (Knupp, 1982, p. 12). The current name of the town, High River, reflects its flooding problem.[10]

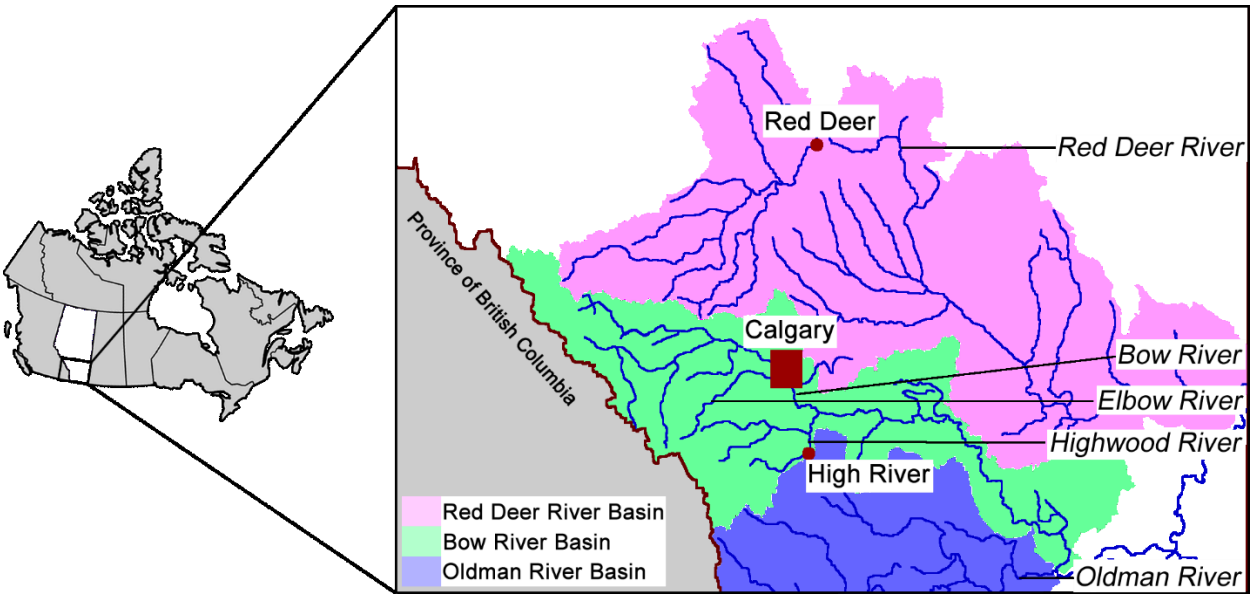

Figure 1.1. Partial map of Alberta, Canada showing the study area and its river basins.

Despite its location in a flood-prone area and a long history of flooding, the Town of High River was not prepared for the 2013 flood; as former Mayor Emile Blokland said, the town was caught with its "pants down" (Howell, 2014, para. 10). And yet the Town has plans to continue developing in these vulnerable areas. At the 2014 commemoration event, Mayor Craig Snodgrass announced the Town's plans: "It's a quickly growing place and will continue to grow" (personal communication, 2014, June 20). He concluded the ceremony by declaring: "We will not forget June 20, 2013, but it will not define us. . . . Let the world know we are not done, and

[10] The Town of High River is located in the floodway and flood fringes which are defined in Chapter 3 (also see Appendix B).

we are not going anywhere, because this is our home and we love it" (C. Snodgrass, personal communication, 2014, June 20). Extreme disasters like the High River flood, and the contradictory responses that amplify disaster vulnerability such as this make ideal case studies for investigation of deeper social causes behind an issue and its consequences (Flyvbjerg, 2004). As a way to deeply explore the social causes of disasters, my dissertation utilizes a qualitative case study approach to examine the social construction of the 2013 flood disaster in High River.

Alberta's flood risk management approach has historically focused on physical infrastructure (structural measures),[11] such as building dams and dikes to resist water (Bryant & Davies, 2017; Morrison, Noble, & Westbrook, 2018). In contrast, other provinces such as Ontario and British Columbia have invested more resources in diversifying their flood management strategies, including adopting more non-structural measures (Shrubsole, 2013).[12] The high cost of Alberta's 2013 flood and concerns about future flooding, however, triggered exploration of other approaches, such as the Dutch Room for the River (RfR) approach which applies a "living with water" paradigm and moves away from "fighting water" (through physical infrastructure approach (see Dissertation Chapter 4).

Addressing the issue of flooding requires two conditions to be met. First, policies and practices must be coordinated at all levels of government (Grimes et al., 2007; Shrubsole, 2013). Second, affected stakeholders must participate and collaborate in the decision-making process. Meaningful stakeholder engagement and dialogue enable multiple perspectives to be heard and is

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[11] *Structural measures* are "physical construction[s] [that] reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems" (United Nations Office for Disaster Risk Reduction [UNISDR], 2009, p. 28).

[12] *Non-structural measures* are those "not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education" (UNISDR, 2009, p. 28).

thus critical for creating a democratic space where diverse strategies can be explored (Ashley et al., 2012; Haque, Kolba, Morton, & Quinn, 2002; McCarthy, Crandall, Whitelaw, General, & Tsuji, 2011). These two conditions—coordination and collaboration—initiated my interest in researching decision-making processes, implementation,[13] and stakeholder interactions, collectively known as flood risk governance.[14]

Flood risk governance refers to how actors interact with and influence one another when developing and implementing decisions in flood risk management. *Flood risk management,* in contrast, encompasses specific policies and practices developed to prevent, manage, and reduce the impact of disasters across the disaster phases: preparedness, response, recovery, and mitigation (Henstra & McBean, 2005). In this research, I mainly focus on the mitigation phase. I refer to flood preparation, flood response, flood recovery, and flood mitigation as flood risk management strategies to distinguish them from the disaster phases. Many types of practices comprise flood risk management strategies, such as policy-making, decision-making, land-use management, map-making, and others (see Appendix A for details).

In this dissertation I investigate flood risk governance to understand how perceptions of, and practices related to, flooding are shaped by sociopolitical factors in Alberta. To accomplish this objective, I asked questions such as: How are flooding and flood risk management framed and by whom? What policies and practices are proposed and promoted and by whom? Which practices, out of all the options, are implemented? What are the roles and responsibilities of various stakeholders? How do interactions among the stakeholders influence practices? In this

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[13] *Implementation* is defined as activities and events that occur after a policy adoption and include the administration of the policy and its actual effects (Prater & Lindell, 2000).
[14] *Governance* is defined as the ways in which actors both interact with, and influence each other, to make and implement decisions to achieve a set of goals (Institute on Governance, 2018).

introductory chapter I begin with an overview of the evolution of disaster studies leading to the incorporation of the social dimensions of disasters. I then outline the research questions and objectives that guide my research. Next, I briefly describe my theoretical and methodological approaches followed by an overview of the three main dissertation chapters.

Evolving, Interdisciplinary Perspectives on Disasters

Disaster research arose post-World War II and is rooted in military and public administration. Most research on natural disasters up until the 1990s focused on disaster administration, such as emergency preparedness, restoration of normalcy, and organizational and collective behaviour during an incident (Quarantelli, 2005). Being problem-oriented and practice-based, with little attention to theory (Perry, 2007), disaster research became insular from broader sociological fields and still lags behind in theoretical and conceptual advancements (Tierney, 2007). Until the last decade or so, disaster research did not adequately investigate or account for the social production of disasters and related issues of social inequality, diversity, and social change (Tierney, 2007).

Early approaches to disaster management were characterized by a *structural functionalist* perspective which frames disasters as natural, unforeseeable events caused solely by earth and atmospheric conditions (Perry, 2007; Quarantelli, Lagadec, & Boin, 2007). This perspective views atmospheric or geological events as disrupting the social structure[15] and operationalizes society as the dependent variable (Webb, 2007). Therefore, a structural functionalist approach focuses on hazards[16] such as floods by framing it as the river imposing on people, and formulates

[15] Examples of social structure are social institutions, organizations, and networks.
[16] *Hazard* is defined as "the potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources" (IPCC, 2012, p. 560).

solutions that control the river. In contrast, the more recent *social constructionist* perspective contends that disasters arise as a result of how society interacts with nature through various practices. Natural processes (hazards) like flooding become disasters through poor planning and design of communities or systems that make them vulnerable[17] to hazards (Mileti, 1999). This perspective treats social structure as a causal force of disasters and operationalizes it as an independent variable. A social constructionist approach would frame flooding as people encroaching on the river and thus construct solutions to control where people establish residential and industrial developments.

Gilbert White (1945) was one of the pioneers who paved the way for a social constructionist perspective on flooding. He connected social, environmental, and economic dimensions of disasters in his statement: "Human encroachment upon the flood plains of rivers accounts for the high annual toll of flood losses" (White, 1945, p. 2). White examined a range of structural and nonstructural (social mitigation) measures he referred to as adjustments. He argued that determining the most effective use of floodplains requires evaluation that integrates engineering, geography, and economics. White's dissertation work offered a new way of perceiving disasters, even while structural functionalism (manifested as structural measures for flood control) continued to be the dominant paradigm (Macdonald et al., 2011).

In 1983, geographer Kenneth Hewitt further challenged the dominant structural functionalist perspective that disasters are natural events, arguing that this perspective is "the single greatest impediment to improvement in both the understanding of natural calamities and the strategies to alleviate them" (p. 3). Hewitt argued that approaches to disasters have been

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[17] *Vulnerability* is "the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard" (UNISDR, 2009, p. 30)—for example, various physical, environmental, social, and economic factors.

driven by the priorities of dominant stakeholders, such as government, scientists, and technocrats, rather than by theory. He argued that mainstream disaster research separated disasters from their social contexts and reinforced scientific and technocratic worldviews, which were then manifested in approaches that aimed to control nature rather than where and how people build.

The social constructionist perspective of White (1945), Hewitt (1983), Mileti (1999), are echoed by Freudenburg, Gramling, Laska, and Erikson (2009), Tierney (2007), and others (see for example Haque and Etkin, 2007), who call attention to larger social patterns such as the role of institutions and trends in development, recognizing that "disasters are part of a set of negative externalities that occur as a consequence of larger political-economic trends and that must be explained by reference to those forces" (Tierney, 2007, p. 510). For example, communities may be driven by economics to develop flood-prone areas for profit. Disasters thus reveal such trends and other "social structures and processes that are hidden in everyday affairs" (Stallings, 2002, p. 283). The cumulative work of social constructionist scholars facilitated a social turn in how disasters are understood and approached, moving away from merely responding to disaster events to reducing disaster risks for prevention (Raju & de Costa, 2018).

There is also a growing body of research in environmental sociology drawing attention to unsustainable environmental practices that have disastrous consequences, as well as perpetuate "deadly and avoidable patterns" (Freudenburg et al., 2008, p. 1016). Tierney (2012) added that "Basically, [many] disasters are manifestations of failures in environmental governance and sustainability, and that linkage should be more explicitly acknowledged" (p. 358). For communities to become safer, a cultural shift is needed in which not only profit, but also the principles of sustainability are also part of guiding values (Mileti, 1999). In sum, the social

dimensions of disasters need to be examined and brought to light in order to reduce risks and damages (Tierney, 2014). As such, a social constructionist perspective on disasters has informed my research approach.

Research Question and Objectives

This dissertation explores how flooding and flood risk management practices are socially constructed. I asked, how are perceptions of, and practices related to, flooding shaped by sociopolitical factors and how do these perceptions and practices change over time? I centered my research on a case study of the 2013 flood in the Town of High River, Alberta, informed by a social practice-based approach and frame/framing analysis. The following objectives guided this research:

1. To examine flooding discourses of various stakeholders (in private and public sectors and hybrid organizations[18]).
2. To investigate decision-making processes for choosing and implementing flood management practices at the municipal, provincial, regional, and federal levels.
3. To analyze the interactions of stakeholders in flood risk management and their influence on one another.

Although this case study focuses on the Town of High River, Alberta, flood policies and practices are embedded in municipal as well as regional, provincial, and federal geographical and legal jurisdictions. Therefore, this research contributes to an understanding of local-level responses to natural disasters and how local responses are facilitated or hindered by extra-local factors. These extra-local factors include the influence of the Dutch RfR approach to flooding.

Examining Flood Risk Governance: Theoretical Lenses

This research is theoretically grounded within the sociology, environmental sociology, and disaster sociology literature and informed by literature on governance and policy studies to

[18] Hybrid organizations are a combination of public and private sectors (e.g., for infrastructure projects).

further understand flood risk governance. In this section, I examine the most relevant aspects of governance for my research from natural resource management and disaster governance scholarship. I then briefly describe the theoretical frameworks I drew from—practice-based approaches and frame/framing analysis—and explain how and why I interfaced the two frameworks. I provide more details on the analytical framework I developed, the threaded situation analysis (TSA) approach, in Chapter 2.

Governance

Politics, policy-making, and power dynamics have shifted considerably since the 1970s as a result of growing neoliberalism and the subsequent transfer of roles and responsibilities to govern public issues and resources from governments to a broader range of stakeholders including private, non-profit, and hybrid agencies. The vocabulary of governance rose in prominence in the 1970s and 1980s in disciplines such as corporate governance, urban planning, policy analysis and public administration, environmental studies, and risk research (Hajer & Wagenaar, 2003; Renn, Klinke, & Van Asselt, 2011). The widespread adoption of governance has led to different conceptualizations of the term and subsequently a wider array of theoretical and methodological approaches has been developed (see Dissertation Chapter 2). The application of governance thinking to the environment has similarly led to varying interpretations.

The field of environmental governance[19] has been strongly influenced by the biologist Garrett Hardin and later challenged and shaped by the pioneering work of Nobel Prize–winning political scientist Elinor Ostrom. Hardin's (1968) *Tragedy of the Commons* is premised on

[19] Environmental governance is the combination of organizations and regulatory processes through which actors influence environmental actions and outcomes (Carolan, 2018).

individual utility maximization (cost–benefit analysis) for common pool resources.[20] The policy implications of this rationalist approach are to influence individuals' rational choices to achieve social change; for example, by increasing incentives to tip people's cost–benefit calculations. Hardin's approach has been criticized for focusing too much on agency[21] and for making two key assumptions: that people's decisions are based on rational choice and that interaction and deliberation are lacking among actors. In fact, both assumptions are often false. For example, Tversky and Kahneman (1981) found that how information is framed, rather than reason, influences individual decisions. Hence, they illustrated how a rational choice approach to policy may be problematic. In the context of flood risk management, an individualist approach promotes citizens to calculate costs and benefits, to flood proof their homes, and to prepare emergency plans and kits. Such individualist approaches have mixed and often disappointing results (Everett & Lamond, 2014). Furthermore, this approach avoids governments' role in land-use planning, such as restricting development in flood-prone areas in the first place, and in regulating resource extraction activities that increase vulnerability to disasters.

One of Hardin's (1968) main critics was Ostrom (1990), who illustrated in *Governing the Commons* that local communities can successfully govern common pool resources and avoid a tragedy through communication and coordination, social norms (informal rules), and institutions (formal rules). Ostrom (2011) also argued that people have limited information, time, and cognitive abilities to process this information; therefore, they have bounded rationality in that they make the best choice possible given "incomplete information and imperfect information-

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[20] Common pool resources are natural or human-made goods that are available to everyone for consuming (i.e., non-excludable) and by being consumed availability to others is reduced (i.e., rivalrous, subtractable), such as forests and rivers.

[21] The definition of agency varies but, in this chapter, it refers to the capacity of actors to act or intervene by interpreting, improvising, and reshaping aspects of the social structure: agency is a form of power.

processing capabilities" (p. 14). The policy implications of this institutionalist approach are to design the "right" institutions, develop "good" governance, and to facilitate behavioural and social change through norms, rules, and regulations. The main criticism of Ostrom's (1990) work is that it focuses too much on structure and assumes that actors simply follow rules, instead, actors respond differently than expected based on their in-situ logic, expertise, values, and interests (Arts, Behagel, van Bommel, de Koning, & Turnhout, 2013). In other words, an institutionalist approach falls short because individuals rarely linearly follow plans or procedures set by policy and decision-makers, and rarely produce exactly the predicted or preferred outcomes. For example, the implementation of a disaster management policy often appears different on-the-ground (in practice) as it filters through various sociopolitical layers (Johnson, Tunstall, & Penning-Rowsell, 2005; Prater & Lindell, 2000). To counter the limitations of rationalist and institutionalist approaches, a practice-based approach examines the interplay between structure and agency, which I review below.

The shift from government to governance has also occurred in disaster management. The *Sendai Framework for Disaster Risk Reduction* (United Nations Office for Disaster Risk Reduction [UNISDR], 2015) shifts from a heavy, top-down government approach characteristic of the earlier *Hyogo Framework for Action* (UNISDR, 2005) and "mak[es] disaster risk reduction everyone's business" (Raju & da Costa, 2018, p. 286). In other words, responsibility for reducing risk is spread out across a range of public, private, and hybrid stakeholders. As such, disaster governance plays a crucial role in risk reduction; according to Tierney (2012):

> Disaster governance consists of the interrelated sets of norms,[22] organizational and institutional actors, and practices (spanning predisaster, transdisaster, and postdisaster periods) that are designed to reduce the impacts and losses associated with disasters

[22] Norms are bound in formal and informal mechanisms such as laws and regulations, best practices through policy and practitioners, consensus-based standards, and cultural expectations, such as culture of safety (Tierney, 2012).

> arising from natural and technological agents and from intentional acts of terrorism (p. 344).

Therefore, disaster governance requires the consideration of several social and geographical factors and stakeholder collaborations to reduce vulnerability to disasters.

While the literature on disasters and governments (administration, legislation, policy, and programs) is plentiful, research on disaster governance involving various actors and how these systems change over time is sparse (Tierney, 2012). Adding to this, rather than focusing on how stakeholders *should* interact or how their interactions are documented on paper, Margareta Wahlstrom (former Special Representative of the UN Secretary-General for Disaster Risk Reduction) stressed that it is critical to study the "nitty-gritty details of how stakeholders *actually* interact" (personal communication, 2017, May 22, emphasis added). Interest in flood risk governance is growing but current literature is limited in scope, fragmented, and lacking systematic comparative analysis (Wiering et al., 2017). Contemporary scholarship on risk management has emphasized the key role of perceptions in influencing the response to risk management practices (see Thistlethwaite, Henstra, Brown, & Scott, 2018). Most studies, however, have failed to examine the "interface between perceptions and management/intervention" (Birkholz, Muro, Jeffrey, & Smith, 2014, p. 14) that would reveal nuances, contestation, and varied experiences. This dissertation addresses this gap by focusing on the roles of perceptions and practices in flood risk governance.

There are several analytical risk-related frameworks focusing on perceptions and practices, such as the Social Amplification of Risk (SARF) model developed by Kasperson and colleagues (1988) to analyze risk perception and behaviour, the risk governance framework by the International Risk Governance Council (2005), and the assessment framework recently developed by the STAR-FLOOD research consortium (Wiering et al., 2017). These frameworks

are valuable and widely accepted and applied but they have some unresolved theoretical and analytical issues (see Dissertation Chapter 2 for details). To address these limitations, I develop a practical and comprehensive model, the threaded situation analysis (TSA) approach, to assess flood risk governance by bringing into dialogue perceptions and social practices.

Practice-Based Approaches

A practice-based approach seeks a middle ground between rationalist and institutionalist choice theories and contends that it is neither individual behaviour (agency) nor societal structures exclusively that affect behaviour, but rather the interplay between them in everyday practices (Bourdieu, 1977; Giddens, 1984). This approach recognizes that individuals are not always rational because they are strongly influenced by the social context, and they also interpret, improvise, and reshape rules and institutions in the performance of practices, and thus intervene in practices. A practice lens offers a novel approach by examining social phenomena as consisting of an array of interwoven social practices and thus the unit of analysis is practices. There is no unified practice theory or agreed-upon definition, as such, I apply the term *practice-based* rather than social practice theory.

In this research, I define *practices* as the ensemble of doings, sayings, and things in action that are routinized to the extent that they are recognizable patterns across time and space (Arts et al., 2013; Nicolini, 2012). While numerous scholars have contributed to theories on social practices, I mainly draw on the work of Shove, Pantzar, and Watson (2012), who provide concrete empirical tools for analyzing practices (comprised of materials, meanings, competencies, and their linkages)[23] and the processes by which practices are (re)produced and

[23] Shove et al. (2012) use these terms as follows. Examples of materials are objects and infrastructures. The authors collapse several concepts into meaning and use it synonymously with images, frames and framing, and discourses ideas and aspirations. Competencies are defined as skills and know-how.

change (which I elaborate on in Dissertation Chapter 3). I also draw on other practice-oriented scholars to provide additional ontological concepts[24] such as rules, and actors along with their roles and interactions (see Dissertation Chapter 2).

Flood risk management practices are essentially social practices for the following reasons. First, there are recognizable patterns that are shared, and these patterns can change over time and space. For example, historically the Netherlands has focused on managing riverine floods through dikes but has shifted to making room for the river such as relocating houses out of flood areas (see Dissertation Chapter 4). Second, flood risk management practices are not attributable to individual actions but rather involve the interplay of agency and structure. For example, when people choose to buy a home, many decisions have already been made for them by municipal, provincial, and federal institutions; the location of homes are determined through land use planning, and the overall designs of homes are determined by existing building codes. Third, flood-management related activities are embedded in social and material contexts; for example, building houses on stilts to allow seasonal floods versus building homes with basements behind berms. It should be noted that because flood risk management practices are social practices, they can be changed and represent a starting point for progressive flood risk governance.

Overall, a practice lens allows for examination of which ideas and policies are chosen out of all the various options and how they are implemented on-the-ground. However, a clearer conceptualization of meanings is needed which is provided through frame/framing analysis as described below.

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[24] Ontology is the philosophical study of being that explores the nature of reality and existence, including the basic categories or properties that constitute a phenomenon and the relationships between them. For more details on the role of ontological concepts in theoretical analysis see Chapter 2.

Frame/Framing Analysis

As noted earlier, perception plays a critical role in decision-making and practices related to risk. Perceptions can be examined through frames and framing. In general, frames are the mental images or meanings people use to make sense of their world, and framing is the communication of those ideas. Frames and framing are often used interchangeably in the literature, resulting in confusion and analytical inaccuracies (Borah, 2011; Dewulf et al., 2009).

To differentiate between frames and framing, I draw on Dewulf et al. (2009) who noted that *frames* are knowledge structures of how individuals perceive and interact with the world through mental filters woven from biological and social influences, helping them to make sense of, or interpret, ideas and events. To augment the analysis of frames, I also adopt Schön and Rein's (1994) conceptualization of frames as problem definition and remedy promotion. In contrast, *framing* is the dynamic processes of interactions in which frames are enacted and meaning is shaped. I separate frame and framing analysis with a forward slash whilst keeping in mind that in life, social phenomena cannot be neatly separated. Whether frames are agreed upon or contested by actors can provide insights into power dynamics (which I explore in Dissertation Chapter 4).

A flood can be framed as being caused by nature/river or by development/people in flood-prone areas. Which of these problem definitions is proposed and gains dominance will influence the solutions such as structural or nonstructural measures. Other examples of frames related to flooding in the literature include progress/growth versus sustainability and risk versus safety. The most common type of interaction or governance style among stakeholders involved in flood risk management has been top-down (centralized) approach; however, scholars have critiqued this approach and bottom-up (decentralized) and mixed approaches are becoming more

common (see Dissertation Chapter 3). I divide framing into three typologies that provide insights into power dynamics: top-down (centralized) versus bottom-up (decentralized); collaboration and/or coordination; and conflict and/or competition. Investigating the interactions between stakeholders provides insight into how decisions are made and implemented and what factors facilitate or hinder these processes.[25]

In summary, applying frame/framing analysis is valuable in that it allows for identification of various perspectives on how flooding problems are defined and consequently, which remedies are promoted and by whom, thereby providing insight into the iterative process by which individuals interpret and reproduce the meanings through social interactions. One of the limitations of relying on analysis of frames and communications about them is that the findings may not reveal whether those frames were applied and thus may not accurately reflect actual events (Couch, 2000). To account for this limitation, I also apply a practice lens to examine on-the-ground implementation as noted above.

Interfacing Frame/Framing Analysis and Practice-Based Approaches

Although practice-based approaches and frame/framing analysis are often separated in research and in the literature, I argue that bringing them into dialogue enhances understanding of the complexity of flood risk governance in ways that using just one of these approaches might miss. I chose the term *interfacing*, which refers to the point at which these two approaches affect or influence each other or share a common boundary, rather than *combining*, because these approaches have different ontologies and epistemologies (as described in Dissertation Chapter 2). Interfacing practice-based approaches and frame/framing analysis provides the ontological

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[25] Some of the key scholars of decision-making research are Cerulo, Leschziner, Slovic, Swidler, Vaughan, and Williams. To explore decision-making processes, I draw from framing analysis and focus on interactions, which I divided into three typologies.

concepts (and subconcepts) identified as critical in the governance literature and thus needed for analysis: actors (roles, power, and interactions as framing); structures (institutions and rules); contexts (geography); and practices (materials, meanings as frames, and competencies). In the TSA approach, each of these concepts are analyzed to try to recreate the situation that shaped the actors' decisions and actions while, recursively, the actor shaped that situation. A *situation* arises when actors, structure/context, and practices, come together in an arrangement specific to a time and place.

Interfacing practice-based approaches and frame/framing analysis provides the concepts needed for examining how perceptions of, and practices related to, flooding are shaped by sociopolitical factors. The benefit of examining flood risk governance through the TSA approach is that it provides insights into the social construction of flooding disasters and thus opens opportunities for a different way of organizing society to reduce disaster risks and damages to enhance resilience.

Methodology and Methods

Since events cannot be disassociated from their socioeconomic contexts and practices occur within specific times and spaces, I utilize a qualitative *case study approach*, which is an empirical inquiry that investigates a phenomenon within its real-life context (Flyvbjerg, 2001). A case study approach yields thick and rich descriptions of social reality; hence, it is essential for studying the cultures of disasters (Webb, 2007). I have chosen flooding in the Town of High River since it is an extreme case: The town was hardest hit during the 2013 Alberta floods, it has a long history of reoccurring flooding, and yet Town leaders have plans to continue developing in a flood prone area.

To increase confidence level and ensure construct validity, I have incorporated theoretical frameworks and concepts from the literature in disaster studies, environmental governance, sociology, and public administration and policy studies, as they relate to flood risk governance. Since disasters cannot be exactly or ethically replicated, triangulation (accumulation of data from different sources and/or studies) is used to examine the same dimension of a research problem across different types of research in order to ensure consistency of findings and to obtain the highest confidence in the (external) validity of the conclusions (Stallings, 2007). Further verifying external validity of the case study method can be achieved by checking analytic generalization such as expanding themes or furthering theory, rather than statistical generalization (Yin, 2014). Analytic generalizations, principles, or lessons learned may apply to other situations. Reliability is ensured by using well-developed case study protocols and clearly demonstrating that the operations of the study (e.g., data collection) can be repeated with similar results (Yin, 2014). Empirical data were collected from four main data sources: (a) interviews with key informants in Alberta and the Netherlands; (b) observations and journal notes taken in the field; (c) policy documents; and (d) media articles.

Interviews are one of the most widely used methods in qualitative research that allows for relationship building and awareness of the flow of conversation (Nunkoosing, 2005). An "inter-view," as Kvale (2007) pointed out, allows for an interchange of views between people, providing opportunities to share ideas, ask for clarification, and build trust. I focused on decision-makers because "leadership during a crisis is crucial for determining its outcome and is particularly revealing about how a society is organized" (Murphy, 2009, pp. 346–347). As such, I conducted interviews with key informants with expertise related to flooding or in influential roles to gain insight into their perceptions and the rationalization of actions upon obtaining

University of Alberta Research Ethics Approval (see Appendix C). Initially, I identified potential interviewees from media articles, reports, and websites. Interviewees were selected based on their decision-making or advisory roles in flood management, including representatives from government (federal, provincial, municipal), community-level organizations, scientific institutions, media, and the private sector. I then used snowball sampling to identify more interviewees.

In 2015, I conducted research in Alberta, including interviews[26] with key informants (n = 38),[27] observation at three flood anniversary ceremonies (in 2014, 2015, and 2016), and tours of High River and surrounding areas. I also attended other events such as municipal open houses on flood mitigation and development plans. In 2017, I travelled to the Netherlands for three months to learn more about the Dutch RfR program and to conduct additional interviews (n = 11). I also presented the findings from my research on Alberta's implementation of the RfR approach and preliminary findings of my research on the Dutch RfR at three research venues in the Netherlands, and asked participants (n = 65) for feedback through a series of discussion questions in these group interviews,[28] providing validation of some of the research findings. While in the Netherlands, I also toured four RfR projects.[29] The semistructured interviews in both jurisdictions included topics related to perceptions and practices of flood management (see Appendix D for the telephone and e-mail scripts, Appendix E for the information letter and consent form, and Appendix F for the interview guide). I categorized Alberta and Dutch

[26] All interviews conducted were face-to-face except for two telephone interviews in Alberta.
[27] I conducted 35 interviews; some had more than one participant.
[28] The group interview participants self-selected by attending the presentations which were promoted through the organizations where the events were held.
[29] Dutch interviewees provided me with tours of the following RfR projects: Rivierenland, Overdiepse Polder, IJssel Delta South, and Nijmegen. I did not interact with residents in these areas.

interviewees based on their employment title and/or their areas of competencies. Details on participant selection, classification, and interview analysis are provided in Appendix G.

Policy documents provide an understanding of the macroscale factors influencing policies and practices.[30] Policy responses to disasters are revealing since they involve uncertainty and require consideration of political palatability (Vink, Boezeman, Dewulf, & Termeer, 2013). Therefore, research on policy requires an examination of complex problems, competing inputs, and "seemingly irrational decision-making styles" (Majchrzak, 1984, p. 15). In Canada, disaster management policies (and subsequent practices) are shaped by relationships between various levels of governments (Henstra, 2013). I reviewed select policy documents related to flood management and land-use planning authored by all three levels of government and key organizations to gain insights into how flooding was framed, which solutions were promoted and implemented (including through regulations), and power dynamics. I categorized policy documents into three categories: legislative transcripts, reports, and supplementary materials.

For the provincial legislative transcripts, I focused mostly on three types available online: (a) Hansard transcripts, (b) Votes and Proceedings, and (c) Committee of Supply Records. I reviewed legislative transcripts which contained the search words High River and/or flood related to the 1995, 2005, and 2013 flooding in High River. I focused on the 2013 flood, but the 1995 and 2005 legislative documents served as a valuable comparison and for understanding the evolution of the flooding problem in High River and Alberta in general. I examined 128 legislative documents ranging from 1995 to 2018, of which I coded 78 (61%). Other policy

[30] Brooks and Miljan (2003) suggested that policy involves "conscious choice that leads to deliberate action—the passage of law, the spending of money, an official speech or gesture, or some other observable act—or inaction" (p. 4). What constitutes a policy document are textual materials that are concerned with these types of acts or the prevention of these acts and have legal bearing.

documents examined included policy briefs and six legislative Acts. For more details on the methodology for legislative document analysis, see Appendix H. For a list of the legislative transcripts analyzed, see Appendix I.

I identified potential reports from websites of governments and other organizations, media articles, and other reports. I examined 108 reports from all governance levels (municipal, regional, provincial, national, and international) published between 2006 and 2018. I chose 18 reports to code for further in-depth analysis that were the most relevant to flooding in High River (see Appendix J for report selection and analysis details and Appendix K for a list of the reports).

Supplementary materials are categorized in this research as those that do not fall into the policy document and report categories but are still relevant for providing insights on flooding in High River, such as videos, photographs, and maps. These documents were used as supporting information and were reviewed but were not analyzed as in-depth as the other types of documents.

Mass or mainstream media[31] is the most prevalent site of collective recollection or memory in modern national societies (Huyssen, 2000) and in contemporary liberal democracies, it is a significant factor structuring and dominating the public sphere (Flyvbjerg, 2012). Alternative media sources can provide a venue for marginalized perspectives. I included both mass media and alternative media sources. In addition, I included letters to the editor and opinion sections, as they provide a diversity of views within the context of a dominant narrative (Young, 2013). Large national newspapers are a source of information for other media. Local news agents may be less likely to disrupt the status quo, including local power structures (Carvalho, 2008;

[31] Mass or mainstream media is seen as maximizing audiences by appealing to safe and conventional formulas, whereas alternative media does not use depoliticizing formulas that discourage advocacy for social change and may raise uncomfortable issues (Hamilton, 2000).

Davidson & Bogdan, 2010). Given the influence of community newspapers, it is important to understand how an issue is portrayed in order to understand localized impacts and responses to disaster events. I analyzed media articles at the international, national, regional, provincial, and municipal levels. *The High River Times*, a weekly newspaper, has played a prominent role in the community since 1905 (Knupp, 1982). I examined 113 media articles ranging from 2006 to 2018, of which I analyzed in-depth 57 on the 1995, 2005, and 2013 floods in High River with a focus on the most recent flood (see Appendix L for details on selection and analysis and Appendix M for list of media articles).

Interviews, policy documents, media articles were coded in Nvivo into the themes listed in Appendix N. Nvivo thematic coding categories were initially identified from the literature review (disaster studies, governance studies, policy and administration). I revised these codes after analyzing about 10 percent of documents and interviews. On the one hand, Nvivo was an invaluable tool for organizing and coding the large volume of data. On the other hand, qualitative data analysis should not be equated with coding, which tends to decontextualize and fragment discourse (St. Pierre & Jackson, 2014). Thus, in addition to coding in Nvivo, I also analyzed interviews based on responses by interview questions (rather than themes/nodes). Analyzing interviews at a broader level allowed me to recontextualize fragmented discourses (as coded elements), find broader narratives, and tie narratives together.

A critique of this research might identify one of the research limitations as the lack of intercoder reliability. Conversely, trying to achieve intercoder reliability with other coders who do not have knowledge of the research participants or the theoretical context of the study is difficult and, if done, could be seen as a "superficial marker of positivist scientism" (St. Pierre & Jackson, 2014, p. 715). To strengthen the reliability of my coding approach, I had ongoing

discussions with my PhD supervisors about the coding process and my decisions during the process.

Overview of Dissertation Chapters

In Chapter 2, "Examining Flood Risk Governance by Bringing Perceptions and Practices Into Dialogue in the Threaded Situation Analysis Approach," I describe in more detail how I developed the TSA approach to assess flood risk governance. I begin by examining how to interface frame/framing analysis and practice-based approaches in ways that acknowledge their ontological and epistemological differences. I reconstruct and reorganize ontological concepts—actors, meaning, context/structure, practice—identified as critical in the governance literature to develop the TSA approach. I accomplish this reconstruction with five maneuvers to address the limitations of each of the theoretical frameworks and the challenges of interfacing them. With these five maneuvers, I move away from the metatheoretical foundations that characterize practice-theoretical traditions. For example, unlike practice scholars who focus on practices, I place situation as the unit of analysis. Although the TSA approach moves away from typical practice-based approaches, it provides a way to study practices in addition to other factors that are key for understanding governance, such as actors and their interactions. Overall, the TSA approach for assessment is a step towards developing much-needed tools for integrating social dimensions into flood risk management and policies.

In Chapter 3, "Unraveling the Social Construction of the 2013 Flooding Disaster in High River, Alberta, Through the Threaded Situation Analysis Approach," I apply the TSA approach to a case study of High River. I reconstruct three situations: (a) lack of legislative changes to reduce flood risk, (b) insufficient updating of flood hazard maps, and (c) absence of notification on land titles about flood risk. These three situations provide insights into the causes and

conditions that contributed to building two neighbourhoods in designated high-risk flooding and consequently, how vulnerability to the flooding disaster was socially constructed. In addition, my findings reveal that the informal roles of municipal governments as well as non-governmental actors (such as homeowner associations, real estate industry, developers, and private industry) played a critical role in influencing the decisions and actions of the Alberta government in ways that prevented or diminished changes critical for reducing flooding risks and damages. In this chapter, I propose the terms *suppressing* and *languishing* to understand how some practices stay dormant while others become dominant. Having tested and evaluated the application of the TSA approach I argue its value as a useful analytical tool, as it allowed for a more accurate description and comprehensive analysis of flood risk governance than existing similar frameworks and if I had applied only frame/framing analysis or practice-based approaches.

In Chapter 4, "Making Room for Nature? Applying the Dutch Room for the River Approach to Flood Risk Management in Alberta, Canada," I examine how the Dutch RfR was perceived and implemented in Alberta in three locations: High River, Bow River Basin, and Red Deer River Basin. Overall, Alberta interviewees perceived the RfR projects as triggering a paradigm shift away from "fighting water" towards "living with water" and as opening opportunities to expand this approach into future flood risk management projects across the province. The Dutch RfR, however, is not just technological change: It requires fundamental governance and cultural change, and hence is challenging to implement. I explore the extent to which four features of the RfR approach were adopted in Alberta: (a) shifting away from mega-infrastructure, (b) making space for rivers, (c) moving people, and (d) regulating floodplain development. I assess whether the application of the Dutch RfR approach resulted in a shift towards more preventative, environmentally sustainable flood mitigation to reduce disaster risks

and damages or whether a business-as-usual approach of undeterred development in flood-prone areas was undertaken with resulting reliance on disaster relief programs.

Finally, in Chapter 5, I synthesize the findings and contributions of Chapters 3 and 4 in terms of how sociopolitical factors, namely power, shape perceptions and practices related to flooding disasters in Alberta across three main themes: (a) shifting from emergency management to risk reduction; (b) shifting culture from framing disasters as caused by nature to that caused by human nature; and (c) shifting risk and responsibility from government to governance. I then reflect on the theoretical contributions (Chapter 2) and methodological contributions of my research. Recommendations are cautiously provided. I also outline steps for knowledge mobilization before presenting my concluding comments.

The following dissertation includes findings from the results of the qualitative case study on High River and interviews in the Netherlands. In this chapter, I introduced the research problem: How are flooding disasters socially constructed? To answer this question, I briefly situated the issue of flooding in High River in the context of wicked problems and how flood risk governance can address these challenges through stakeholder collaboration and coordination. I also situated this research more broadly in the disciplinary fields of disaster sociology and environmental sociology. These fields are quickly evolving and are increasingly calling attention to the role of human–nature interactions in "designing" disasters by increasing vulnerability to hazards through decisions and practices, such as poor land-use planning and unsustainable resource management. I then turned to the literature to place this work in a broader theoretical framework before outlining my methodological approach.

The aim of this dissertation is to identify the ways that individuals and institutions contribute to (socially construct) increasing flooding risks and damages as a way to better

understand and possibly alter these patterns. My aim is to provide the reader with a rich understanding of the complexities of flood risk governance that create challenges for developing policy solutions.

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Chapter 2. Examining Flood Risk Governance by Bringing Perceptions and Practices Into Dialogue in the Threaded Situation Analysis Approach

Natural disasters are expected to continue increasing in severity and frequency worldwide as a result of climate change exacerbated by human activity (Intergovernmental Panel on Climate Change, 2012). Most of these so-called natural disasters, including flooding, are triggered by geological or atmospheric events, but they are ultimately social phenomena because vulnerabilities to disasters and the extent of damages are shaped by how a society interacts with nature (Perry, 2007). Engineering solutions to flooding are alone insufficient because their causes and consequences are embedded in complex sociopolitical contexts involving a range of stakeholders with sometimes conflicting interests. Thus, addressing flooding requires examining governance to understand how actors interact with and influence one another when developing and implementing decisions to achieve their goals (Institute on Governance, 2018).

Over the past decade, the definition of governance has become more nuanced, shifting away from an emphasis on government characterized by centralized, bureaucratic, and top-down decision-making towards modes of governing that are characterized as decentered, pluralistic, multilayered, and contextual (Jessop, 1998). Hajer and Wagenaar (2003) noted that the more recent conceptualizations of governance recognize new political players and arrangements, including new actors (e.g., nongovernmental organizations, hybrid organizations), temporary or informal arrangements (e.g., networks, alliances), and distributed power among noninstitutional and institutional actors (e.g., political, legal, economic, scientific). Research has shown that effective flood risk governance is achieved through dialogue and collaboration of a broad range of stakeholders who affect, and are affected by, floods, and through coordination of policies and

practices at all governmental levels (Henstra, 2013; Shrubsole, 2013; United Nations Office for Disaster Risk Reduction, 2016).

A common challenge in this process is that stakeholders frame problems through meanings or schemas in accordance with their own views and interests, making it difficult to achieve consensus (Schön & Rein, 1994). A second problem is that flooding, like other wicked problems, is not amenable to a single, definitive solution, but rather is addressed through provisional policy responses that are influenced by how the problem is framed (Rittel & Webber, 1973). Last, even when policy solutions are eventually developed, they are often altered during implementation due to a range of social and political factors (Johnson, Tunstall, & Penning-Roswell, 2005; Prater & Lindell, 2000). Consequently, there is a need to consider how flooding is framed, how policy decisions are put into practice for managing flood risk, and which stakeholders are involved. For example, if the cause of river flooding is framed as a natural disaster, then the solution would be to control that river with dams or dikes; whereas if the cause is framed as a consequence of land use practices, then one solution would be to locate human development elsewhere. Although numerous scholars have used either perceptions/frames or practices to investigate flood risk governance, most have not incorporated both in ways that are theoretically and analytically consistent, or they have not operationalized[1] practices into empirical terms for testing.

In this chapter, I develop a practical analytical tool for assessing flood risk governance that incorporates perceptions and practices, which I call the threaded situation analysis approach (TSA approach). To understand perceptions, I examine how problems are framed and how frames are socially constructed through interactions between stakeholders (i.e., framing as the

[1] Operationalizing is the process of developing a concept into a measurable variable in a study.

process of creating frames). I also draw on practice-based approaches (PBAs) for investigating what is happening on-the-ground, including which flood risk management practices are implemented. Although PBAs and frame/framing analysis are often separated in research, I argue that bringing a dialogue between them enhances understanding of the complexity of flood risk governance and provides tools for operationalizing the following research question: How are perceptions of, and practices related to, flooding shaped by sociopolitical factors and how do perceptions and practices change over time?

I situate my approach in the broader literature on governance, including disaster studies, environmental governance, and public administration and policy studies. I begin by comparing previous approaches to assessing flood risk governance and argue the need for an alternative approach informed by frame/framing analysis and PBAs. Next, I deconstruct frame/framing analysis and PBAs and identify the opportunities and challenges of bringing them into dialogue by interfacing them. I chose the term *interfacing*, which refers to the point at which these two approaches affect or influence each other or share a common boundary, rather than *combining*, because these approaches have different ontologies and epistemologies. Subsequently, I reconstruct aspects of these theoretical frameworks[2] with five maneuvers that distinguish the TSA approach from other approaches to assessing flood risk governance.

Assessing Flood Risk Governance

Most scholarly articles on the social dimensions of flood risk governance have been published within the last 10 years (Morrison, Westbrook, & Noble, 2018). In general, this literature identifies the following key components of water, flood, risk, and/or disaster

[2] I refer to frame/framing analysis and PBAs as theoretical frameworks to capture the theoretical and methodological variations within each (discussed later).

governance: actors, including their perceptions, roles, and interactions (including power dynamics); practices; rules; resources, including materials; and the interplay between these components. In this section, I highlight literature on the relationship between perceptions and practices and return to the other governance components throughout the remainder of this chapter.

Contemporary scholarship on risk management has emphasized the importance of perceptions in influencing the response to risk management practices implemented by individuals and communities (see Thistlethwaite, Henstra, Brown, & Scott, 2018); however, two main problems have been identified in this analysis. First, there are theoretical and methodological issues: a lack of theoretical coherence and analytical rigour, a lack of evidence linking individual flood risk perceptions and flood risk mitigation responses, and insufficient use of theoretical frameworks available in social science (Bubeck, Botzen, & Aerts, 2012; Kellens, Terpstra, & De Maeyer, 2013). Second, numerous studies and conceptual frameworks have incorporated risk perception, but as Birkholz, Muro, Jeffrey, and Smith (2014) pointed out, most have failed to examine the "interface between perceptions and management/intervention" (p. 14) in a substantive way to capture nuances, contestation, and experiences. An improved understanding of the link between perceptions and responses could contribute to developing more effective risk communication and disaster management (Burns & Slovic, 2012), which is still an under-researched area (Birkholz et al., 2014).

A limited number of analytical frameworks specifically examine flood risk governance,[3] so I have drawn from the broader literature to explore studies relevant to risk that focus on

[3] Morrison et al. (2018) found only five peer-reviewed articles that cover frameworks related to practice/application, research, and/or governance. The authors highlighted the gap in available tools for integrating social dimensions such as perceptions, values, and needs into flood risk management decision-making processes and policies.

perceptions and practices to identify their strengths and limitations. For example, Tversky and Kahneman (1981) found that individual decisions are influenced by how information is framed rather than by reason, illustrating how a rational choice approach to policy may be problematic. Disaster sociologists with a social constructionist lens have also examined the influence of frames and have critiqued structural functionalist perspectives in disaster management that frame disasters as natural, unforeseeable events caused solely by earth and atmospheric conditions (Perry, 2007; Quarantelli, Lagadec, & Boin, 2007). Social constructionists argue that disasters originate from how society interacts with nature through various practices and thus natural processes (hazards) like flooding become disasters only when they intersect with vulnerability through poor planning and design (see Haque & Etkin, 2007; Mileti, 1999). Similarly, in a landmark study of Hurricane Katrina in Louisiana, Freudenburg, Gramling, Laska, and Erikson (2009) demonstrated that the hurricane was framed as "removed from the patterns of everyday life [as] 'un' events—not just unfortunate, but uncommon, unexpected, unplanned, uncontrollable . . . a kind of parenthetical insertion, located within the ordinary sweep of events but kept conceptually separate nevertheless" (p. 8). As such, politicians and mass media ignored the role of land-use planning and environmental degradation in contributing to the severity of the hurricane's destruction in New Orleans, and thus the solutions were focused on technological fixes and not on social changes.

Several analytical risk-related frameworks focusing on perceptions and practices are worth noting. The Social Amplification of Risk Framework (SARF) developed by R. E. Kasperson and colleagues (1998) systematically analyzes risk perception and risk-related behaviour. SARF incorporates actors and examines how their roles and rules are internalized and how social structures such as government and media shape perceptions, which in turn influence

behavioural intentions and actions that have societal impacts through ripple effects. Renn, Burns, Kasperson, Kasperson, and Slovic (1992) empirically tested SARF and found the strongest correlation between risk perception and individual action, further strengthening the argument for the need to examine the link between perceptions and practices. Limitations of SARF are that it does not explicate how the concepts are linked, nor does it include guidelines on how to convert abstract concepts into testable ones (J. X. Kasperson, Kasperson, Pidgeon, & Slovic, 2003).

The International Risk Governance Council (IRGC; 2005) developed a risk governance framework that consists of four main phases: (a) preassessment (e.g., problem framing); (b) risk appraisal (includes risk assessment and concern assessment such as risk perceptions); (c) judgement (risk evaluation and risk characterization); and (d) risk management (decision-making and implementation). Renn, Klinke, and van Asselt (2011) have argued that IRGC's model is too rigid and augmented it to develop a modified risk governance framework by incorporating additional steps and a broader range of stakeholders beyond private or public regulatory bodies (see also Klinke & Renn, 2012). However, neither IRGC's framework nor Klinke and Renn's (2012) augmented model provide details on how to examine the link or interface between perceptions and practices in a substantive way (Birkholz et al., 2014). Along these lines, Boholm, Corvellec, and Karlsson (2012) reviewed numerous critiques of IRGC's framework and advocated for an approach that incorporates context and practices to (organizational) risk governance. Based on evidence from their case studies, Boholm et al. argued that "any theoretical understanding of risk governance must allow the deconstruction of risk definitions to reveal how controversies and consensus, individual actions and organizational strategies, and, more generally, interaction and communication condition the social process of risk

characterization and management" (2012, p. 3). In other words, researchers must trace back how "risk is 'in practice' characterized and managed" (Boholm et al., 2012, p. 3).

The most in-depth studies to date that have focused specifically on flood risk governance were conducted by the European STAR-FLOOD research consortium from 2012 to 2016.[4] With a team of 40 policy analysts, legal scholars from six countries,[5] and funding from the European Union, STAR-FLOOD conducted 18 case studies and succeeded in developing a systematic assessment framework to investigate flood risk governance institutional arrangements through which flood risk management strategies (consisting of specific practices) are delivered to achieve resilience (see Wiering et al., 2017). The Policy Arrangements Approach (Arts, Leroy, & van Tatenhove, 2006) was the theoretical backbone for STAR-FLOOD's framework for analyzing stability and change via four dimensions and their interactions: actors and their roles, discourses, rules, and resources, including power (Hegger et al., 2014). STAR-FLOOD promoted practice-oriented analysis of governance by examining how these four dimensions materialize through day-to-day practices (Larrue, Hegger, & Trémorin, 2013a, 2013b). STAR-FLOOD referred to practice theorist Anthony Giddens (1984) but offered no explanation of how to operationalize Gidden's theoretical ideas about practices in the empirical research. STAR-FLOOD also drew on several influential policy frameworks,[6] and although each framework provides useful insights on its own, Capano's (2009) in-depth comparison of some of these frameworks revealed theoretical and epistemological inconsistencies.

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[4] More information on the STAR-FLOOD research consortium can be found at http://www.starflood.eu/.
[5] The six European countries are England, Scotland, Belgium, France, the Netherlands, Poland, and Sweden.
[6] STAR-FLOOD's explanatory framework comprises the multiple streams approach (MSA), punctuated equilibrium theory (PET), advocacy coalitions framework (ACF), path dependency framework (PDF), and the multilevel perspective (MLP).

Deconstructing: Positioning and Operationalizing the Theoretical Frameworks

When designing a theory or theoretical framework, Capano (2009) stated that researchers "first need to solve (or decide on) certain structural epistemological and theoretical (and sometimes methodological) puzzles" (p. 8). The first step is to deconstruct theories to reveal the hierarchical order of concepts—which are dominant and which are subsumed—and open up opportunities to destabilize and reorganize the order (Iser, 2006). In this section, I deconstruct PBAs and frame/framing analysis to reveal the differences in their ontological and epistemological (metatheoretical) foundations and clarify how these two frameworks could be interfaced. Additionally, examining these theoretical frameworks provides opportunities to evaluate the degree to which they fulfill the four major tasks of theoretical practice: description, analysis, explanation, and explication (Datta, 2013).[7]

Practice-Based Approaches

Social practices shape and constitute people's activities and other social phenomena such as knowledge, meaning, language, institutions, markets, science, power, and social change (Hui, Schatzki, & Shove, 2017a; Nicolini, 2017a, 2017b). Since the 1970s, PBAs have been applied across many disciplines, creating a diversity of practice theories, methods, and vocabularies, each providing specific affordances and limitations (Hui et al., 2017a; Nicolini, 2012, 2017b; Thompson, 2014). As such, there is no unified practice theory or agreed-upon definition. For this

[7] Datta (2013) described the four major theoretical tasks as follows. *Description* labels a real-life phenomenon with specialized language by resignifying it, such as with Goffman's (1974) strategic interaction. *Analysis* answers questions of "what" by breaking down a complex social phenomenon into its component parts through categories and is thus closely tied to ontology. *Explanation* goes beyond or underneath the "facts," answering questions of "how" and "why" by offering an account of constitution, conditions, causes, and consequences. *Explanation* consists of the explanandum and the explanans and is evaluated based on five criteria: relevance, logical strength, completeness, informative, and evidence-based and true. *Explication* is a reflective exercise of clearly defining concepts, categories, questions, and underlying assumptions. Explication further extends and modifies the theoretical positions, justifications, and explanations of a theory by critiquing and comparing to other positions to strengthen its persuasive power.

reason, and also because of the ongoing debate about whether social practice is a theory or a methodology or both (Jonas, Littig, & Wroblewski, 2017), I apply the term *practice-based* rather than social practice theory. In this chapter, I define *practices* as the ensemble of doings, sayings, and things in action that are routinized to the extent that they are recognizable patterns across time and space (Arts, Behagel, van Bommel, de Koning, & Turnhout, 2013; Nicolini, 2012). Nicolini (2012) noted that PBAs have a unique ontology and do not fall into functionalism (individual actors follow the rules to maintain the system), symbolic interactionism (social interactions are symbolic exchanges), or textualism (the social world is produced through signs and text). Instead, a practice lens offers a novel ontological approach by examining social phenomena as consisting of an array of interwoven social practices (Nicolini 2017b; Schatzki, 2016; Shove, 2017).

Another key characteristic of PBAs is that neither individual behaviour nor societal structures exclusively affect behaviours, but rather there is interplay between agency[8] and structure[9] in everyday practices (Bourdieu, 1977; Giddens, 1984). This interplay makes PBAs unique from ideal-type approaches, such as rationalist and institutionalist choice theories, by decentring institutions, actors, and objective discourse and knowledge (Arts et al., 2013; Shove, 2017). Each of these theoretical choices identifies different key strategic points for policy intervention (see Arts et al., 2013). A rationalist approach is premised on individuals maximizing their own interests based on rational decisions, and targets individuals' attitudes, behaviours, and choices (dubbed "ABCs" by Shove, 2010). An institutionalist approach views individuals as obeying norms and rules and targets regulations. In contrast, a PBA seeks a middle ground

[8] The definition of agency varies but, in this chapter, it refers to the capacity of actors for action or intervention by interpreting, improvising, and reshaping aspects of the social structure: agency is a form of power.
[9] Examples of social structure are social institutions, organizations, and networks.

between rationalism and institutionalism by recognizing that individuals are not always rational because they are strongly influenced by the social, and they also interpret, improvise, and reshape rules and institutions in the performance of practices, and thus intervene in practices.

PBAs vary in how practices are organized and connected to constitute social phenomena (Schatzki, 2016). To develop the TSA approach, I drew mainly from the work of Shove, Pantzar, and Watson (2012) as they operationalized practice theory for empirical research, examined governance,[10] and connected practices to policy. Four main features of this scholarly work distinguish it from other PBAs. First, the authors posited that practices are composed of a constellation of three elements and their linkages: materials (objects and infrastructures), meanings (ideas and aspirations[11]), and competencies (skills and know-how). Second, they asserted that there is an analytical distinction between practice-as-entity and practice-as-performance. Practice-as-entity refers to the arrangement of the three elements and their connections; for example, dams, safety, and engineering skills. Practice-as-performance is how the element arrangements are put into practice (enacted, reproduced, and changed); for example, building dams to reduce flood risk. Third, Shove et al. referred to actors as carriers or hosts of practices, which is a "radical departure" (2012, p. 7) from other approaches that conceive of meanings and competencies as personal attributes rather than as appropriated from social practices. Fourth, the authors described and analyzed the processes of stability and change to explore "exactly how practices emerge, evolve and disappear" (Shove et al., 2012, p. 4).

Shove et al.'s (2012) approach has several limitations when applying it to assess flood risk governance. They did not specifically define governance, although they did refer to it as a

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[10] Schatzki (2015) also examined practices in the context of governance but did not operationalize practice.
[11] Shove et al. (2012) used meanings synonymously with images, frames and framing, and discourses.

constellation of practices and provided examples such as policy-making and top-down approaches, referred to as "carrots, sticks, and sermons" (Shove et al., 2012, p. 144). Shove et al.'s PBA would allow me to *describe* changes in flood risk management practices but not clarify why those changes were decided upon. Their methods do not provide adequate tools to *explain* (third task of theoretical practice) flood risk governance because ontological concepts identified in the literature earlier and in the next section as critical for *analysis* (second task)—namely, actors and their roles, interactions, structures (institutions and rules), and context—are missing or subsumed. More specifically, Shove et al.'s approach does not attend to actors, their roles, or their interactions; it subsumes rules under practices; it conflates meaning, making it difficult to operationalize; and it excludes structure and context.[12] Consequently, their approach allows only for a partial explanation of the phenomenon, leaving the researcher with an incomplete picture of governance. I expand on these problems in the section titled Reconstructing: Developing the TSA Approach.

Shove et al. (2012) stayed true to the logic of practice as decentering the categories of structures (including institutions and rules) to avoid determinism, actors to avoid voluntarism, and discourses to recognize that knowledge is not objective. In contrast, other practice scholars succeeded in bringing to the surface elements that Shove et al. subsumed and did not operationalize. For example, Lave and Wenger (as cited in Wenger, 2010) expanded on actors and their roles as communities of practice, Goffman (1974) focused on interactions, and Schatzki (as cited in Watson, 2017) expounded on rules. To develop my TSA approach, I retained Shove et al.'s ontological concepts of materials, meanings, and competencies and their ideas on how

[12] Subsuming means incorporating concepts within a larger concept and implies a hierarchy whereas conflating means collapsing concepts without creating a hierarchy.

practices change by emerging and disappearing. In addition, I drew from the work of other practice scholars to include the subsumed concepts, which I further expand on below. Before doing so, I turn to frame/framing analysis to develop a clearer and more nuanced understanding of meanings and social interactions, both key components of flood risk governance.

Frame/Framing Analysis

Frames and framing are key aspects of culture and communication because they provide the lens through which individuals perceive reality and construct social phenomena. Frames and framing are often used interchangeably with divergent and inconsistent ontological, epistemological, and methodological approaches, resulting in confusion and inaccuracies (Borah, 2011; Dewulf et al., 2009). In general, frames are the mental images people use to make sense of their world, and framing is the communication of those ideas. Frames and framing fall into the relativist ontological category, that multiple realities exist, and constructionist epistemology, that meaning is created from the interplay between subject and object (Moon & Blackman, 2014). I use the term *analysis* rather than *theory* for two reasons. First, Goffman (1974), a sociologist, referred to frame analysis, whereas media and communication studies have tended to refer to it as a theory (e.g., D. A. Scheufele, 1999). Second, there is no unified frame/framing theory (Borah, 2011; Entman, 1993).

I drew on Dewulf et al. (2009), who differentiated frames and framing based on multiple paradigms and their respective assumptions. *Frames* come from a cognitive paradigm and are cognitive representations or knowledge structures of how individuals perceive and interact with the world through mental filters woven from biological and social influences, helping them to make sense of, or interpret, ideas and events. Subjective meanings, schemas, mental models, cognitive structures, and “snapshots” are other terms for frames. Frames are stored in the

individual mind and memory or "between the ears" (Gergen, 1996, as cited in Dewulf et al., 2009, p. 162). In contrast, *framing* comes from the interactional paradigm; it is an interactional (co)construction (e.g., negotiation, discourse) that captures the dynamic processes of interactions in which frames are enacted and meaning is shaped. Framing is located between people or "between the noses" (Gergen, 1996, as cited in Dewulf et al., 2009, p. 162).

For frames, the focus is on variance between individuals by examining data from which frames are inferred (experiments, interviews, observations, documents). The data are then categorized into various cognitive frames. In contrast, in framing research, the focus is on how actors react to one another by observing interactions and analyzing recordings and transcriptions through discourse analysis to develop interaction patterns.[13] It is worth sorting out frames and framing because they are important for analyzing policy and for understanding and directing social change, as highlighted in the studies described earlier. In life, social phenomena cannot be neatly separated into cognitive and interactionist paradigms, and the paradigms themselves are not truly separate; rather, each emphasizes either frame or framing by subsuming one concept into the other (Wenger, 1998, as cited by Dewulf et al., 2009). Therefore, I separate frame and framing analysis with a forward slash (i.e., frame/framing) to indicate that my analysis includes both concepts. Goffman (1974) also made this observation and demonstrated in *Frame Analysis* how the micro-level interactions influence the macro-level of social structure and vice versa. Goffman's central tenets are that frames develop through interactional processes (i.e., framing), rather than being intentionally, cognitively created on one's own, and situated frames do not necessarily fit into rigid taxonomic categories (van Hulst & Yanow, 2016). Schön and Rein

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[13] Media and communication studies and social movement studies focus on static frames (e.g., B. T. Scheufele & Scheufele, 2013; Tversky & Kahneman, 1981). Conversely, the process of framing through interactions and power relations is the focus of sociology and studies on conflict, negotiation, and mediation (e.g., Schön & Rein, 1994).

(1994) incorporated Goffman's tenets and highlighted the importance of analyzing discourse in public policy to compare actors' frames, especially with wicked problems and when actors' frames are incompatible because of incommensurable views and values, creating intractable policy controversies. To deal with conflict and stalemates, Rein and Schön (1977, as cited in van Hulst & Yanow, 2016) proposed stepping backwards and reexamining how problems are defined in the problem-setting phase because "the questions we ask shape the answers we get" (p. 96).

To develop tools for analyzing perception, meaning, and interactions in flood risk governance, I adopted Dewulf et al.'s (2009) differentiation between frames as cognitive representations and framing as interactions. I also adopted Schön and Rein's (1994) conceptualization of frames as problem definition and remedy promotion. Examples of frames related to flooding in the literature include progress/growth versus sustainability and risk versus safety. Common types of interactions among stakeholders involved in flood management include collaboration, conflict, or top-down versus bottom-up. One of the implications of Goffman's (1974) central tenets for research is that "'frame' signifies a more definitional, static, and potentially taxonomizing approach to the subject; [whereas] 'framing' offers a more dynamic and . . . potentially politically aware engagement" (van Hulst & Yanow, 2016, p. 93). In other words, a long list of frames will not provide as much insight into a social phenomenon as studying the social interactions by which frames are (re)produced. Hence, the goal of the TSA approach is not to attempt to identify every possible frame; rather, it is to examine how actors use identified frames in their interactions relevant for decision-making. Analyzing actors' interactions can provide insight into power dynamics based on whether meanings are agreed upon or contested. One of the limitations of relying on analysis of frames and communications about them is that the findings may not reveal whether those frames were applied and thus may

not accurately reflect actual events (Couch, 2000). To account for this limitation, the TSA approach incorporates a practice lens to examine on-the-ground implementation.

Interfacing Practice-Based Approaches and Frame/Framing Analysis

Deconstructing PBAs and frame/framing analysis by exploring their meta-theoretical foundations and how their concepts are delineated and hierarchically ordered provides a more detailed assessment of some similarities but mostly the differences between them. Interfacing these frameworks addresses some of the limitations that using only one of these approaches would miss when assessing flood risk governance. To reiterate, drawing from several variations of PBA provides the ontological concepts (practices, materials, meanings, competencies, rules, and actors along with their roles and interactions), ways of understanding the links between these elements, and the processes by which practices are (re)produced and change to empirically investigate practices (which I elaborate on in Dissertation Chapter 3). Frame/framing analysis facilitates a clearer and more nuanced understanding of meanings and perceptions (frames) and the iterative process by which individuals interpret and reproduce the meanings through social interactions (framing), thereby providing insights into power dynamics.[14]

Reconstructing: Developing the Threaded Situation Analysis Approach

To develop the TSA approach for assessing flood risk governance, I now reconstruct and reorganize the components identified as critical in the literature. A *situation* comprises actors, practices, and context/structure, and their interplay, as depicted in Figure 2.1.[15] Additionally, each of the main components is a function of other subcomponents, and the connections between

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[14] I explore power dynamics in detail in Dissertation Chapters 3 and 4.

[15] Figure 2.1 is an analytical or heuristic model characterized by abstract conceptualizations to aid research (Datta, 2013). It is not an explanatory model, which identifies explicit systematizations of causal mechanisms of phenomena.

the components are represented by lines. Practices consist of materials, meanings (frames), and competencies. Actors have agency, often perform multiple roles in their personal and professional lives, interact with others (framing), and enact relations of power. Structures consist of institutions (political, legal, economic, scientific, etc.) guided by rules (legal and social norms) that are bounded within certain physical contexts, such as geography.

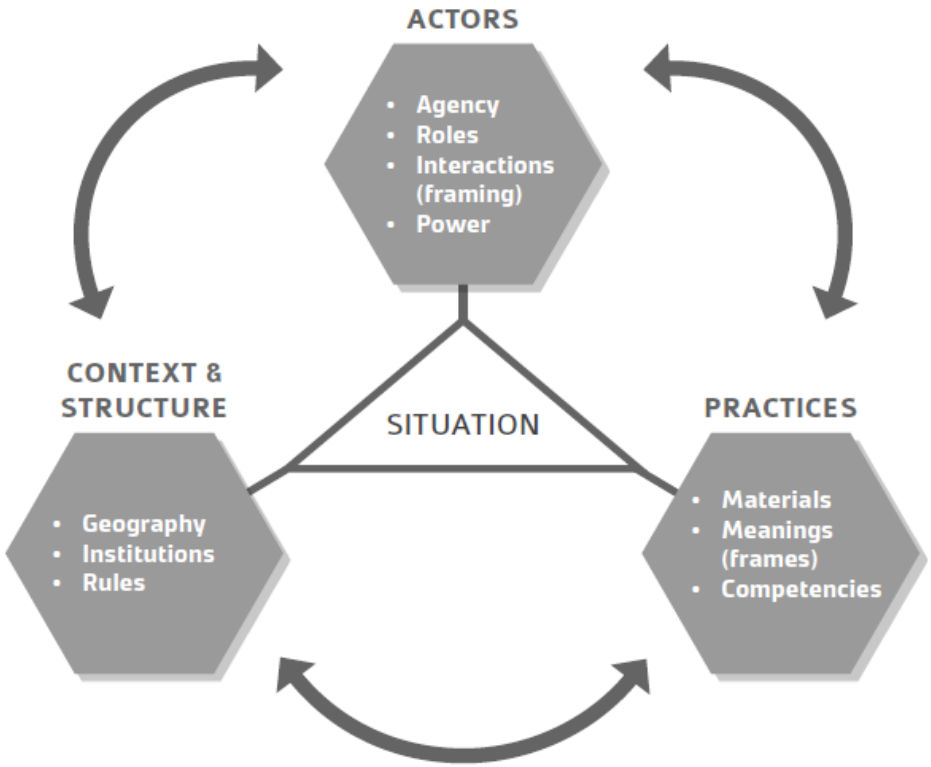

Figure 2.1. Analytical model of the TSA approach.

In the following five maneuvers, I describe how I reorganized actors, practices, context/structure, and their subcomponents to develop my TSA approach. I also address the limitations of PBA and frame/framing analysis and the challenges of interfacing them whilst explicating the characteristics that distinguish the TSA from other approaches to analyzing flood risk governance.

Maneuver 1: Positioning Actors on the Stage

The first maneuver acknowledges the shift from government to governance, which means that new types of actors in addition to governments are critical to the process. Actors shape governance through their different interests, competencies, roles, and interactions with one another and with formalized structures. Scholars across the governance literature have prioritized actors in a variety of ways in their analyses. For example, actors are the entry point to the policy arrangement approach because through them the other components (discourses, rules, resources) materialize (Larrue et al., 2013b). Tracking a range of actors is important because different actors influence various aspects of disaster cycles through their roles and responsibilities (Hegger, Driessen, & Bakker, 2016; Tierney, 2012). Tracking actors outside of the typical water community is also valuable because their input can enhance decision-making (de Loë & Patterson, 2017). Policy entrepreneurs and advocacy or discourse coalition groups are particularly powerful compared to other actors in creating change in flood risk management because "the actions of knowledgeable and capable agents are crucial for bringing together problem (framings) and solutions" (Wiering et al., 2017, p. 19). Also powerful are resource users (such as industries) who can "capture" the agenda of resource institutions (such as regulatory agencies) and influence priorities and practices over time, resulting in agency capture (Davidson & Frickel, 2004).

One of the challenges of using a PBA for analyzing governance is that it decenteres actors to avoid casting them as individuals free from external influences (rationalism/voluntarism) and as the sole source for explaining social phenomena (methodological individualism). At the same time, practice theorists have acknowledged that it is individuals who negotiate the rules and interact in communities of practice. Consequently,

locating actors in the analysis becomes tricky. Shove (2017) clarified in her later work that in terms of methods, the subject does not necessarily need to be decentered, which may result in leaning towards methodological individualism, but the chosen method should not progress into subjectivism or a focus on individuals without concern for shared experience and the larger social setting (Giddens, 1979, as cited by Nicolini, 2012). Shove (2017) stated: "The key point is that whatever their method (in the narrow sense of technique), the analysis does not revolve around features like the personalities of the actors involved" (para. 16). As such, a practice-orientation does not focus on individual behaviour per se (Shove et al., 2012).[16] Personality rests in psychology's arena.

Another challenge is that Shove et al. (2012) did not examine actors' roles; rather, they focused on the roles of elements, time, and place, and how those factors influence actors rather than the other way around, thereby subsuming actors' roles under practices. Drawing on the work of Goffman, and Lave and Wenger (as cited in Shove et al., 2012), the researchers developed the mechanisms by which practices recruit practitioners, including encountering communities of practice and being either captured through a career or committing as a carrier of a practice. In sum, for Shove et al., actors are backstage without their personalities and behaviour, and practices are center stage. This positioning raises another issue about whether personalities, behaviour, and motivations can be separated from practices, which has triggered a lively debate between Shove and policy-makers (Shove, 2010, 2011; Whitmarsh, O'Neill, & Lorenzoni, 2010). Other critics have argued that some PBAs go too far in detaching agency from

[16] Taking this stance stays true to sociological tradition as it is not concerned with people and behaviour (although people are taken into account); rather, it is concerned with connections, conditions, and causes (Datta, 2013).

consciousness (Porpora, 2015) although some versions, like Gherardi's (2008) organizational PBA, incorporate reflexivity.

Unlike many PBAs, I do not completely decenter actors because they play an important role in governing and in animating nonhuman components of governance. Instead, I position actors as social beings who share the stage with practices and context/structure. Hence, I displace practices as the sole unit of analysis, and for that reason, I break from a "practice theoretical approach" (Shove, 2017, para. 10). In the TSA approach, I include how actors interpret flooding through their frames. I also include how actors interpret their roles, the rules that define and constrain their positions, how they improvise to bring attention to their agency, and the agency–structure interplay. Inspired by the work of Lave and Wenger (as cited in Wenger, 2010), I record which community of practice an actor is part of based on his or her competencies, such as engineers or environmental specialists, and capture the nuanced ways these communities frame flooding and their roles in flood risk governance, thereby recognizing the influence of the social to avoid voluntarism.

Maneuver 2: Locating Meaning Between the Ears and Between the Noses

In the literature review, I highlighted prominent studies that have demonstrated the relevance of framing[17] for influencing perceptions, behavioural outcomes, and practices. In environmental governance studies,

> discursive approaches do more than simply focus on texts, language and words: they critically scrutinise the social settings in which these are uttered and produced and also the social practices in which they gain their meaning and are acted upon. (Arts et al., 2013, p. 8)

[17] I noted earlier that *frames/framing*, *meaning*, and *discourses* are used interchangeably in the literature.

Indeed, the framing of the "nature of 'nature'" (Davidson & Frickel, 2004, p. 479) and the corresponding policy action is often at the "heart of environmental conflict" (p. 479). Meanings, frames, and discourses play an important role in flood risk governance (see Driessen, Hegger, Bakker, Van Rijswick, & Kundzewicz, 2016). For instance, in the European Union the ecological turn discourse (rather than climate change, EU Floods Directive, and economic rationalization) was the most influential factor for diversifying flood risk strategies (Wiering et al., 2017).

Applying a PBA creates challenges for operationalizing meaning, which I address in this second maneuver. A PBA decenters claims of objective discourse and knowledge, arguing that discourses actively shape how actors see and experience the world (Arts et al., 2013). In general, a PBA investigates "how discourses and knowledge are shaped, produced, and reproduced in *context-specific interactions and interpretations*" (Arts et al., 2013, p. 11, emphasis added). Shove et al. (2012) simplified the concept of meaning and anticipated critique for doing so:

> Our [Shove et al.] next simplifying move is to collapse what Reckwitz describes as mental activities, emotion and motivational knowledge into the one broad element of 'meaning', a term we use to represent the social and symbolic significance of participation at any one moment. This is tricky territory in that those who write about social practices are in much less agreement about how to characterize meaning, emotion and motivation. (p. 23)

The above quote illustrates that for Shove et al. (2012), meanings are shared social constructions. However, their approach does not accommodate the study of interactions between individuals; rather, they are interested "beyond the confines of face-to-face interaction" (Shove et al., 2012, p. 48). This seeming contradiction creates a challenge because they want to get at the social meaning between the noses, but without studying actors' interactions to avoid interactional reductionism.

To shed some light on this methodological problem, I compare how practice theorist Taylor (1971, as cited by Shove et al., 2012) conceptualized meaning:

> Meanings and norms implicit in . . . practices are *not just* in the minds of the actors but are out there in the practices themselves, practices which cannot be conceived as a set of individual actions, but which are essentially modes of social relations, of mutual action. (p. 5, emphasis added)

Meaning or sense-making, then, is not just an individual internal mental process but also a situated sense-making that draws on collective frames of meaning and reflexive forms of knowledge (Schmidt, 2017). If imagined as a spectrum, Charles Taylor's conceptualization of meaning ranges from the individual to the social, whereas Shove et al.'s (2012) meaning is located on the social relations end of the spectrum because it is not a personal attribute but rather appropriated from social practices. Two challenges exist in trying to apply Shove et al.'s conceptualization of meaning: Simplifying requires the researcher "to concentrate on instances in which interpretations and symbolic associations are relatively uncontested . . . [and to] play down the fact that attributions of meanings are unavoidably relative, situated and emergent" (2012, p. 53). Excluding variations in meanings amongst actors and falsely projecting a unified agreement on a meaning is contrary to understanding wicked problems, which are intractable precisely because of competing frames; hence, capturing contestation requires a different method for operationalizing meanings than that offered by Shove et al.

To examine meanings, I adopted Schön and Rein's (1994) problem definition and remedy promotion to identify nuanced meanings held by actors, as described earlier. To shift examination from individual perceptions (between the ears) to social meanings (between the noses), I examined how meanings as frames are contested between different stakeholder groups or communities of practice in their interactions (framing) as per Goffman (1974). In addition, the TSA approach connects smaller-scale frames or discourses such as progress/growth and

risk/safety to larger-scale (cultural) frames or discourses[18] such as human–nature interactions, thereby reiterating the agency–structure interplay.

Maneuver 3: Bringing Back Context and Structure

Critical disaster studies by social constructionists have called attention to the ways in which social contexts and structures "design" disasters via the role of states, trends in development, and globalization in disasters (Freudenburg et al., 2009; Haque & Etkin, 2007; Mileti, 1999; Tierney, 2007). Contextual and structural drivers influencing changes in flood risk policy and practices include biophysical environmental factors; social, economic, and political dimensions; governance structures; knowledge and information; and technology (Johnson et al., 2005; Wiering et al., 2017). Context matters for wicked problems like flooding because there is no true–false solution; rather, there are only good or bad solutions, which are evaluated based on the values of select actors (Rittel & Weber, 1973). Hence, analysis of flood risk governance needs to be sensitive to context (Driessen et al., 2016; Pahl-Wostl, 2017).

PBAs decenter institutions and "make clear that social structures such as rules and institutions do not simply exist or influence actors 'from the outside,' but are produced and reproduced in practice, in the interaction between actors and structures" (Arts et al., 2013, p. 8). Decentering institutions avoids casting individuals as controlled by external influences (determinism, institutionalism, structuralism) and as the sole source for explaining social phenomena (methodological structuralism). Decentering institutions positions actors as

[18] I refer to the larger-scale frames as cultural discourse for practical purposes. This breaks from a PBA because practice theorists have argued that culture is not a separate entity but consists of a constellation of practices (Hui et al., 2017a; Welch & Warde, 2017). Critical realists have faulted practice theorists for conflating culture into practices, arguing that it is a separate entity (Porpora, 2015). This debate is beyond the scope of this chapter.

influenced by social structures but not necessarily as passive recipients; rather, actors have agency to improvise and influence the practices which constitute the structures.

Staying true to the decentering of institutions, Shove et al. (2012) did not include rules as one of the three elements of practices. For these scholars, rules are not explicit but shape how practitioners perform practices, and thus they are subsumed (Watson, 2017). In contrast, Schatzki (as cited in Watson, 2017) conceptualized rules as one of several factors that organize practice–material arrangements and thus did not subsume them under practice. Regarding context and structure, Shove and colleagues' work can be characterized in two ways. First, Shove et al. explicitly stated they "do not concentrate exclusively on context-specific processes involved in producing localized configurations of knowledge, meaning, materiality and action" (2012, p. 11). Instead, to avoid localism, they focused on how that practice extends across space and time, and how it is linked with other practices. Second, in an earlier work, Shove and Walker (2010) argued there are no forces or sources "external to the reproduction and transformation of practice" (p. 475). This view resonates with a flat ontology. To clarify, these authors did not entirely exclude contextual factors—they considered contextual factors only as they have been incorporated into practices. Critical realists like Porpora (2015) have argued against conflating structure into practices (flat ontology), which I expand on in the fifth maneuver.

To emphasize the importance of context and structure, I brought them into my TSA approach as main components. *Context* and *structure* are used interchangeably in the literature and are also categorized in different ways. In this chapter, structure refers to social institutions (e.g., economic, political, scientific, and legal), and includes formal rules such as regulations, as well as informal rules such as social norms. Context refers to physical factors such as geographical and hydrological factors. I concur with practice theorists that contextual and

structural factors are composed of practices, but I argue that the factors comprise other variables as well that require attention. I foreground and examine in detail those that are prominent and relevant and refer to the rest as abstractions in the background. Hence, my analysis focuses on a select number of contextual and structural factors, how they shape which actions are possible and permissible, and how they are incorporated into practices, as well as how actors influence them recursively through their improvisations to avoid determinism.

Maneuver 4: Putting Situation in the Spotlight: The Unit of Analysis

Within specific situations, individuals and institutions might respond differently than expected based on their in-situ logic, expertise, values, and interests, and this tendency informs my fourth maneuver. A practice lens is ideal for investigating how governance actually plays out on-the-ground because it takes into account complexities of social life and unexpected results "that cannot necessarily be avoided by 'improving design,' instituting 'good governance,' or setting the 'right standards'" (Behagel, Arts, van Bommel, de Koning, & Turnhout, 2013, p. 244). Practice-as-performance situates practices as an act in a specific time and place, while at the same time situated practices are connected to broader practices across space and time. Situatedness is important for flooding because, for example, STAR-FLOOD found that for most of its case studies, on-the-ground implementation of strategies was not necessarily consistent with how implementation had been agreed upon in discussions and policy plans, justifying the need to examine practices (Hegger, Driessen, & Bakker, 2018). This finding is consistent with other studies that have found that implementation of a policy often appears different on-the-ground as it filters through various sociopolitical layers (Johnson et al., 2005; Prater & Lindell, 2000).

Shove et al. (2012) highlighted that "the social is situated in practice" (p. 6), distinguishing practice theories from other cultural theories that locate the social in one of three places: in the heads of humans (cultural mentalism); in chains of symbols, discourse, or texts (cultural textualism); or in social interactions (cultural intersubjectivism). Practice theorists take practice as their unit of analysis. In contrast, other scholars have examined practices but have located the social in the situation. For example, Goffman's (1967, as cited in Schmidt, 2017) main contribution to sociology was to shift attention from acting subjects or methodological individualism towards interactional situations/contexts and the interplay of actions/practices, or methodological situationalism. Goffman stated, "Not the individual and his psychology, but rather the syntactical relations among the acts of different persons mutually present to one another. . . . Not then, men and their moments. Rather, moments and their men" (1967, as cited by Schmidt, 2017, p. 150).

A critique of methodological situationalism is that the only object of empirical investigation is "orderly scenes of action taken one at a time . . . [and] nothing can be said of what happens beyond in situ social interactions" (Nicolini, 2017a, p. 101). However, this is a narrow interpretation of methodological situationalism which can turn into an "empirical straightjacket" (Nicolini, 2017a, p. 101). Nicolini (2017a) advocated for a form of relational or *connected situationalism*, in which

> the basic unit of analysis is not a single scene of action or a specific situation or instance of the accomplishment of a practice, but rather a chain, sequence or combination of performances plus their relationships—what keeps them connected in space and time. (p. 101)

Unfortunately, scholars who have conceptualized social phenomena as emerging from interconnected practices as networks or assemblages have not necessarily provided pragmatic empirical methods (Nicolini, 2017a).[19]

"Situation" or the "situatedness" of aspects of a phenomenon, such as physical context, language, and interactions, can be interpreted in multiple ways and can be traced to various practice scholars (e.g., Clarke, Friese, & Washburn, 2017; Gherardi, 2008). Situatedness can even be traced in the work of Wenger's (2010) communities of practice and Gherardi's (2008) knowing in practice. Because their empirical focus is still practice, practice is considered the outcome of the "weaving together" (Gherardi, 2008, p. 9) of components such as context, social world, materials, and competencies; consequently, the importance of these components is not necessarily examined. Conversely, each of these components is critical in governance studies and may influence governance in different ways; hence, each warrants explicit attention.

To understand a social phenomenon, the researcher needs to reconstruct the situation that shaped the actors' decisions and actions while the actor recursively shaped the situation (Wagenaar & Cook, 2003). To reconstruct the situation, rather than just focusing on the outcome in the form of practices, my fourth maneuver is to displace practices as the central unit of analysis and replace it with situation. Again, I break from practice-theoretical traditions, but practices can be studied without pledging allegiance to being a practice theorist (Porpora, 2015). For this chapter, a *situation* arises when actors, structure/context, and practices come together in an arrangement specific to a time and place. In this model, practice is just one of three dimensions that form a constellation to produce a situation. In my TSA approach, I foreground

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[19] According to Nicolini (2017a), an exception is Kemmis and colleagues, who developed a systematic method to examine practices in the form of a checklist, but this approach is "mechanical and simplistic" (p. 105) and suited only for direct, not indirect, interactions.

select practices and their constituted elements (materials, meanings/frames, competencies), actors (roles, interactions as framing), structure (including institutions and rules), and context (geography). Focusing on a limited number of practices is supported by Nicolini (2012), who argued that in order to avoid developing a weak program through "mere a-theoretical cataloguing" (p. 13), practices should be analyzed in ways that provide insight into the dynamics of activities, how practices come about, what makes them possible, why they take certain forms, how they operate across time and place, and how they contribute to, or conflict with, the production of social order or the social phenomena of interest. Heeding this advice to build a strong program, my analysis focuses on what the relationships between governance components reveal about connections, conditions, and causes of flood risk governance. The analytical focus on connections is the origin of the term *threading* in my approach. The concept of threads weaving or threading through has been used by several scholars[20] to capture connections of objects or practices across space and time (Hui et al., 2017b; Nicolini, 2017a).

Maneuver 5: Deconflating Practices

Recall that PBAs have a flat ontology[21] because "(1) they treat practices as the central element in the constitution of social phenomena; and (2) practices are laid out on one level" (Schatzki, 2016, p. 31). A flat ontology brings into question whether micro-phenomena like decision-making to build a dam and macro-phenomena like government policies to reduce flood risks can be clearly distinguished. Through this perspective, social phenomena of all sizes

[20] I also include the term *threaded* to differentiate my approach from Clarke's (2003) situational analysis. Clarke advocated for a grounded theory approach for building the concepts, whereas the variables in my TSA model are predetermined based on a review of the governance literature.

[21] Interestingly, Porpora (2015) did not consider Bourdieu (1977) to have a flat ontology and likened Bourdieu's work closer to critical realism than to other versions of practice theories. Nicolini (2012) classified both Bourdieu and Giddens as not prescribing to a flat ontology.

"emerge and transpire through connections between practices" (Nicolini, 2017a, p. 102). The flat ontology of PBAs is critiqued by critical realists for conflating agency, structure, and culture into one entity—practices; they have argued that these factors are ontologically distinct and should not be reduced to the other (Porpora, 2015).

Conceptualizing scales and the order of society (ontology) is important because "a key point of contention within governance literature concerns the scales and levels through which governance processes occur, and corresponding impact upon the type and scale of solutions to environmental problems" (Alexander, Priest, & Mees, 2016, p. 39). Scholarly studies on environmental, water, disaster, and flood risk governance have tended not to subsume the many factors of governance into a single component and instead have highlighted actors, context/structure, rules, etc., in their analyses (de Loë & Patterson, 2017; Pahl-Wostl, 2017; Tierney, 2012). Along these lines, I deconflate actors, culture, and structure from practices.

Variables of phenomena can be configured into composite effects that are connected as complex causal combinations or as linear-causal effects (Capano, 2009). A linear view of causality assumes clear separation between the independent and dependent variable and is a positivist and nomothetic approach that seeks general laws to answer why something happens. In contrast, the complex view searches for possible combinations of causal conditions through an ideographic approach to uncover historical and cultural particulars to answer how something happens and is common in case studies. Practice-based scholars (e.g., Hui, Schatzki, Shove, and Nicolini), governance-related studies (e.g., de Loë & Patterson, 2017; Tierney, 2012; Wiering et al., 2017), and the policy arrangement approach (Arts et al., 2006) have tended to conceptualize complex social phenomena as causal combinations: connections of elements and events in terms of nexus, constellations, and arrangements that are constantly shifting and connected to wider

complexes. Similarly, I arrange these components into complex causal combinations that are connected or threaded through rather than linear-causal effects.

Threaded Situation Analysis Approach

Bringing PBAs and frame/framing analysis into dialogue in the TSA approach provides the ontological concepts identified as critical in the literature and outlined in Figure 2.1: actors (agency, roles, interactions as framing, power dynamics), practices (materials, meanings as frames, and competencies), and context/structure (as formal and informal rules, institutions, and geographical contexts). Interfacing PBAs and frame/framing analysis provides analytical concepts that other approaches, such as STAR-FLOOD (Larrue et al., 2013a, 2013b; Wiering et al., 2017), IRGC (2005), and SARF (R. E. Kasperson et al., 1998), miss when assessing flood risk governance. Additionally, examining the link between (risk) perceptions and practices fills a gap noted in the literature review and provides ways to capture nuances, contestation, and experiences (see Birkholz et al., 2014).

Interfacing PBAs and frame/framing analysis provides tools for examining and operationalizing how perceptions of, and practices related to, flooding are shaped by sociopolitical factors and how perceptions and practices change over time. Specifically, interfacing these theoretical frameworks allows me to ask important questions: How are flooding and flood risk management framed, and by whom? What policies and practices are proposed and promoted, and by whom? How do stakeholders interpret and improvise rules, roles, and responsibilities? How do stakeholder interactions influence practices? Which practices become dominant and implemented, and how does this occur? The benefit of examining these questions through the TSA approach is that understanding the governance aspect of flood risk management

provides insights into the social production of flooding disasters and thus opens opportunities for a different way of organizing society to reduce disaster risks and damages.

Investigating how and why certain narratives and sets of practices in flood risk governance become dominant over others is especially important because a diverse set of strategies are needed for communities to enhance their flood resilience (Ashley et al., 2012; Hegger, Driessen, Wiering, et al., 2016). I concur with Watson (2017) that there is room to further develop the conceptualization of power in Shove et al. (2012). Shove and colleagues have acknowledged that power is located not just in the reproduction of elements and practices but also in "the resources and capacities of individual actors" (2012, p. 136) and that they "have not yet paid attention to deliberate or wilful attempts to bring new practices into being or to kill them off for good" (2012, p. 136). These are precisely the points I have investigated through my TSA approach to gain insight into how flooding and flood risk management practices are socially constructed in the Town of High River, the community most impacted by the 2013 flood in Alberta (see Dissertation Chapters 3 and 4). Interfacing a PBA and frame/framing analysis helps illustrate how individual meanings, frames, or discourses (between the ears) are connected to larger ones circulating in a culture (between the noses). For example, how does a mayor's speech on hope, progress, and continued growth after the High River flooding disaster echo the discourse of the growth machine[22] (Freudenburg et al., 2009; Tierney, 2010), and is this viewpoint contested by other stakeholders? What are the implications of this discourse for land-use and flood risk mitigation practices? TSA thus provides methodological tools for investigating power dynamics and how certain discourses change over time and become dominant.

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[22] Molotch (1976) coined "The Growth Machine" (p. 309) based on his research on the perpetual growth of cities that revealed the elites' continual pressure on governments to permit development for their financial gain.

A possible limitation of analyzing all the components of the TSA approach (see Figure 2.1) is the so-called paralysis by analysis, but this outcome can be avoided by limiting analysis to three situations. If these situations are insufficient to reveal threads for understanding flood risk governance, more can be added. In my research (see Dissertation Chapter 3), I analyze the following situations within my case study of High River: (a) lack of legislative changes to reduce flood risk, (b) insufficient updating of flood hazard maps, and (c) absence of notification on land titles about flood risk.

Conclusion

I began this chapter with an examination of how to interface frame/framing analysis and PBAs in ways that acknowledge their ontological and epistemological differences. I first deconstructed these theoretical frameworks to redefine and reconfigure the components of flood risk governance identified as key in the literature. Next, I reconstructed these components to develop my TSA approach with five maneuvers that are consistent with the governance literature and with inflections from critical realism. I also clarified how to operationalize perceptions or meanings via frames as cognitive snapshots and framing as interactions between actors. Connecting individuals' discourses to larger cultural discourses preserves the agency–structure interplay with which practice scholars, and those linked with this tradition, including Goffman (1974), are associated. Unlike practice scholars who have focused on practices, I placed situation as the unit of analysis. A situation arises when actors, structure/context, and practices come together in an arrangement specific to a time and place. In the TSA approach, each of these factors is examined, rather than conflated and subsumed, to recreate the situation that shaped the actors' decisions and actions while recursively understanding how the actors shaped the

situation. With these five maneuvers, I move away from the metatheoretical foundations that characterize practice-theoretical traditions.

Overall, the TSA approach for assessment is a step towards developing much-needed tools for integrating social dimensions into flood risk management and policies. The TSA approach contributes to the debates on governance in several ways. As noted earlier, a few key studies and frameworks have provided insight into understanding flood risk governance in terms of perceptions and practices, although many have not operationalized or linked them, nor have the studies been theoretically coherent and analytically rigorous. The first contribution of the TSA approach is that interfacing frame/framing analysis and PBAs guides investigations of how problems are framed, which solutions are promoted, which practices are chosen over all the possibilities and why, and how those practices are implemented to examine what is actually happening on-the-ground, which may differ from what was intended in agreements and policies. A second contribution is that the TSA approach moves beyond disaster management approaches that neglect historical and sociopolitical processes to include social constructionist views on how disasters are framed. A third contribution of this chapter is that it intervenes in the debates on PBAs. One of the recent advances in PBAs is to shift application from daily life to the study of a large-scale phenomenon such as governance; however, there are unresolved challenges with how to apply methodologies that have traditionally focused on micro-scale practices such as driving or cooking. Although the TSA approach moves away from typical PBAs, it provides a way to study practices and other factors that are key for understanding governance, such as actors and their interactions. A potential area for innovation for the TSA approach is to present it to a focus group of decision-makers involved in flooding issues and receive feedback on the benefits and limitations of this model. These stakeholders could use the TSA for their own purposes to

analyze flood risk governance and facilitate discussion about the complexities of flood risk governance for policy-making.

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Chapter 3: Unraveling the Social Construction of the 2013 Flooding Disaster in High River, Alberta, Through the Threaded Situation Analysis Approach

Historically, natural disasters were thought to be caused by nature getting "out-of-control." Social science research has proven otherwise, revealing that the origins of disaster are a result of *human* nature[1]; in other words, social, political, and economic factors. Along these lines, social constructionists argue that flooding is a natural process (hazard) and becomes a disaster (risk) only when flood waters intersect with human vulnerability resulting from design (Mileti, 1999), such as poor planning and inadequate preventive measures. Thus, disasters are not "natural" or uncontrollable; on the contrary, disasters are a consequence of social practices and "the forces driving the production of disaster are embedded in the social order itself" (Tierney, 2014, p. 5).[2] Preventing future disasters requires understanding in-depth the social forces that produce them and taking action to reduce risks and damages (Tierney, 2014).

Certain social practices, and an evasion of responsibility by stakeholders behind these practices, can generate a "circular liability crisis" (Freudenburg, Gramling, Laska, & Erikson, 2008, p. 1023) resulting in increased vulnerability. For example, those who are harmed (property owners or renters) by flooding are legally unable to receive liability settlements from municipalities that permitted development in flood-prone areas or from the real estate industry that did not provide information on the flood risks. In other words, there is a misalignment in risk apportionment. Complicating the issue of practices is that agreed-upon policies or regulations

[1] The term human nature refers to human decisions and activities and is used to contrast with nature in terms of the natural environment.
[2] These forces include social, political, economic, and cultural factors ranging from the local to the global level.

(rules) often appear different once implemented as they filter through various sociopolitical layers (Johnson, Tunstall, & Penning-Rowsell, 2005; Prater & Lindell, 2000).

An example of a driving force is the "growth machine" (Molotch, 1976, p. 309), which describes how connections between politics and economics result in the elite persuading governments to provide opportunities and permissions for them to use land in ways that intensify the use and value of the land. In return for these government decisions, the elite contribute to economic growth, which governments desire and sometimes require for re-election. An example of the social order is the concentration of political and economic power, which increases the potential for disasters. This occurs when stakeholders who prioritize the economy use political influence to (a) exempt them from regulations intended to reduce risks and (b) suppress potential critics, leading to increased vulnerability of others to risks (Perrow, 2007). The social constructionist perspective on disasters is relatively underutilized in understanding the social dimensions of flooding. More scholarship is needed to investigate "how risks originate in the first place and how and why they are allowed to proliferate" (Tierney, 2014, p. 11).

The risks and damages from flooding are expected to increase worldwide as a result of anthropogenic-induced global warming (Intergovernmental Panel on Climate Change, 2012). For example, in 2016, hydrological events such as river flooding and flash floods increased from 39% to 50% and accounted for the highest economic losses (32%) of all global disaster events (Munich RE, 2017). In Canada, flooding is the most costly and common hazard, representing the single largest draw on the federal Disaster Financial Assistance Arrangements at $673 million annually (Office of the Parliamentary Budget Officer [PBO], 2016). More than three-quarters of insurance claims are flood-related (Kovacs & Sandink, 2013). Damages are concentrated in the prairie provinces of Alberta, Saskatchewan, and Manitoba. Focusing on one province, Alberta

has been labelled as “ground zero” (McGillivray, 2018, para. 2) for catastrophic losses in Canada, accounting for seven of the top 10 costliest natural disasters, with $8.2 billion in insured damages and even more economic losses since 2009. Thus, flood risk management is a necessity in the realm of contemporary environmental governance.

Flood risk management[3] in Alberta has historically focused on physical infrastructure, such as dams and dikes, which emphasizes scientific and technical solutions (Bryant & Davies, 2017; Morrison, Noble, & Westbrook, 2018). Yet some engineer scholars critique physical infrastructure approaches as ineffective because flooding routinely exceeds defence structures, and disaster assistance removes the incentive for property owners to reduce their risk (Klijn, Knoop, Ligtvoet, & Mens, 2012). Governance scholars also critique the structural defence approach because spending public resources on structural defences to permit development on flood-prone lands raises questions about fairness and equity. Additionally, 75% of residents living in high-risk flood areas across Canada are not aware of their risk, highlighting poor transparency and accountability (Thistlethwaite, Henstra, Peddle, & Scott, 2017).

Flooding is not a simple high-water event; it is a wicked problem in that its causes and consequences are embedded in complex sociopolitical contexts involving diverse stakeholders with conflicting interests. Flood risk governance is contentious because it touches on core values of public safety, property rights, and economic security, which are often directed by ideological interests. Conflicts surrounding solutions often overwhelm decision-makers, deadlock policies, and lead to the privileging of top-down approaches. The reliance on top-down (centralized)

[3] Flood (risk) management consists of strategies (policies and practices) to prevent and reduce damages across the disaster phases (preparation, response, recovery, and mitigation), which are outlined in Appendix A. Flood risk governance involves the diverse actors and their interactions when developing and implementing decisions related to flood risk management.

approaches has been frequently critiqued by scholars as undemocratic, and as creating barriers to innovative responses (Ashley et al., 2012) and psychosocial barriers between residents and institutions (Haque, 2000). In contrast, poor decisions and practices in land use at the lower level of government (bottom-up or decentralized) have also been identified as increasing vulnerability to disasters by allowing localized development in high-risk areas and permitting activities that compromise broader environmental sustainability (Prater & Lindell, 2000; Shrubsole, 2000, 2013; Tierney, 2014).

Research has shown that flooding issues can be addressed through effective governance by enhancing dialogue and collaboration between stakeholders; clarifying roles and responsibilities; improving transparency and accountability; coordinating policies and practices at all governmental levels; and mixing centralized and decentralized governance (Driessen, Hegger, Bakker, Van Rijswick, & Kundzewicz, 2016; Grimes, Goos, Little, & Shannon, 2007; Haque, Kolba, Morton, & Quinn, 2002; Hegger, Driessen, & Bakker, 2018). However, these recommendations are challenging for practitioners to implement due to complex and context-specific social dimensions of flood risk governance. In Canada, flood management and oversight are problematic because a "flood is the responsibility of a patchwork quilt of entities" (McGillivray, 2016a, para. 14), with insufficient coordination and communication between and among them (Henstra & Thistlethwaite, 2017a; Shrubsole, 2013).

Alberta stands out as the province with the highest costs from natural disasters partly because of its geographical features, including mountains, forests, and rivers. However, "hazard does not directly equate to loss" (McGillivray, 2016b, p. 9) because vulnerabilities arise from the social order. Additionally, "some types of organizational arrangements and practices seem to attract risk" (Tierney, 2014, p. 84). The financial loss from disasters indicates that the social

arrangements and practices in Alberta appear to "attract" disaster risks and damages. Despite this situation, there is limited peer-reviewed scholarship on the social dimensions of flooding disasters in Alberta (cf. Grimes et al., 2007; Haney & McDonald-Harker, 2016). To address this gap in research, I conducted a case study of High River, the community most severely impacted during the extensive flooding that occurred in southern Alberta in 2013, to understand the social dimensions, including the power dynamics, that contributed to its vulnerability to flood damage. In this chapter, I test the application of the threaded situation analysis (TSA) approach (see Dissertation Chapter 2) to analyze three situations: (a) lack of legislative changes to reduce flood risk, (b) insufficient updating of flood hazard maps, and (c) absence of notification on land titles about flood risk. I begin with a description of flooding in High River and how the town is embedded in multiple jurisdictions and items of legislation.

Case Study of Flood Risk Governance in High River

In June of 2013, southern Alberta was inundated with over 250 mm of rain over four days (Pomeroy, Stewart, & Whitfield, 2016). The result was massive flooding, impacting 125,000 people in 30 communities, resulting in five deaths, and causing damages estimated at over $5 billion in property and infrastructure (Alberta Emergency Management Agency, 2015). Over 13,000 residents of the Town of High River[4] and surrounding area were evacuated; 59% of the land was inundated by water; 14,500 or 70% of homes were moderately to severely damaged; and 79 out of 83 buildings downtown experienced significant damage.

One of the reasons for the extensive damage in High River is that the Highwood River runs through the middle of the town. The river has a long history of flooding, having spilled its

[4] The Town of High River has a population of 12,715 (Statistics Canada, 2014).

banks more than 10 times between 1894 and 2013, including a significant flood in 2005[5] (Henstra & McBean, 2005; AECOM, 2014, as cited in Prinsen, Klijn, & van Duijne, 2015; Rushworth, 2014). The frequency of flooding is attributed to the town being located in an alluvial fan[6] where rivers tend to jump their channels (Prinsen et al., 2015). Another reason for the extensive damage is that the town and several neighbourhoods, including Wallaceville and Beachwood, were built in both the designated flood fringe areas and floodways, as per Figure 3.1 (Government of Alberta [GoA], 2016; Town of High River [THR], 2018a, 2018b).[7] The floodway is where the flow of water is the most destructive, and new development is discouraged in this area. The flood fringe is outside of the floodway where water is shallower and flows slower. New development is permitted in the flood fringe on the condition that buildings are floodproofed.[8]

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[5] The 2005 flood in southern Alberta cost approximately $400 million, affected 40 communities (with 14 declaring official states of emergency), and resulted in four deaths (Environment Canada, 2017).
[6] An alluvial fan is a triangle-shaped deposit of sediment (called alluvium) consisting of gravel, sand, and silt. Alluvial fans tend to be created as water flows down mountains, hills, or canyon walls.
[7] Alberta's flood maps are designated based on the 100-year return period which has a 1% chance of occurring in any given year (Auditor General, 2015). The 100-year return is also used at the federal level, but some provinces use a 200-year return period (e.g., British Columbia), and Saskatchewan uses a 500-year standard (PBO, 2016).
[8] A flood hazard area is the combination of the floodway and the flood fringe. For more specific definitions of these terms, see GoA (2018b) and Appendix B.

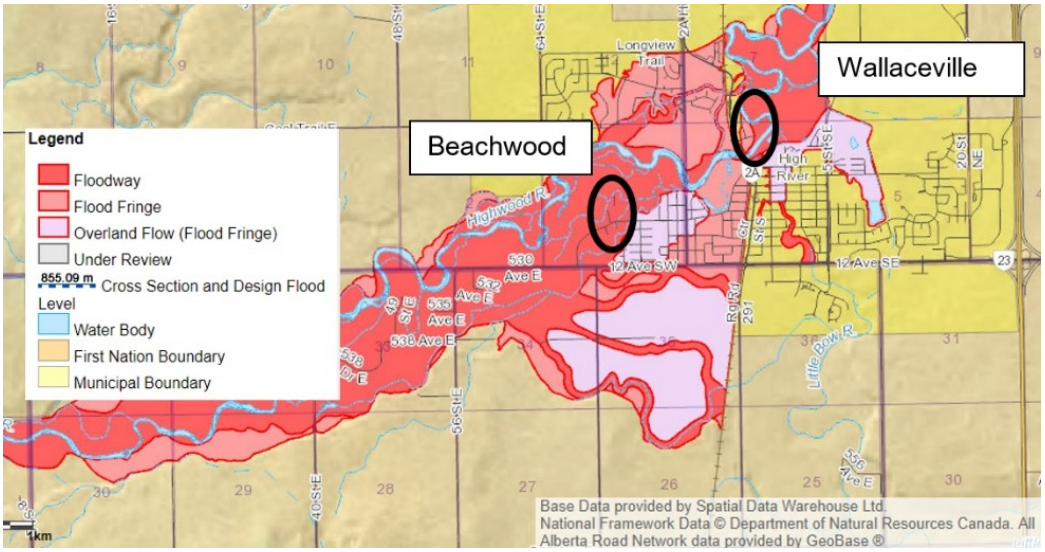

Figure 3.1. Flood hazard map of the Town of High River modified to highlight Beachwood and Wallaceville neighbourhoods (GoA, n.d.).

Wallaceville was one of the first neighbourhoods developed in the Town of High River, following the establishment of the Lineham Lumber Company Mill in 1892, and it first flooded in 1902 (Klassen, 1998; Knupp, 1982). Despite a history of flooding, only a few homes in Wallaceville are designated as being in floodway and flood fringe areas, and several homes are located in both zones (Piovesana, 2013). Moreover, Wallaceville residents were upset when flood maps released in 2013 indicated only a small section of the neighbourhood was located in the floodway even though some areas flood regularly ("Accuracy of Alberta," 2013). The Beachwood Estates neighbourhood, in contrast, was built in a designated floodway in the late 1980s and early 1990s, with a dike around Beachwood built in 2008, indicating that there was awareness of flood risk (Wright, 2013). This neighbourhood consisted of the most expensive homes in the town. The developer of Beachwood is a former mayor of High River ("Former mayor says," 2013; "Study for Beachwood," 2007).

Flood risk governance of High River is embedded in multiple geographical and legal jurisdictions. The town is situated in the Municipal District of Foothills and is subject to numerous items of legislation,[9] which consist of statutory and nonstatutory rules,[10] practices, and roles and responsibilities. In general, municipalities are responsible for considering flood risk in their municipal development plans and land use bylaws, and when issuing development permits (Alberta Urban Municipalities Association & Alberta Municipal Services Corporation [AUMA & AMSC], n.d.). Local governments, however, seem to lack the will and/or the capacity to implement floodplain land use regulations (Shrubsole, 2000).

In Canada, provincial governments are responsible for reducing flooding vulnerability while both provincial and national governments pay for disaster compensation expenses (Henstra, 2013; Shrubsole, 2000, 2013). Floodplain management falls under provincial jurisdiction in the Canadian Constitution as provinces are primarily responsible for water resources and land use matters (Government of Canada [GoC], 2013). This responsibility includes regulating activities in floodways, identifying flood risk (such as through flood hazard maps), and flood forecasting (Groeneveld, 2006). Despite having the constitutional power to intervene, provincial governments have been reluctant to mandate that municipalities mitigate flood risk (Henstra & McBean, 2005).

Six months after the 2013 flood, the Alberta government amended the Municipal Government Act (MGA) to enact Bill 27: Flood Recovery and Reconstruction Act (2013) to

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[9] Among several pieces of legislation influencing flood risk governance in Alberta are the Emergency Management Act and the Flood Recovery and Reconstruction Act (both Acts amended the Municipal Government Act), the Environmental Protection and Enhancement Act, Financial Administration Act, Fiscal Planning and Transparency Act, Government Organization Act, Public Lands Act, Public Service Act, Responsible Energy Development Act, Surface Rights Act, and Water Act. A detailed examination of this legislation is out of scope of this discussion.

[10] "Statutory instruments are specifically provided for in legislation and are often mandatory. Non-statutory instruments are measures that are voluntarily adopted by council by bylaw or resolution to further assist in achieving planning outcomes" (AUMA & AMSC, 2017, p. 31).

restrict floodway development to limit future flood risks and damages (GoA, 2014a; MGA, 2000). However, as I describe later, the regulation pertaining to the Act, the Floodway Development Regulation, has not been promulgated (i.e., put into effect). The Alberta government is also responsible for a portion of payments of uninsurable disaster damages through the Disaster Recovery Program. In August 2013, the Alberta government announced the Floodway Relocation Program as a voluntary buyout of homes located in the floodway. Under this program, approximately 250 homes were eligible for buyout across the province, including 102 homes in High River. The Wallaceville and Beachwood neighbourhoods were to be returned to an undeveloped state (THR, 2018a, 2018b). About 80% of Wallaceville residents were relieved to be offered the buyout (Hennel, 2013), and the homes were demolished within a year. Beachwood residents, on the other hand, fiercely contested the neighbourhood buyout because only a few homes received sewer back-up damage, and they delayed removal of their homes until 2018 (see Dissertation Chapter 4).

Provincial governments are reimbursed for disaster damages through the federal Disaster Financial Assistance Arrangements program created in 1970 (PBO, 2016).[11] Five years later, the federal Flood Damage Reduction Program (FDRP) was developed to facilitate the shift away from structural to nonstructural flood mitigation measures. The FDRP discouraged development in flood vulnerable areas by providing funding for provinces to create flood hazard maps (GoC, 2013). The Alberta government joined the FDRP in 1989 and since 1999 has been updating flood hazard maps under its independent Flood Hazard Identification Program (Auditor General, 2015; GoA, 2018b). In 1999, the federal government ended the FDRP based on evaluations that did not

[11] The Disaster Financial Assistance Arrangements Program pays up to $15 per capita of a province and above that amount, 90% of the costs (PBO, 2016).

accurately capture the full range of benefits and costs of the program (de Loë & Wojtanowksi, 2001), consequently "leaving the field of flood damage reduction to provinces" (de Loë, 2000, p. 355). However, the federal government continues to provide flood mapping guidelines and funding for mitigation projects. Overall, the federal government's goals are to minimize major disruptions on regional economies and reduce disaster assistance payments (GoC, 2013).

In 2008, the federal, provincial, and territorial governments launched Canada's National Disaster Mitigation Strategy, which involves annual consultations with public- and private-sector stakeholders on coordinating and implementing disaster mitigation activities (GoC, 2018). Two of the guiding principles for disaster mitigation are *fairness* to "consider equity and consistency in implementation" (GoC, n.d., p. 2) and *sharedness* to "ensure shared ownership and accountability through partnership and collaboration" (p. 2). The National Disaster Mitigation Strategy acknowledges that "a governance structure that engages and enhances local-level responsibility is more effective than a top-down approach" (GoC, n.d., p. 4). In 2015, the federal government further established the National Disaster Mitigation Program to build safer and more resilient communities by advancing knowledge and up-to-date information on flood risks (including risk assessments and flood mapping), investing in flood mitigation activities (including mitigation planning, nonstructural mitigation projects, and small-scale structural mitigation projects), and fostering discussions on residential flood insurance (GoC, 2018).

At the international level, Canada adopted the *Sendai Framework for Disaster Risk Reduction 2015–2030* (United Nations Office for Disaster Risk Reduction [UNISDR], 2015), which emphasizes risk management across all the disaster phases and promotes prevention rather than focusing on protection measures such as structural defences, characteristic of the previous *Hyogo Framework for Action 2005–2015* (UNISDR, 2005). This change in emphasis requires a

shift in authority from government to governance, involving a wider range of stakeholders (Henstra & Thistlethwaite, 2017b). To fully adopt the Sendai framework, Canada needs to overcome significant governance barriers such as the fragmented distribution of responsibility to manage disaster risk, and limited stakeholder engagement and public awareness (Henstra & Thistlethwaite, 2017b).

Theoretical Framework: Threaded Situation Analysis Approach

There are limited frameworks for analyzing the complex issue of flood risk governance (see Dissertation Chapter 2). Morrison et al. (2018) found only five peer-reviewed articles that presented frameworks related to practice/application, research, and/or governance. These authors highlighted the gap in available tools for integrating social dimensions such as perceptions, values, roles, responsibilities, and needs into decision-making processes and policies related to flood risk management. The risk governance framework developed by the International Risk Governance Council is prominent in the literature, but Boholm, Corvellec, and Karlsson (2012) critiqued this approach and advocated instead for a contextual and practice-based approach to (organizational) risk governance. These scholars argued the need to "reveal how controversies and consensus, individual actions and organizational strategies, and, more generally, interaction and communication condition the social process of risk characterization and management" (Boholm et al., 2012, p. 3). Similarly, Birkholz, Muro, Jeffrey, and Smith (2014) also pointed out that many frameworks fail to examine the "interface between perceptions and management/intervention" (p. 14) in a substantive way to capture nuances, contestation, and experiences. In sum, an analytical framework is needed that can capture these complexities in flood risk governance.

To that end, I developed the TSA approach as a practical and comprehensive analytical tool for assessing flood risk governance (see Figure 3.2). The model is based on two key theoretical frameworks: frame/framing analysis and practice-based approaches. I draw on frame/framing analysis to examine perceptions and the interactions between stakeholders in shaping perceptions. I also apply a practice lens for examining what is happening on-the-ground, including which practices were chosen and how they were (or were not) implemented. In Chapter 2, I deconstruct these two theoretical frameworks into their ontological concepts[12] and then reorganize the hierarchical order of concepts in terms of which are dominant and which are subsumed. Bringing these two aspects into dialogue contributes to an enhanced understanding of the complexity of flood risk governance in ways that using just one of these approaches might miss (see Dissertation Chapter 2).

[12] Ontology is the philosophical study of being that explores the nature of reality and existence, including the basic categories or properties that constitute a phenomenon and the relationships between them, and thus influence analytical concepts. For more details on the role of ontological concepts in theoretical analysis see Dissertation Chapter 2.

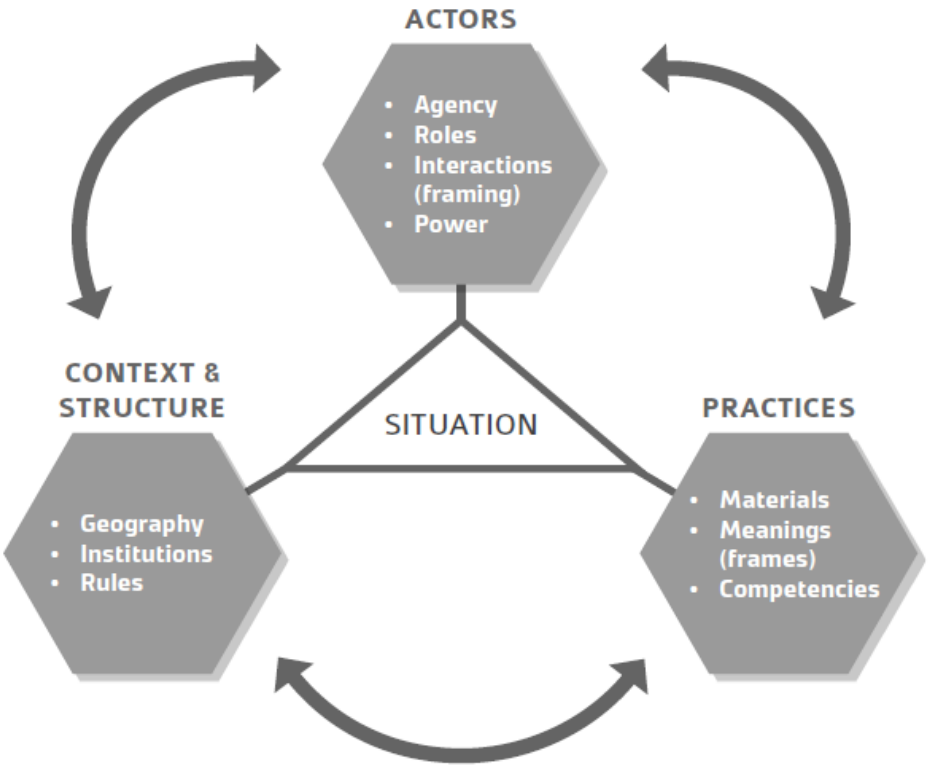

Figure 3.2. Analytical model of the TSA approach.

In the TSA approach, each of the three main components—actors, context and structure, and practices—is a function of other subcomponents and connections between them (see Figure 3.2). Actors have agency,[13] they juggle multiple roles and responsibilities, and, through their interactions with others (framing), enact power relations. The context and structure component is made up of institutions (economic, legal, scientific, and political) that are guided by rules (formal and informal) and are influenced by physical contexts (e.g., geography, including hydrology). Practices are constituted by materials, meanings (frames), and competencies. Actors, context and structure, practices, and their interplay thus constitute a situation.

[13] The definition of agency varies but, in this chapter, it refers to the capacity of actors for action or intervention by interpreting, improvising, and reshaping aspects of the social structure: agency is a form of power.

Practice-based approaches vary in their conception of what constitutes practices and how the elements are arranged (Schatzki, 2016). However, all share the fundamental premise that neither individual behaviour (agency) nor societal structures exclusively affect behaviours; rather, it is the interplay between individuals and structures in everyday practices and specific contexts (Bourdieu, 1977; Giddens, 1984; Nicolini, 2012). I define *practices* as the ensemble of doings, sayings, and things in action that are routinized to the extent that they are a recognizable performance (Arts, Behagel, van Bommel, de Koning, & Turnhout, 2013; Nicolini, 2012). For the practice component of my TSA, I draw from the work of Shove, Pantzar, and Watson (2012) in their influential work *The Dynamics of Social Practice.*

I apply two features from Shove et al.'s approach. First, practices are composed of a constellation of three elements and their linkages: materials (e.g., infrastructures such as dikes and objects such as maps, money, and documents), meanings (e.g., frames such as risk and safety), and competencies (e.g., knowledge such as historical knowledge and skills such as engineering). Second, Shove et al. (2012) described and analyzed the processes of stability and change to explore how practices emerge, persist, alter, and disappear, referred to as "practice routes" (p. 6). A given practice emerges, persists, or disappears based on the constellation of materials, meanings, and competencies as well as through interaction with other practices. A practice lens provides insight into which practices, out of various possibilities, have been implemented and how practices change over time.

However, Shove et al.'s (2012) approach has several limitations when applied to risk governance. For example, Shove and colleagues have acknowledged that power is located in "the resources and capacities of individual actors" (2012, p. 136) but noted that they "have not yet paid attention to deliberate or wilful attempts to bring new practices into being or to kill them off

for good" (p. 136). These analytical limitations arise because their approach conflates and subsumes many ontological concepts under practices. For example, actors are decentered, their roles and responsibilities are subsumed under practices, and their interactions are not examined. Shove et al. also subsumed rules under practices. However, it is important to analyze rules because they may be interpreted differently when in use than initially intended, or not implemented at all. Context and structure are also subsumed under practices by Shove et al. and meanings are conflated, which creates challenges for operationalizing them.[14] In sum, these ontological concepts are missed in the analysis (see Dissertation Chapter 2).

Although Shove et al.'s (2012) theory of practice can be applied to flood risk management in terms of various practices (Appendix A), their approach does not provide sufficient tools to explain flood risk governance in terms of why certain decisions were made and by whom, because the specified ontological concepts are missing or subsumed under practices. Consequently, I suggest a different approach that incorporates those missing concepts. To develop my TSA approach, I retained the two main features of Shove et al.'s work (constellation of practices and practice routes) but also drew on other scholarship to redefine and reorganize the concepts. To address the limitations of Shove et al.'s practice-based approach, I turned to frame/framing analysis to develop a clearer and more nuanced understanding of meanings and social interactions, both key components of flood risk governance.

The terms frames and framing are often used interchangeably even though they have divergent metatheoretical foundations, resulting in confusion and inaccuracies (Dewulf et al., 2009). *Frames* are subjective meanings, mental models, perceptions, schemas, cognitive structures, and snapshots: Frames help individuals to interpret, or make sense of, ideas and

[14] Meaning in terms of frames and framing is further explored in Dissertation Chapter 4.

events (Dewulf et al., 2009). Frames related to flood risk governance include ideas about risk and safety, fairness, and accountability, among others. *Framing* captures the interactions between actors in which frames are presented and communicated, and the processes by which meaning is shaped as a result. I divide framing into three typologies that provide insights into power dynamics: top-down versus bottom-up, collaboration and/or coordination, and conflict and/or competition.

I separate frame and framing analysis with a forward slash (i.e., frame/framing) to indicate that my analysis includes both concepts; however, in social phenomena, they are not truly separate but are part of the larger process of communication (Wenger, 1998, as cited in Dewulf et al., 2009). One of the limitations of relying only on frame/framing analysis is that the findings may not reveal whether those frames were accepted and implemented, and so may not accurately reflect actual events (Couch, 2000). To account for this limitation, the TSA approach incorporates social practices to examine on-the-ground implementation (as described above).

Agreements and policies on paper often differ once they are implemented. This change happens because actors are dynamic entities. Thus, they may respond to a situation differently than expected due to their rationale, values, interests, and expertise. Numerous scholars have interpreted the concept of situation, or the situatedness of aspects of a phenomenon, in multiple ways (e.g., Clarke, 2003; Clarke, Friese, & Washburn, 2017; Gherardi, 2008; Goffman, 1967). In this chapter, a *situation* consists of actors, context and structure, and practices that come together in a specific time and place. Some scholars such as Nicolini (2017) have advocated for connected situationalism, which incorporates numerous practices that are connected in space and time. Nicolini (2012) also contended that the focus of analyzing practices should not be merely to

catalogue them but rather to investigate the conditions, causes, and connections among them. To conduct such an investigation, I use the term *threading* in the TSA approach.[15]

Methodology and Methods

I undertook a qualitative case study of the Town of High River to understand the causes and conditions that contributed to increasing vulnerability to flooding damage as a result of the building of two neighbourhoods in designated high-risk flooding areas. High River is an extreme case in many ways: It was hardest hit during the 2013 flood, it has a long history of recurrent flooding, and yet the Town leaders have plans to continue developing within a flood-prone area. Extreme cases often reveal more information as more actors and mechanisms are activated in the situation (Flyvbjerg, 2004), and can further reveal "aspects of social structures and processes that are hidden in everyday affairs" (Sementelli, 2007, p. 283).

I conducted 35 semistructured interviews (three interviews had multiple interviewees; n = 38) with individuals who were involved with the 2005 and/or 2013 Alberta floods. Interviewees had decision-making or advisory positions in flood prevention, response, recovery, or mitigation at municipal, regional, provincial, and federal levels. To ensure anonymity and confidentiality, I labelled quotes using a format starting with the interview number (e.g., 01) then the location of Alberta (AB).[16] I also observed three flood anniversary ceremonies in High River and toured the town and surrounding areas to see the impact of the flood. Additionally, I conducted content analysis of 18 official reports (2006–2018), 78 legislative documents (1995–2018), and 57 media

[15] As described in Dissertation Chapter 2, several scholars apply the metaphor of threads, weaving, or threading through to capture connections of objects or practices across space and time (Hui, Schatzki, & Shove, 2017; Nicolini, 2017).
[16] See Appendix G for more information about interviews.

articles (2006–2018) relevant for understanding flood management in High River, with a focus on the 2005 and 2013 floods.[17]

To analyze the above data, I applied the TSA approach to examine the complexity of flood risk governance involving practices, context and structure, and actors. I focused specifically on the (sub-)components omitted from analysis in Shove et al.'s (2012) approach: actors and institutions, their roles and responsibilities, and their power relations through interactions (framing); formal rules such as policies, regulations, programs, and plans; and informal rules such as social norms, implemented and not implemented. I focused on practices such as flood hazard mapping, and developing and enforcing policies and regulations (e.g., zoning). I also explored Shove et al.'s practice routes of emerging and disappearing, as well as languishing and suppressing; I develop the latter two below. I limited my analysis to three situations germane to the case study of High River and identified as problematic by official reports on the 2013 flood in the Town specifically, and in Alberta in general.

Findings and Analysis

Situations to Analyze for Understanding Flood Risk Governance in High River

To understand the conditions, causes, and connections that contributed to increasing vulnerability to flooding damage in High River, such as building Beachwood and Wallaceville in designated high-risk flooding areas, I explored three key situations: lack of legislative changes to reduce flood risk, insufficient updating of flood hazard maps, and notifications on land titles that were cancelled immediately after they were announced.

Situation 1: Lack of legislative changes to reduce flood risk. As noted earlier, the Alberta government is responsible for regulating activities in the waterways (as per the Water

[17] See Appendices H–M for more information.

Act, 2000) and for flood risk identification. Municipalities currently make development decisions as mandated under the MGA (2000) and are responsible for considering flood protection when developing their land use bylaws and emergency management. In December 2013, the Government of Alberta enacted Bill 27 to amend the MGA, thereby restricting development in floodways to ensure rebuilding would occur in ways that would limit future flood risk.[18] Stakeholder engagement was held in May and October 2014 (GoA, 2014b), and the process has stalled since then. To date, the Floodway Development Regulation pertaining to the Act has not been promulgated and, as such, municipalities still retain building decisions on their floodplains (Alberta Association of Municipal Districts and Counties, 2017; Alberta Municipal Affairs, 2014; AUMA & AMSC, 2017).

Past attempts to restrict development in the floodways have also been unsuccessful. Most notably, in 2006, George Groeneveld, the Member of the Legislative Assembly (MLA) for High River, led a provincial committee to conduct extensive stakeholder engagement across 58 communities and developed a report with recommendations after the 2005 flood. One of the targets of *The Provincial Flood Mitigation Report: Consultation and Recommendations* (Groeneveld, 2006) was to discourage inappropriate future developments in flood-prone areas through regulations and programs. More specifically, a recommendation was that "the Disaster Recovery Regulations be amended to prohibit disaster recovery payments for new inappropriate development in flood risk areas" (Groeneveld, 2006, p. 13). The estimated cost of implementing the recommendations, which included structural flood mitigation, was $306 million. Although this is a sizeable cost, it is relatively insubstantial compared to the $6 billion in damages from the

[18] Exemptions from Bill 27 were made for the municipalities of Drumheller and Fort McMurray because of existing significant development in the floodways (Alberta Municipal Affairs, 2014).

2013 Alberta flood. The Groeneveld report was not released until 2011, and there was insufficient time to implement the recommendations before the 2013 flood occurred.

Situation 2: Insufficient updating of flood hazard maps. The flood hazard maps indicate whether an area is vulnerable to flooding; hence, they are a key source of information for residents, various levels of government, organizations, and businesses, including insurers and developers. Flood maps are also important post-flood because they are used by both government and insurance companies to determine whether property owners are eligible for compensation and, if so, to calculate the value of losses.[19] Although the Alberta government has mapped more than 70% of the province's populated areas (GoA, 2013a), it has been criticized for not completing flood maps of the remaining areas (770 km remain), not updating flood maps (a third of the maps are more than 20 years old), and not releasing updated maps once they have been created (Auditor General of Alberta, 2015; Canadian Underwriter, 2015; PBO, 2016). For example, the flood maps released for High River in 2013 were last updated in 1992. Additionally, less than half of the 48 flood hazard maps created have been formally designated and subsequently publicly released.

Situation 3: Absence of notification on land titles about flood risk. The 2006 Groeneveld report recommended establishing a notification system to inform potential buyers that a property is located within a designated flood risk area. Premier Alison Redford attempted to introduce a location notice on land titles for homes in floodways and flood fringes in July 2013, but within less than a month cancelled the plan (GoA, 2013b, 2013c). There is minimal information available on this decision; however, examining the challenges with flood-related

[19] The accuracy of flood maps is complicated because the information contained therein varies depending on whether it was developed by government, insurance companies, or others.

regulations (Situation 1) and updating of flood hazard maps (Situation 2) provides some insights into the power dynamics that potentially contributed to its swift cancellation (see below). Instead of the location notice, a Disaster Recovery Program (DRP) notice is placed on land titles for homes in the floodway, but only if homeowners received DRP assistance. For homes in the flood fringe that were covered by DRP, the notice will be removed once the minimum mitigation requirements are met. The titles of homes located in the floodway and flood fringe that were damaged but did not receive DRP will not have notices about the level of flood risk. These alternatives to notification on land titles makes it more challenging for potential buyers to be aware of their flood risk. To become informed, the Alberta government encourages property owners to use the government's flood mapping hazard website (GoA, 2013c).

Practice Routes Through Suppressing, Languishing, and Disappearing

I draw on the three situations above to focus on the practice routes of emerging and disappearing (identified by Shove et al., 2012) and to propose the new practice routes of suppressing and languishing. I explore the suppression of the 2006 Groeneveld report, the languishing of floodway regulations and updated flood maps, and the swift emergence and disappearance of notices on land titles.

Suppressing reports on flood risk mitigation. I characterize *suppressing* as a practice route that occurs when a practice could emerge or alter but is prevented directly or indirectly from doing so either by human actors or by other factors, and hence stays dormant. An example of suppression in the High River case study includes the Groeneveld (2006) report not being released until 2011. There were numerous requests for the report to be released during legislative debates ("Alberta could have reduced flood damage," 2013; Paperny, 2013), but the response was: "The issue of flood mitigation is very complex. . . . We need to ensure that we have the

right balance of the recommendations that are coming from that report, and we will bring those responses to this House very quickly" (Danyluk, as cited in Province of Alberta, 2008, p. 1150). The Groeneveld report was not the first key report on flooding to be withheld: the *Draft Flood Mitigation Report* (2002, as cited in Groeneveld, 2006) was also not released (Wingrove, 2013).

When asked by the media, several government officials said they did not know why the report was withheld for six years ("Alberta could have reduced flood damage," 2013; Paperny, 2013; Wingrove, 2013). Renowned water scientist John Pomeroy speculated that "it's politically touchy to designate prime waterfront land off-limits [for development], or to tell homeowners they need to pack up and move because their property's now a flood zone" (as cited in Paperny, 2013, para. 33). Even though government officials were not able or willing to be as forthcoming as this scientist, the feedback from consulted stakeholders—as summarized in the Groeneveld (2006) report on the recommendation to restrict future development in flood-prone areas—brings to light some of the conditions and causes that led to the report being suppressed. Small municipalities supported the recommendation to restrict floodway development because it reinforced their decisions to refuse development permits. As well, it limited their liability, thereby reducing pressures from developers with minimal political repercussions as the responsibility would shift to the provincial government. In contrast, large municipalities, which already had numerous developments in riverside areas, opposed this recommendation because it halted development in areas with the highest sale values and taxation revenues. This feedback from municipalities supports the speculations of the scientist quoted above. When asked about the 2013 flood, retired MLA Groeneveld commented: "Can you imagine how much development has happened on the flood plains since 2006?" (as cited in Paperny, 2013, para. 16). Answering this question is challenging because such information tends to be buried in government records.

However, as of 2013, approximately 250 homes in the floodway were eligible for buyout. The suppression of the 2006 Groeneveld report for six years resulted in failure to take sufficient protective action to reduce disaster risks and damages prior to the 2013 Alberta flood.

Research participants observed that in Alberta, development (residential, industrial) is prioritized: "That's the way it has been in Alberta; development trumps the rest [environment and residents]" (08-AB). Opposition from municipalities to the Alberta government's recommendation to limit floodway development illustrates Molotch's (1976) growth machine logic. Disaster sociologists Tierney (2010, 2014) and Freudenburg and colleagues (2008, 2009) have further problematized the logic behind growth machine thinking, arguing that natural disasters are socially produced when communities are driven by political-economic choices that result in increasing vulnerability to disasters, such as poor land use and environmental degradation. These social structures and economic processes evolve over time and are often hidden in everyday affairs, resulting in mounting unaddressed risks that are eventually revealed through disaster situations (Sementelli, 2007; Tierney, 2014).

Languishing regulations to restrict floodway development. I characterize *languishing* as a practice route in which components of a situation have emerged to some degree but have not gained enough traction to persist or to be effective; they have not disappeared but remain dormant.[20] As noted earlier, the MGA was amended to enact Bill 27 in December 2013 and is an example of a rule that emerged yet languished. As of April 2019, the Floodway Development Regulation pertaining to this Act had not yet been put into effect; therefore, municipalities are not prevented from building in floodways.

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[20] The inspiration for the term arose from a media article that described a structural mitigation project in Alberta as languishing (Wood, 2018).

The Alberta government was heavily criticized for not enforcing such regulations prior to the 2013 flood (Auditor General of Alberta, 2015). Critics have argued that provincial governments need to legislate changes to control development in order to reduce flood risk and damages (Thistlethwaite & Henstra, 2018b). The Province of Ontario is often cited as a leader in flood prevention. The Ontario government amended the Conservation Authorities Act (1990) after Hurricane Hazel in 1954 to enable the authority to acquire land for conservation and recreation purposes, thereby restricting development in the floodplain. In contrast, Alberta and the other prairie provinces will continue to have regulatory challenges in terms of compliance and enforcement as long as floodplain management remains the responsibility of municipalities (PBO, 2016).

Legally, the Alberta government could legislate such changes. Ultimately, the responsibility lies with the provincial government as municipalities are considered "creatures of the provinces,"[21] meaning that municipalities' "functions, finances, governing structure—even their very existence—depend upon provincial authorization" (Tindal & Tindal, 2004, p. 10). There are two key characteristics of municipalities pertinent to flood risk governance (Tindal & Tindal, 2004): municipalities are created based on the will of the provincial legislature and as such do not require the consent of the local residents; and the authority of the municipality is not a given but is conferred from the provincial government. In other words, municipalities are given power from the province that enables them to turn down developers' requests.

Politically, however, it appears that the Province of Alberta is a creature of the municipalities. The source of political pressure arises from Alberta's 87 electoral divisions, of

[21] The division of power is outlined in 92(8) of the Constitution Act, 1867, which states that provincial governments have exclusive powers over municipalities.

which 26 (30%) are located in the City of Calgary and 20 (23%) are located in the City of Edmonton (GoA, 2018a). These two cities alone constitute 53% of the electoral divisions in Alberta, and as such, are political heavyweights. It is then not surprising that when Alberta's larger municipalities did not support halting development in floodways, as noted by Groeneveld (2006), the provincial government's decision to create and enforce such regulations languished. This happened in 2013 as well as in 2006 and 2002 (as per the respective flood mitigation reports).

In contrast to the provincial government's position, interviewees in this research supported the enforcement of provincial regulation to restrict development in the floodway. A former municipal politician called for a halt to development, which was also expressed by other interviewees, highlighting the conflicting values between local autonomy, risk, and safety:

> We've got to stop. If we're not capable of doing that in the community, of not recognizing that, then somebody has to take that authority away from us [municipalities]. I absolutely believe that. To hell with local autonomy. It's the risk. It's the risk to human life. Why would we put anyone through [a flooding disaster] again? (25-AB)

These conflicting values and interests are at the root of the wicked nature of flooding and the problems that make them intractable policy issues.[22]

One of the contributing factors to municipal governments having excessive influence over provincial regulations regarding flood management in Alberta is "the circular liability crisis" (Freudenburg et al., 2008, p. 1023). As noted earlier, municipalities are responsible for taking flood risk into consideration in their land use bylaws and when issuing development permits. However, when disaster strikes, DRP payments are issued by the provincial government and a portion thereof is covered by the federal government's Disaster Financial Assistance

[22] The debate about the local autonomy of municipalities is deeply divided and broad—an in-depth examination is out of scope for this chapter.

Arrangements program, both funded by taxpayers. The way responsibility is currently assigned, municipalities and developers are not held financially accountable for their decisions. In other words, the current risk apportionment is problematic and does not meet Canada's National Disaster Mitigation Strategy principle of fairness and accountability (GoC, n.d.). Essentially, the costs of poor land use decisions have been borne not by the developers, politicians, or planners who permitted the development, but by residents with damaged property, taxpayers across the country, and insurance holders around the world.[23]

Having said this, further analysis revealed a surprising finding. Although developers benefit the least from complying with or exceeding building standards for reducing disaster risks and damages (Multihazard Mitigation Council, 2017), the developers I interviewed supported a province-wide restriction of development in floodways because financially they also suffered when areas still under development or properties being rented were flooded. In addition, developers do not qualify for DRP assistance. An enforced restriction on floodway development was perceived as creating an even playing field in which some developers did not gain advantage over others. Even though the developers interviewed do not represent all developers in Alberta, this finding highlights a potential opportunity to gain support from developers on restricting floodway development.

Languishing flood hazard maps. The updating of provincial flood maps in Alberta has also languished, and this issue was a major target of criticism after the 2013 flood.[24] High River residents questioned the accuracy of the maps, given that the entire Wallaceville neighbourhood

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[23] Overland flood insurance was not available in Canada for homeowners until after the 2013 flood (see Henstra & Thistlethwaite, 2017a).

[24] Unlike in Canada, in the United States a flood hazard map is available, indicating both the potential flood risk and the history of flooding on LexisNexis (Stolte, 2016).

was devastated yet only a small corner was designated as floodway. In Beachwood, only a few homes had sewer back-up damage, yet the neighbourhood is designated as floodway ("Accuracy of Alberta," 2013). The following quote from one interviewee captures the importance of maps:

> The only booth [at a flood information event] they [attendees] care about is flood mitigation, seeing the flood map because they're making a big decision taking [their homes] down and it's all on flood mitigation. Now the conversation is, what map are we looking at? Is this the 1992 map, is this the old map? Is this the new map? (18-AB)

The quote refers to the issues surrounding flood maps, such as homeowners needing to know whether their home is in the designated floodway, which means they are eligible for DRP payment for repairs, or whether they need to tear down their home. These are decisions laden with financial, social, and emotional consequences and thus require accurate information.

A major criticism from residents, media, the Auditor General, and other organizations was that the map for the Town of High River had not been updated since 1992 even though there had been major flooding in 1995 and 2005, as well as some minor floods. The Alberta government maintained that "flood hazard studies and maps do not have an expiry date" (GoA, 2013a, para. 6) and "updates are only required if there are changes to the river such as if a major flood event has significantly changed the river channel" (para. 7). Groeneveld (2006) made a recommendation to complete and update flood maps of 66 urban communities which was supported or strongly supported in 99 out of 100 responses from the municipalities consulted during stakeholder engagement. Municipalities recognized that flood maps are an essential planning tool, but they had questions about terminology and other issues. Another recommendation strongly supported by municipalities was to develop flood maps for rural areas at risk of flooding with lower levels of accuracy in order to make mapping large areas more feasible (Groeneveld, 2006). In addition, Groeneveld recommended to update maps when there have been changes to the river or adjacent areas, including after major floods, but municipalities

did not have an opportunity to provide feedback on this recommendation. Since the 2013 flood, the provincial government has increased funding for continued updating of flood hazard maps and for increasing the number of areas being mapped (GoA, 2018b).

My research confirms the findings of Thistlethwaite et al. (2017) that property owners and potential buyers want transparency about whether a home is located in a high-risk flood area and if it has been damaged by floods in the past. Potential buyers want this information to be made available prior to the purchase. Provinces are expected to provide accurate flood maps, and research from across Canada indicates support for doing so, which begs the question as to why this process has languished in Alberta. As noted earlier, the media, the Auditor General, other organizations, and research participants have pointed to the Alberta government as delaying the process, as this interviewee stated: "The Province is dragging its heels on releasing flood hazard maps" (22-AB).

To answer the question on why flood hazard maps languished, it is important to note that a vital feature of the political dynamic that tends to be missed or omitted in these criticisms is the informal practice (or sociopolitical norm) of municipal governments having to sign off on a flood map before the Alberta government publishes it. The following recommendation from the Groeneveld (2006) report provides parameters for this informal arrangement between the provincial and municipal governments:

> The Minister of Environment designates a flood risk area after the responsible local authority has had an opportunity to review the maps and provide comments on the technical elements. The recommended time period for designation is within six months of receiving the maps. (p. 3)

This recommendation prescribes a six-month deadline as an attempt to speed up the process because some municipalities have taken years to sign off on the updated maps or have not signed off at all. Municipalities may be reluctant to approve updated provincial flood maps or

to use tools to help them map their own flood risk due to fears that property values in flood-prone areas will drop, triggering anger from homeowners, and that they (municipalities) will be held liable for damages: "Municipalities immediately raised red flags, suggesting they wanted no part of [flood hazard maps] due to concerns about legal liability and political backlash" (Press, 2017, para. 1). Hence, many flood maps sit languishing on the shelf due to issues within municipalities rather than the provincial government.

The challenges faced by municipalities are illustrated in the following example from the City of Edmonton (the provincial capital of Alberta). Edmonton was the first Canadian municipality to publicize a map showing the flood history of specific homes and predictions for future overland flooding due to rain and sewer back-up (Stolte, 2016).[25] However, Edmonton did not willingly disclose this map; rather, it was forced to do so after a freedom of information request and appeal to the provincial government (Stolte, 2016). City officials were reluctant to provide flood maps for fear of homeowners' concerns about declining property values and the City's uncertainty about how to deal with them. In contrast to these concerns, several studies have found that disclosing flood risk only marginally and temporarily reduces property prices (see Henstra & Thistlethwaite, 2018a; Shrubsole, Green, & Scherer, 1997).

Releasing maps could thwart development, slowing down or stopping the growth machine, which has become a dominant strategy and source of income for municipalities in providing utilities, services, and other amenities to residents. If municipalities do not have sufficient income, infrastructure degrades. Indeed, aging infrastructure such as sewer and water treatment facilities is a major contributing factor to increased flood losses across Canada

[25] The Alberta government flood maps indicate risk of flooding from rivers and creeks, not rainfall or sewer back-up which municipal maps may identify.

(Shrubsole, 2000). Deficit spending on municipal infrastructure in Canada was estimated in 2014 at $55 billion ("Insurers zero in," 2014). With reduced funding from provincial governments, it is not surprising that municipalities continue residential and commercial development, even in flood-prone areas, because property taxes are their major funding source (Shrubsole, 2000). The resistance from municipalities to publish flood maps illustrates issues in transparency and accountability, conflicting values and interests, lack of coordination or clarity in roles and responsibilities for different levels of government, and the political and economic power of homeowners and municipal governments to influence decisions on flood maps.

Disappearing location notices on land titles. During a real estate process, property owners in Alberta are not required to divulge information about flood risk, and the flood hazard maps on the Alberta government website are not routinely relied upon (Groeneveld, 2006). However, approximately 80% of municipalities supported the recommendation in the Groeneveld report for a notification system to inform potential buyers that a property is located within a designated flood risk area (Groeneveld, 2006). Reasons provided by several communities that did not support a notification system was that it was a complex process to place caveats on land titles and would require legislative changes. This justification is questionable given that changes to legislation are common.

Adding location notices on land titles about flood risk was among the Redford government's first plans to reduce flood damages in Alberta following the 2013 floods. However, the plan was cancelled within a few weeks of it being announced as a result of feedback from property owners, homeowner associations, the real estate industry, developers, and private industry (GoA, 2013b, 2013c; Komarnicki, 2013). Instead, the real estate industry is entrusted to inform potential buyers. Alberta is the only Canadian province in which the real

estate association does not offer a property disclosure form to identify issues that could influence potential buyers' decisions (Henstra & Thistlethwaite, 2018a). Property disclosure practices vary across the rest of Canada. The property disclosure forms in Manitoba, Quebec, and New Brunswick ask sellers whether the property has been damaged by previous floods. Only Ontario's Seller Property Information Statement includes a question about current flood vulnerability. As noted earlier, in Alberta, a DRP notice will be placed on land titles for homes in the floodway but only if homeowners received DRP assistance. For homes in the flood fringe DRP notices are removed once the minimum mitigation requirements are met. In essence, the level of flood risk is not as transparent as it could be.

The cancellation of flood risk notices on land titles by the Redford government due to pressure and opposition from different stakeholders illustrates how "the change process may be hijacked by actors who are motivated solely by economic or political motives" (Tierney, 2014, p. 123). The concentration of political and economic power in these stakeholder groups who are drivers of growth machine logic in Alberta, and their influence over flood risk decisions, is problematic. The primary concern is that these few stakeholder groups do not represent all Alberta residents who are at risk of flooding, nor all Albertans and other Canadians who are held financially responsible through increased taxes and insurance fees for the decisions of those in powerful positions. This misalignment in risk apportionment creates socially unjust conditions. Even though it is not currently common in Canada, property disclosures to inform buyers about flood risk are part of public policy in many other jurisdictions such as Alaska, California, and Illinois in the United States and the state of Victoria in Australia (Henstra & Thistlethwaite, 2018a). Alberta and other Canadian provinces could look to these jurisdictions for insights on

how to navigate the challenging but not insurmountable practice of property disclosures about current flood vulnerability.

Assessment of the TSA Approach for Flood Risk Governance

In this section, I evaluate the TSA approach and outline its contribution to practice-oriented studies. I focused on components in the TSA approach that Shove et al. (2012) have not attended to, such as actors and institutions; their roles, responsibilities, interactions, and power dynamics; and formal and informal rules. From the three situations and their analysis, in Table 3.1 I identify the following components (and subcomponents) based on the TSA approach.[26] If I had applied a conventional practice-based approach, the analysis would have been limited to practices and the elements that constitute them, such as materials, meanings, and competencies. Applying the TSA approach allowed me to identify actors, who are decentered in practice-based approaches, and by doing so I was able to determine their roles and responsibilities and how they have interpreted and negotiated them, whereas Shove et al. (2012) subsumed roles and responsibilities under practices.

[26] These three situations do not incorporate all aspects of flood risk governance; however, as I demonstrate below, they do provide insights into the social construction of flooding disasters and complexity of flood risk governance.

Table 3.1

Applying the TSA Approach for Analyzing Flood Risk Governance in High River, Alberta

Components of TSA approach	TSA components in flood risk governance identified for analysis
Situations	1. Lack of legislative changes to reduce flood risk. 2. Insufficient updating of flood hazard maps 3. Absence of notification on land titles about flood risk.
Context and structure	Context describes the geography including hydrology. Structure includes institutions and rules.
Geography, hydrology	High River is located in southern Alberta in an alluvial fan, and neighbourhoods such as Beachwood and Wallaceville are located in designated floodway or flood fringe areas.
Rules (formal and informal)	Flood Recovery and Reconstruction Act (Bill 27) to amend the Municipal Government Act, Floodway Development Regulation, Water Act, Land Use Bylaw, Disaster Recovery Program, Floodway Relocation Program, Flood Damage Reduction Program (1975–1999), Disaster Financial Assistance Arrangements Program, National Disaster Mitigation Strategy, National Disaster Mitigation Program, Sendai Framework. Municipalities signing-off on flood maps.
Institutions	All levels of government (federal, provincial, municipal), homeowner associations, developer groups, real estate associations, media corporations, insurance companies, etc.
Actors	Residents, property owners, developers, real estate agents, government officials (bureaucrats and politicians), journalists, scientists, etc.
Agency	Actors interpret and negotiate the rules, roles, and responsibilities and carry out practices.
Roles and responsibilities	Federal government: Responsible for providing federal flood mapping guidelines and funding for flood mitigation projects. Pays for disaster damages. Provincial government: Responsible for managing natural resources, including regulating activities in the waterways and flood risk identification. Pays for disaster damages. Municipal governments: Responsible for considering flood protection in developing their land use bylaws and emergency management.
Interactions (framing)	Top-down (centralized) or bottom-up (decentralized) approaches, collaboration and/or coordination, and conflict and/or competition.
Power dynamics (through practice routes)	The power of municipal governments and nongovernmental stakeholders in influencing the disappearance of flood-risk notices on land titles, suppression of flood mitigation reports, and the languishing of regulations and updated flood maps.
Practices	Flood hazard mapping, developing and enforcing various policies and regulations on development in flood-prone areas (land use), and placing notices on land titles regarding flood risk. Also see Appendix A.
Materials	Flood hazard maps, documents such as the *Provincial Flood Mitigation Report: Consultation and Recommendations* (Groeneveld, 2006) and the *Draft Flood Mitigation Report* (2002, as cited in Groeneveld, 2006), money/funding, and infrastructure such as dikes.
Meanings (frames)	Risk versus safety, fairness, transparency, accountability, property rights, and economic security.
Competencies	Examples of professional competencies include engineering, environment, politics, and so forth. Examined in detail in Dissertation Chapter 4.

My analysis reveals that the informal role of municipal governments, as well as nongovernmental actors such as homeowner associations, the real estate industry, developers, and private industry, played a critical role in influencing the decisions and actions of the Alberta government in ways that prevented or diminished changes critical for reducing flooding risks and damages. This includes practices such as the suppression of the release of flood mitigation reports, the languishing of floodway development regulations and flood hazard map updates, and the disappearance of location notices on land titles warning potential property owners of flood risk. Even though the Alberta government has the legal responsibility for managing floodplains and regulating activities in floodways, and thus has the constitutional power to intervene in municipal decisions, it has been hesitant to take a top-down approach. The political dynamics on-the-ground are such that municipalities and various stakeholder groups hold concentrated political and economic power; therefore, flood risk governance in Alberta has a strong bottom-up influence. These power dynamics would have likely remained obscured if actors, roles and responsibilities, and their interactions had not been empirically investigated. Omitting or downplaying these components illustrates why Shove et al.'s (2012) approach has been critiqued for hindering exploration of power dynamics (Watson, 2017).

Formal and informal rules—legislation, regulations, programs, and plans—are also critical for understanding flood risk governance. Too often rules are subsumed under practices. As I have demonstrated, rules need to be examined in detail because how they are intended often differs from how they are implemented. The difference between intended and implemented rules is often the crux of the problem in disaster management. Hence, a practice lens based on Shove et al.'s approach provides ways to describe and partially analyze the practice routes of emerging, changing, and disappearing but does not account for deliberate attempts by actors to bring new

practices into existence or eliminate them. The TSA approach contributes to practice-oriented studies by proposing the concepts of suppressing and languishing to understand how some practices stay dormant while others become dominant as a result of actors, providing further insights into power relations.

Overall, the TSA approach is an analytical tool that incorporates the ontological concepts missing in Shove et al.'s (2012) practice approach, allowing a more accurate description and comprehensive analysis of flood risk governance. The TSA approach provides insight into the connections, conditions, and causes—including individual actions and organizational strategies—that create consensus, controversies, and nuances that are missing in existing analytical frameworks on flood risk governance. The explanations provided for how and why flood risk governance functions in Alberta align with those provided in the academic literature, such as the evasion of responsibility that creates the circular liability crisis, the growth machine, and the concentration of political and economic power. Therefore, limiting the number of situations to three in this analysis provided sufficient evidence to corroborate explanations from other research. In future research, the TSA approach could be applied to analysis of flood risk governance in other jurisdictions, other types of governances, and other wicked problems.

Conclusion

Studies of, and solutions to, flooding have tended to focus on scientific and technical approaches and have neglected the social dimensions of flood risk governance, where a range of stakeholders are involved in influencing or making decisions. The social constructionist perspective argues that disasters are not natural or uncontrollable; on the contrary, disasters are a consequence of social activities (practices) and how society interacts with nature. There is limited scholarship addressing questions on the social origins of risk and the processes that

enable them to proliferate. To address this gap, I examined the social construction of flooding disasters using a case study of flooding in High River, Alberta.

There are a limited number of frameworks in the literature for analyzing flood risk governance. In this chapter, I tested the TSA approach which I developed (see Dissertation Chapter 2) in order to include components of flood risk governance (actors and institutions; their roles, responsibilities, and interactions; rules) that are not present in other analytical frameworks, such as the practice-based approach by Shove et al. (2012). I examined the practice routes of emerging and disappearing identified by Shove et al., and I extended my analysis by also proposing and examining the important processes of suppressing and languishing. By incorporating the analytical concepts omitted or subsumed under practices by Shove et al. into my TSA approach and proposing new practice routes, my research has provided insight into the social dimensions of flood risk governance that focusing on practices alone would have missed.

I examined three situations identified as problematic by official reports. The first situation described ways in which the Alberta government failed to halt development in the floodway by not promulgating regulations and by suppressing the release of key flood mitigation reports published in 2002 and 2006. The second situation highlighted delays in provincial updating of flood hazard maps and the absence of such maps for numerous flood-prone communities. Not promulgating the regulations and delaying the updates of flood hazard maps are examples of how practices can languish. In the third situation, a plan to place flood risk notification on property titles was cancelled within a few weeks of its announcement, creating barriers for future property owners to be informed about flood risk. This situation demonstrated how a practice can emerge and quickly disappear. In sum, these three situations provide insights into the causes and conditions that contributed to building two High River neighbourhoods in

designated high-risk flood zones and thus how vulnerability to the flooding disaster was socially constructed.

Criticisms have been directed at the Alberta government for failing to address flooding vulnerabilities, as provinces have specific legal and jurisdictional roles and responsibilities regarding flood risk. However, critics tend to miss the complex sociopolitical dynamics on-the-ground. For example, as I noted earlier, even though the provincial government has constitutional power over municipalities (municipalities are '"creatures of the Province'"), the actual dynamics are such that municipal governments have a strong influence over the provincial government (the Province appears to be a creature of the municipalities).

Another power relation revealed through the TSA approach is that of nongovernmental actors such as homeowner associations, the real estate industry, developers, and private industry, who played a critical role in influencing the decisions and actions of the Alberta government. The primary concern is that these few stakeholder groups do not represent all Albertans at risk of flooding, nor all those who are held financially responsible. This misalignment in risk apportionment creates socially unjust conditions. In sum, the influence of municipalities and nongovernmental actors illustrates that power relations in Alberta's flood risk governance manifested as more of a bottom-up (decentralized) approach. But scholars have identified challenges with favouring either centralized or decentralized approaches, and instead advocate for a mixed approach for successful multilevel governance of flood risks.

This research contributes to disaster studies and governance literature by providing insights into the complexities and contestations of flood risk governance that create challenges for policy solutions. The case study of High River also contributes to the limited literature on the sociopolitical aspects of flood risk governance in Alberta, including insights into the power

relations that have resulted in challenges and even barriers to creating changes to reduce flood risks and disaster damages. With a deeper understanding of the social forces that produce flooding disasters, will sufficient actions be taken to address these forces? Or does there need to be a more severe flood in the future to trigger change?

With the forecast of more severe and frequent flooding expected in Alberta (and the other prairie provinces) due to climate change, it is likely that Alberta will again be put to the test. Only time will tell whether there is enough political determination to take actions needed for effectively reducing flood risks and damages or whether Albertans will be subject to what McGillivray (2017, para. 1) describes as the costly cycle of “flood, rinse, repeat.”

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Chapter 4. Making Room for Nature? Applying the Dutch Room for the River Approach to Flood Risk Management in Alberta, Canada

The increasing severity and frequency of flooding worldwide has resulted in growing awareness of the need to shift away from "fighting with water" to "living with water" by making more space for rivers (Warner, Edelenbos, & van Buuren, 2013). One such approach, the Dutch Room for the River (RfR), achieves flood protection by increasing river conveyance through two objectives: improved safety and spatial quality such as environmental protection, aesthetics, and recreational value (Klijn, de Bruin, de Hoog, Jansen, & Sijmons, 2013; Rijkswaterstaat, n. d.). Developed and implemented in the Netherlands in 32 separate projects from 2005–2015, the RfR approach is now heavily promoted internationally by the Dutch as a best practice in flood risk management. There are, however, challenges in transferring this approach to other jurisdictions due to differences in environmental and social contexts (Zevenbergen et al., 2013a, 2013b). River basins are all unique in terms of geology and hydrology; therefore, implementing the RfR approach requires location-specific considerations.

The RfR approach is not just about changes in technology: It also requires a fundamental shift in the way people think about and live with rivers, as well as changes in governance. The successful implementation of the RfR projects in the Netherlands—on time, within budget, and with broad stakeholder support—has been attributed to effective multilevel governance (Rijkswaterstaat & UNESCO-IHE, 2015). Adaptation of the RfR approach to other jurisdictions thus requires an in-depth understanding of the multidimensional nature of this approach as well as the sociopolitical and environmental context to which it is applied.

Interest in the Dutch RfR approach emerged in Alberta, Canada, following the extensive flooding that occurred in the southern part of the province in 2013 (see Figure 4.1 for a map of the area).[1] That year, from June 19–22, a low-pressure system over the Bow and Oldman River watersheds released up to 350 mm of rain onto rapidly melting snow in the Rocky Mountains (Pomeroy, Stewart, & Whitfield, 2016). The resulting flood damage was extensive: 55,000 square kilometres and over 30 communities affected; 125,000 people evacuated; 14,500 homes damaged; five deaths; and over $5 billion in property and infrastructure damage (Alberta Emergency Management Agency [AEMA], 2015). This was the costliest flood in Canada's history and resulted in the first-ever declared state of provincial emergency (AEMA, 2015).

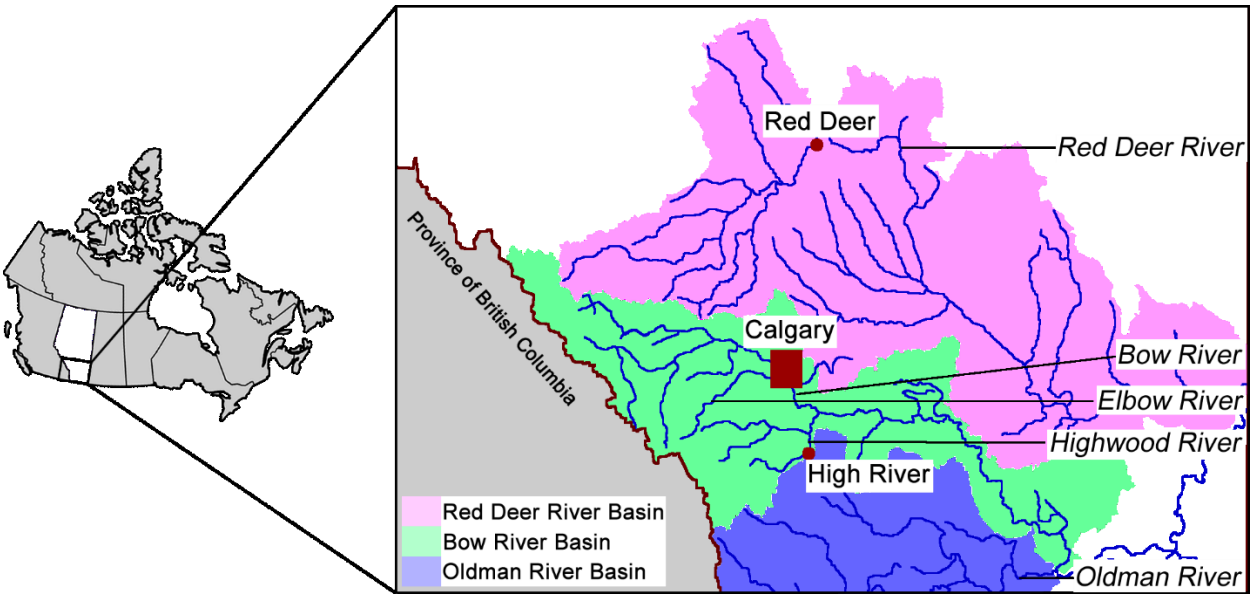

Figure 4.1. Partial map of Alberta, Canada showing the study area and its river basins.

[1] For a map of river basins, visit http://aep.alberta.ca/water/programs-and-services/water-for-life/partnerships/watershed-planning-and-advisory-councils/images/wfl-P-WPACs-map.jpg

The City of Calgary (population 1.21 million) experienced the most expensive damage due to its downtown core being flooded. However, the Town of High River (population 13,584), located 37 km south of Calgary, experienced the most extensive damage: over 10,000 residents were evacuated, 59% of the land was inundated by water, 70% of homes were moderately to severely damaged, and 79 out of 83 buildings downtown were significantly damaged. The Highwood River[2] runs through the town, which has experienced regular flooding since 1894 (AECOM, 2014, as cited in Prinsen, Klijn, & van Duijne, 2015; Rushworth, 2014). Despite this history of flooding, prior to the 2013 flood, several High River neighbourhoods were situated in areas designated as flood fringe and floodway (Government of Alberta [GoA], n.d.; Town of High River, 2018a, 2018b).[3]

The dominant flood mitigation strategy in Alberta has been to build structural defences to resist water and then implement emergency disaster programs if flooding occurs, rather than prevention via avoidance (Bryant & Davies, 2017; Morrison, Noble, & Westbrook, 2018; Pomeroy et al., 2016). Following the 2013 Alberta flood, key policy stakeholders (Hurlbert & Gupta, 2016) and residents of High River (Haney, 2017; Haney & McDonald-Harker, 2016) expressed concern about activities that exacerbate risk such as past and current development practices and the lack of policies to curtail such development. Shrubsole (2013) also noted the lack of regulations to control development, thereby preventing disaster risks and damages. Shrubsole identified that Alberta and Saskatchewan—the major oil-producing provinces—have focused on fighting water with infrastructure such as dams and dikes rather than using nonstructural mitigation such as regulations. In contrast, other provinces have diversified their

[2] The Highwood River is one of the most successful fish habitats in that basin, including for the endangered cutthroat trout, and is thus valuable for nature conservation.
[3] See Dissertation Chapter 3 for definitions of floodway, flood fringe, and flood hazard zone.

flood management strategies. Enforcing regulations is not a politically popular strategy in Alberta, which has been characterized as a pro-industry and pro-development culture (Davidson & MacKendrick, 2004). In Canada, reducing flood risks and damages does not require more technological advancement but rather "a change in the culture and the institutional arrangements for flood risk management at all levels" (Shrubsole, 2013, p. 117).

The high costs associated with the 2013 flood disaster in Alberta and a growing sensitivity to the implications of climate variability resulted in a provincial reassessment of conventional solutions and an exploration of other approaches. Following consultations with government representatives from the Netherlands and the Dutch Deltares Research Institute, the Alberta government approved three RfR pilot projects in the town of High River and the Bow River and Red Deer River Basins.

In this chapter, I examine how the Dutch RfR approach was perceived and applied to flood risk management[4] in Alberta. I also assess the extent to which the RfR approach triggered a shift in policies and practices to reduce disaster risks and damages through nonstructural measures. More specifically, I ask, does evidence point towards more preventative and environmentally sustainable flood mitigation or did business-as-usual continue as characterized by undeterred development in flood-prone areas and reliance on structural mitigation? These are not dichotomous arguments; rather, they represent options on a scale of change and present two possible explanations.

[4] Flood (risk) management encompasses specific policies and practices developed to prevent, manage, and reduce the impact of disasters and across the four disaster phases: preparedness, response, recovery, and mitigation. Flood risk governance includes flood management but is a broader concept in that it incorporates how actors interact with and influence one another when developing and implementing decisions.

I draw on the threaded situation analysis (TSA) approach, the theoretical framework I developed (see Dissertation Chapter 2), with a focus on frames (images or mental models), framing (the process of creating frames through social interactions),[5] competencies of stakeholders, and practices. I also draw on models of policy transfer. I analyzed data gathered through key informant interviews and observation (conducted in Alberta and the Netherlands), media articles, and policy documents (legislature transcripts, policy briefs, reports). I explore the extent to which four main features of the RfR approach were adopted in Alberta: (a) shifting away from mega-infrastructure, (b) making space for rivers, (c) moving people, and (d) regulating floodplain development.

The results of this research point to the critical importance of examining how frames and framing shape flood risk management policies and practices. Both the social and technological aspects of the Dutch RfR have been studied extensively but there is limited comprehensive and peer-reviewed research on transferring the Dutch RfR approach to other countries (Warner et al., 2013; Zevenbergen et al., 2013a, 2013b). As of writing this chapter, there are no peer-reviewed studies on the RfR projects in Alberta and only limited peer-reviewed research on the social dimensions of flood risk governance in the province.

The remainder of the chapter proceeds as follows. First, I provide an overview of the theoretical approach by examining literature on the role of frames/framing in disasters and policy transfer. Next, in the methodology section, I describe my research methods and how the various viewpoints were collected: (a) Albertans' perceptions of the provincial RfR projects, (b) Albertans' perceptions of the Dutch RfR approach, and (c) Dutch feedback on Albertans'

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[5] *Frames* and *framing* are often used interchangeably in the literature but in this chapter, I draw on Dewulf et al. (2009) to differentiate between them (see Dissertation Chapter 2).

perceptions on both points. The findings section is organized according to the four main features of the Dutch RfR as described above. In the discussion section, I assess the extent to which applying the RfR approach triggered a substantial change in Alberta's flood management in terms of geography, ideology, and policy.

Theoretical Framework

Flooding is a wicked problem: Its causes and consequences are embedded in complex sociopolitical contexts involving diverse stakeholders, interests, and beliefs that shape how problems are perceived or framed (Lach, Rayner, & Ingram, 2005), and thus influence which policies are adopted and subsequently implemented. Identifying the stakeholders involved in the framing process and the underlying relations of power is critical to understanding why certain solutions are implemented over others (see Cairney, 2012). In this section, I summarize the literature on frames/framing as a theoretical lens used in disaster and policy studies.

Frames/Framing in Flood Risk Management and Disaster Studies

Frames are images or mental models that filter people's version of reality such as through perceptions and ideas and are used for sense-making and sharing meanings.[6] Frames are constructed by selecting or highlighting some aspects of reality while obscuring or concealing others "to construct an argument about problems and their causation, evaluation, and/or solution" (Entman, 1993, p. 53). Particularly in problematic situations that are "vague, ambiguous and indeterminate" (Schön & Rein, 1994, p. 26), specific features are selected and woven into a coherent story (Schön & Rein, 1994; van Hulst & Yanow, 2016). Schön and Rein (1994) have

[6] Frames can be defined as, and captured by, perceptions, ideas, beliefs, ideologies or worldviews, paradigms, visions, metaphors, culture, norms, knowledge, thoughts, opinions, language, narratives, discourse, among other concepts (Cairney, 2012, pp. 223–224). Not all scholars agree with bundling all of these concepts into frames (see Borah, 2011) but for the purpose of this chapter, some are bundled into frames.

identified five main types of frames that underlie policy: (a) rhetorical frame—the underlying argument and persuasive storytelling; (b) action frame—influences policy practice and implementation (action and rhetorical frames may differ); (c) policy frame—consists of action frames used by institutional actors to construct the problem of a particular policy situation; (d) institutional frame—a more general action frame that institutional actors use to develop policy frames, and that tend to be complex and to consist of elements from both the institution and individual actors; and (e) metacultural frame—broad systems of cultural beliefs that shape rhetorical and institutional frames, often communicated as generative metaphors. Examples of metacultural frames are that floods are caused by the "wrath of Mother Nature" rather than being human-induced, as well as the theories and paradigms described below.

There are two opposing foundational theories in disaster studies. The original but still prevalent *structural functionalist* perspective frames disasters as natural, unforeseeable events caused solely by earth and atmospheric incidents (Freudenburg, Gramling, Laska, & Erikson, 2009; Perry, 2007; Quarantelli, Lagadec, & Boin, 2007; Webb, 2007). The likely solution according to this perspective is to control the river through *structural mitigation* (policy frame), such as dikes or berms,[7] dams, and diversions (action frame). In contrast, the more recent and less prevalent *social constructionist* view argues that disasters occur due to how society interacts with nature through various practices. Natural processes (like flooding) turn into disasters when there is an increase in vulnerability due to poor planning and design (Haque & Etkin, 2007; Mileti, 1999). For example, Freudenburg et al.'s (2009) seminal research on Hurricane Katrina exposed underlying historical, political, economic, and engineering factors, including

[7] Dikes, berms, and levees are often used interchangeably to describe flood mitigation structures. Berms and levees are raised embankments made from excavated land or human construction, whereas dikes are built by digging a ditch and leaving the excavated materials in a mound (Alberta WaterPortal, 2018).

development in flood-prone areas in New Orleans and lack of maintenance of levees, resulting in the hurricane event becoming a catastrophe. If flooding is framed as a result of poor land-use and building practices (rhetorical frame), then the likely solution is to change those practices via *nonstructural mitigation* (policy frame). Nonstructural mitigation addresses the social dimensions of disasters, such as risk perception, historical development paths, institutional structures, and governance processes, all of which play vital roles in reducing disaster risks and losses (Mileti, 1999; Shrubsole, 2013). Nonstructural approaches can be divided into two types of mitigation (and their respective practices): (a) *social mitigation,* such as regulations (land use and building codes), relocation, education and awareness, prediction and warning systems, and capacity building; and (b) *natural mitigation*, such as wetland protection and active flood plains (National Research Council, 2006).

Whether structural or nonstructural mitigation solutions are promoted reveals further insights about human–nature interactions that can be analyzed through the metacultural frames (or worldviews) of the *human exemptionalism paradigm* (HEP) and the *new ecological paradigm* (NEP) developed by environmental sociologists Catton and Dunlap (1978), and described in Table 4.1.[8] The HEP prioritizes humans over other species and nature and considers them as separate, leading to the belief that problems can be solved through technology, such as fighting water with structural mitigation. However, physical infrastructure is expensive and can lead to technological lock-in, inhibiting adaptation to rapidly changing conditions due to climate change and a growing population (Wesselink et al., 2015; Zevenbergen et al., 2013b). Furthermore, the presence of flood mitigation structures reduces perception of flood risk and can even result in the

[8] Several assumptions distinguish NEP from HEP. However, in this chapter, I focus on the differences in how stakeholders assign value to humans and nature as well as in their attitudes towards the role of technology in addressing environmental problems such as flooding.

levee effect[9] (or control paradox), whereby lands behind these mitigation structures are developed because they now appear safe (Hutton et al., 2017; Motoyoshi, 2006, as cited in Zevenbergen et al., 2013a).

Table 4.1

The Relationships Between Structural Functionalism, Social Constructionism, HEP, and NEP

Characteristics	Structural functionalist theory	Social constructionist theory
Description of theory	Society is composed of many parts that must work together for the larger societal structure to function. The emphasis is on social structures such as institutions.	Individuals interact with society recursively to make sense of their lives and to create meaning. Therefore, frames and narratives influence how they act and organize. The emphasis is on social interactions.
Dependent and independent variables	A disaster (independent variable) impacts the social order/structure (dependent variable).	The social order/structure (independent variable or causal force) influences a disaster (dependent variable).
Rhetorical frame	Disasters are caused by nature; they are unforeseeable events caused solely by earth and atmospheric incidents.	Disasters are caused by human nature and are socially produced; social vulnerability is increased through poor decisions.
Problem frame	Rivers impose on people.	People impose on rivers.
Solution frame	Control rivers.	Control where and how people live.
Policy frame	Fight water.	Live with water.
Policy frame	Structural mitigation measures	Nonstructural mitigation measures (natural and social mitigation)
Examples of practices (action frames)	Build dikes, dams, and diversions.	Enact regulations, relocate development, and protect floodplains.
Metacultural frame	Human exemptionalism paradigm (HEP).	New ecological paradigm (NEP).
Human-nature interaction/value	People are separate from nature.	People are part of and dependent on nature.
Role of technology	Technology can fix environmental problems.	Technology can intervene in environmental problems to a limited degree but can also create additional problems.

[9] The levee effect was coined by Gilbert White in 1947 and is well documented (Hutton, Tobin, & Montz, 2017).

HEP and structural functionalism are both fundamentally anthropocentric (Catton & Dunlap, 1978). Nature is perceived as extraneous to society and as an extraction source, advocating for unlimited progress at the expense of nature. Juxtaposed with the HEP, the NEP recognizes humans as part of and dependent on the finite biophysical environment, and while they can intervene to shape or stretch natural resources (such as with technology), this paradigm acknowledges that ecological realities will ultimately limit human activity and constrain economic growth. A living with water approach using social and natural mitigation closely aligns with the NEP.

Another concept that can be tied to structural functionalism is *ecological modernization* discourse (rhetorical frame), which states that nature and unlimited growth/economic development do not need to conflict and can be mutually beneficial, especially with technological advancements (Fisher & Freudenburg, 2001; Spaargaren & Mol, 1992).[10] Ecological modernization discourse appears to borrow from both NEP in terms of people and nature being in harmony as well from HEP in terms of fixing problems from technology. However, NEP and HEP are fundamentally incompatible paradigms. Ecological modernization

[10] Ecological modernization (EM) theorists argue that the growth model of capitalism is possible, and even desirable, and environmental limits and problems can be overcome with technological innovation and market mechanisms (Foster, 2012). Moreover, ecological crisis is not a real barrier and can even inspire further advancements in modernization. Through his examination of the relationship between HEP and EM discourse, Foster (2012) develops a powerful critique that EM has facilitated the morphing of HEP into a form of "new exemptionalism" (p. 212) that incorporates "reflexive" development (society reacts automatically to emerging conditions through industrialization that is self-improving and self-perpetuating). EM/new exemptionalism scholars criticize those in the environmental sociology traditions and oppose ecocentric approaches. The result has been that EM/new exemptionalist proponents threaten the progress made by NEP scholars who raise concerns about the growing planetary crisis through the following actions: denying the scale of environmental issues (but without supporting empirical evidence), challenging the socioecological foundations of environmental sociology as a discipline, and negating the core argument of NEP and critical human ecologists for a just and sustainable society. The EM discourse supports the status quo by conforming to the existing vested interests of dominant institutions and political and corporate elites who are advocating for unlimited growth of capitalism and who are opposing regulation, which might be viewed as a threat to the accumulation of capital. For a genealogical analysis of the evolution of EM from modernization theory and incorporation of structural-functionalist concepts (such as rationalization, individualization, and positivism), see Foster (2012).

discourse has gained popularity among scholars and policymakers, but it can serve as a symbolic political strategy to conceal tensions and contradictions in a policy issue whilst giving the impression that certain goals have been achieved (Edelman, 1964, as cited in Davidson & MacKendrick, 2004). It is important to note that such strategies in political discourse can become powerful enough to exclude discourses that reveal tensions between economic development and environmental protection in order to maintain the status quo of supporting limitless growth (also see Footnote 10).

Contemporary scholarship on risk management emphasizes the importance of perceptions (e.g., frames) in influencing the response to risk management practices. Yet, many studies lack sufficient evidence in linking perceptions and practices (see Thistlethwaite, Henstra, Brown & Scott, 2018). For example, Birkholz, Muro, Jeffrey, and Smith (2014) pointed out that most studies on risk perception fail to examine the "interface between perceptions and management/intervention" (p. 14) in a substantive way to capture nuances, contestation, and experiences. To understand how abstract perceptions and ideas take shape on-the-ground, I looked to the literature on power and policy.

The Role of Frames/Framing in Policy Shifts

Analyzing perceptions and ideas as static frames is insufficient for explaining social change. Rather, identifying the actors who are doing the framing and their corresponding strategies is critical for understanding policy-making and implementation (see Cairney, 2012). Actor coalitions can form around specific storylines (Hajer, 1995, as cited in Davidson & MacKendrick, 2004), including within government, such as politicians, managers, and planners, and outside of government, such as lobby groups (Schön & Rein, 1994). Moreover, the public's reaction to initial frames can influence how the government revises them. Over time, certain

versions of reality become dominant and get repeated in the media (Entman, 1993), excluding or occluding alternatives, which limits the range of debate and constrains the democratic public sphere.

Both frames and framing need to be considered when analyzing public policy (Béland, 2009; Surel, 2000). As frames are persuasive devices that can be used as a political tool, "reframing can be a powerful way to change the direction of policy and practice" (Wesselink & Warner, 2010, p. 6). Yet, how problems are defined in the policy-making process is frequently taken for granted or unscrutinised but can be examined through frame reflection (Schön & Rein, 1994). There is, however, little research on the frame production process and on mixed frames (Borah, 2011). The link between frames/framing and power is also often neglected, especially in media analyses (Carragee & Roefs, 2004). Frames play out in various policy forums such as meetings, legislatures, and media outlets (Schön & Rein, 1994). Within these forums, identifying frames can be challenging as they are not necessarily explicitly stated, multiple or nested frames can sometimes conflict, and frames can also shift. Furthermore, the power dynamics between stakeholders (framing) tend to be invisible but can be revealed by analyzing frame conflicts (Schön & Rein, 1994). *Policy frame analysis* thus examines certain ideas or images whereas *policy framing analysis* explores the process by which a policy issue is framed and the relations between actors framing the issues (van Hulst & Yanow, 2016).

There is extensive literature on policy transfer or adoption but much of it lacks comprehensive, evidence-based examination (see Minkman, van Buuren, & Bekkers, 2018). I focus on two empirical models. First, in the multiple streams approach, Kingdon (1984) identified three aspects that need to come together: the problem stream in which a policy problem is highlighted and framed in a specific way, the policy stream in which a solution to that

problem is presented, and the political stream in which the political conditions are described as conducive to action. More specifically, the political conditions consist of policymakers who are attuned to the problem and the proposed solutions, and who are also considering factors such as their own beliefs, the social mood, feedback from interest groups and political parties, and sometimes changes in political parties (Cairney & Jones, 2016). Kingdon has argued that all three streams must be present to create the political conditions for policymakers to have both opportunity and motive to create a new policy. Disasters can create such opportunities for policy change by opening a "policy window" (Kingdon, 1984, p. 174).

Second, in the policy transfer model, Minkman et al. (2018) categorized the *outcomes* of the policy transfer process in terms of adoption (successful or formal) and nonadoption. Successful adoption occurs when there is a completed transfer process in which policymakers have adopted the policy. On the opposite end of the spectrum is nonadoption, a situation in which transfers were considered but not initiated or initiated but cancelled before completion. Between the two extremes of policy transfer is formal adoption, in which the policy was formally adopted but not implemented or enforced. Minkman and colleagues also identified the following policy transfer *types* or adoption mechanisms: adaptation, imitation, or inspiration.[11]

Methodology and Methods

In developing this qualitative case study, I gathered data from four main sources: interviews, observations, policy documents, and media articles. In 2015, I conducted research in

[11] Adaptation is the incorporation of a basic model with some changes. Imitation is also known as copying or mimicking. Inspiration is creating new policies based on aspects of policies from elsewhere and can result in a hybrid system (Minkman et al., 2018).

Alberta, including face-to-face and telephone interviews (n = 38),[12] two interviews included tours of High River and surrounding areas. I also observed three flood anniversary ceremonies. In 2017, I travelled to the Netherlands to learn more about the Dutch RfR Program and to conduct additional interviews (n = 11). I also presented the findings from my research on Alberta's implementation of the RfR approach and preliminary findings of my research on the Dutch RfR at three research venues in the Netherlands, and asked participants (n = 65) for feedback through a series of discussion questions in these group interviews.[13] Conducting these presentations and discussions provided clarification on the practicalities of implementing the Dutch RfR program, which are sometimes obfuscated in the promotion of this approach (leading to idealistic or impractical views), and also provided validation of some of the research findings. While in the Netherlands, I also toured four RfR projects.[14]

Interviews in both jurisdictions included topics related to perceptions and practices of flood management and flood risk governance. Interviewees were chosen based on their decision-making or advisory roles in flood management, including representatives from government (federal, provincial, municipal), community-level organizations, scientific institutions, media, and the private sector. I categorized interviewees into professional communities of practice based on their employment title and/or their areas of competencies, with up to two main specializations: bureaucracy (B); communication (C); development and building (D); economics and money (Ec), which included insurance; emergency management (Em); engineering (Eg);

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[12] I conducted 35 interviews; some had more than one participant. Alberta interviewees were familiar with the Dutch RfR based on media articles, speaking with Deltares, and their own research and experiences (e.g., Alberta WaterPortal, 2017).

[13] The group interview participants self-selected by attending the presentations which were promoted through the organizations where the events were held.

[14] Dutch interviewees and others provided me with tours of the following RfR projects: Rivierenland, Overdiepse Polder, IJssel Delta South, and Nijmegen. I did not interact with residents in these areas.

politics (P); land use (L); management (Ma); environment (Ev); and other (O). (See Appendix G for more details.) To keep interviewees' identities confidential, I have labelled quotes using a format starting with the interview number (e.g., 01), then the location of Alberta (AB) or the Netherlands (NL), followed by the designation for each specialization. Group interviews (GI) from the Netherlands are labelled as #-NL-GI.

I also analyzed secondary data on the 1995, 2005, and 2013 floods in High River from 18 official reports (2006–2018), 57 media articles (2006–2018), and 78 legislative documents (1995–2018), along with additional supplementary materials relevant for understanding the opportunities and challenges of implementing RfR projects in Alberta (see Dissertation Chapter 1). More details on the selection and analysis of secondary data sources is available in Appendices H to M.

To analyze data, I drew on my TSA approach (see Dissertation Chapter 2). A *situation* comprises actors, practices, and context/structure and their interplay. Each of these three main components is a function of other subcomponents. Practices are constituted by the materials used, the meanings (frames) imbued in that situation, and the competencies or specializations that actors rely upon. Actors have agency,[15] often take multiple roles in their personal and professional lives, interact with others (framing), and, in doing so, enact relations of power. Structures, in contrast, consist of institutions (political, legal, economic, scientific, etc.), are guided by rules (legal and social norms), and are bounded within certain physical contexts such as geography (including hydrology).

[15] The definition of agency varies but, in this chapter, it refers to the capacity of actors for action or intervention by interpreting, improvising, and reshaping aspects of the social structure: agency is a form of power.

In this chapter, I mainly focus on frames to clarify meanings. I explore framing in terms of actors agreeing or disagreeing with each other on frames thereby revealing power dynamics between actors or their professional communities of practice. I examine institutional structures, such as provincial and municipal governments, and their policies, regulations, and preferred flood risk management practices. While the TSA approach provides tools for systematically *describing* and *analyzing* the complexities of flood risk management and governance, it is limited in its ability to *explain* changes (or lack thereof) in policies.

To better understand how the Dutch RfR has been applied in Alberta and whether it has resulted in changes in flood risk management, I drew on aspects of the two empirical models for examining policy transfer outlined in the theoretical framework section of this chapter. I analyzed frames by examining problem definition and remedy (solution) promotion, drawing on Entman (1993) and Kingdon (1984), and categorizing them into the five main types of frames identified by Schön and Rein (1994). I analyzed framing by examining whether actors agreed with or contested frames to gain insight into power dynamics, including differences between expertise and stakeholder groups, and how these interactions shaped the political conditions (Kingdon, 1984; Schön & Rein, 1994). In my analysis I assessed whether the transfer of the Dutch RfR resulted in policy adoption or nonadoption based on Minkman et al.'s (2018) criteria.

Results and Analysis

In this section, I provide details about Alberta's three RfR projects and then explore the extent to which the four main features of the RfR approach were implemented: (a) shifting away from mega-infrastructure, (b) making space for rivers, (c) moving people, and (d) regulating floodplain development. For each feature, I present findings on Albertans' perceptions of the three provincial RfR projects, Albertans' perceptions of the Dutch RfR, and feedback from the

Dutch on Albertans' perceptions. I compare how these features were framed and by whom, the types of frames applied, and whether these frames aligned or conflicted with one another to examine power dynamics. As such, I retrace the steps of how problems are defined, which solutions are proposed, and what political conditions surrounded the policy process for flood mitigation (Kingdon, 1984; Rein & Schön, 1977).

Alberta's Room for the River Projects

In the fall of 2013, representatives from the Netherlands (including Deltares) met with the Alberta government and nongovernment representatives to author the report *Background and Assessment of Possibilities for Dutch–Canadian Cooperation* (Morris, ten Wolde, Liu, & Diaz, 2013). A year after the flood, the Alberta government signed an agreement with Deltares to provide advice on flood mitigation strategies (Delta Programme Commissioner, 2014), leading to a report with recommendations for the Highwood River and critique of proposed projects by two Alberta engineering companies (Prinsen et al., 2015). Deltares also designed the stakeholder engagement for the Bow River Basin (BRB) and the Red Deer River Basin (RDRB) RfR projects which were facilitated by Alberta WaterSmart, an engineering consulting firm (referred to as WaterSmart in this chapter).

The Bow and Elbow Rivers flow through Calgary and are part of the BRB. The Highwood River is also part of the BRB but is excluded in the BRB RfR project. Initiated shortly after the 2013 flood, the purpose of the High River RfR pilot project was to enhance the conveyance capacity of the Highwood River by reshaping it, building and strengthening dikes, and removing two neighbourhoods and other obstacles (GoA, 2014a; Prinsen et al., 2015).[16] In the winter of 2015, a BRB RfR workshop was held (Alberta WaterSmart, 2015b) with the goal of

[16] For a complete list of flood mitigation projects in High River, see Town of High River (2015b).

testing whether the RfR philosophy and its concepts were applicable in Alberta, which was confirmed. The following summer, the RDRB RfR project (Alberta WaterSmart, 2015a) was initiated to ensure that the findings from the BRB RfR workshop were not an anomaly and to refine the process. The conclusion was that the RfR philosophy and concepts were also applicable to other basins. The BRB and the RDRB projects were only conceptual and have not been implemented (as of 2018). Nevertheless, these two river basin projects are important because they demonstrated that in terms of stakeholder engagement,[17] as well as identifying and prioritizing possible projects, the RfR approach is applicable to other watersheds in Alberta and has the potential to be scaled up geographically. In contrast, the High River RfR project was implemented and is therefore my central focus.

The Alberta government (2013b) announced the Floodway Relocation Program in August 2013, offering to buy out approximately 250 homes located in designated floodway zones across the province: 102 homes in High River and 50 homes in Calgary were eligible for relocation, totalling 60% of eligible homes. Plans to return the neighbourhoods of Wallaceville and Beachwood in High River to "undeveloped states" (Town of High River, 2014, p. 6; Town of High River, 2018a, 2018b) were underway by December 2013; however, these mitigation measures were not labelled as RfR approaches until 2015.[18] In addition to the relocations, by the

[17] The decisions to relocate two neighbourhoods in High River were made quickly by the Alberta Government and High River's town council without meaningful public engagement (Bogdan, Bennett, & Yumagulova, 2018). In contrast, the BRB and RDRB RfR projects included in-depth dialogue and collaboration through workshops involving specific stakeholders (technical working groups, watershed groups, and user groups). However, the public was able to provide limited feedback on the draft basin project reports. Public engagement plays an important role in the Dutch RfR approach, but a detailed examination is outside the scope of this chapter. Nevertheless, public engagement is worth noting here because it shapes the political climate in which policies are made and implemented.

[18] The process of retroactively framing the relocation of two neighbourhoods in High River as RfR projects is further explored in terms of frame effectiveness (Bogdan, in progress).

fall of 2014, two Alberta premiers had announced different diversion plans and a dam for High River.

In summary, these RfR projects (along with other flood mitigation projects) were a mix of starts and stops with mixed messages from different stakeholders, which can be partially attributed to Alberta having four premiers between 2013 and 2015: Alison Redford, Dave Hancock, and Jim Prentice, all of the Progressive Conservative Party, which was in power in the province for almost 43 years, followed by Rachel Notley of the New Democratic Party.

Shifting Away From Mega Infrastructure?

The Dutch RfR approach shifts emphasis away from controlling rivers with expensive infrastructure towards nonstructural mitigation. Counter to the RfR approach, mega-infrastructure solutions were proposed by an expert advisory panel appointed by Alberta Premier Redford (GoA, 2013c) five months after the flood: a diversion and a dam for High River[19] and the Springbank dry dam for Calgary's Elbow River (GoA, 2013a; Howell & Markusoff, 2013). The announcement stated: "The Redford government is taking action to *protect* Alberta families and taxpayers from future floods by committing to major mitigation projects on the Highwood and Elbow Rivers" (GoA, 2013a, para. 1, emphasis added). In this story, the government is the protagonist who solves the problem of future floods (antagonist) with structural solutions (policy and action frames). However, not everyone agreed with this storyline. Alberta interviewees feared that the mega-infrastructure announcements had reduced people's "appetite for buyouts" (22-AB-EvC) and for other nonstructural solutions. Furthermore, interviewees characterized the large-scale infrastructure decisions as typical of the Alberta government's historical approach to

[19] The discussions focused on the diversion rather than the dam in High River; as such, the dam is out of scope here.

environmental resource management, which has prioritized development over conservation (institutional frames), and they were critical of this approach for the following two main reasons.

The first criticism by Alberta interviewees was that the Alberta government oscillated between an "ostrich head in the sand" (20-AB-LEv) mentality for permitting development in floodplains and short-term, "knee-jerk" reactions (13-AB-EvC; 20-AB-LEv; 21-AB-EnEv). As a critical rhetorical frame, interviewees and other water experts played on the concept of the hydrological cycle and sarcastically referred to these oscillations as the "hydro-illogical cycle" (Murray & Francois, 2014, para. 2). In the Netherlands, short-term "knee-jerk responses" (Zevenbergen et al., 2013b, p. 1222) were also common in the past but the Dutch learned that engineering solutions can lead to technological lock-in (Wesselink et al., 2015; Zevenbergen et al., 2013b). Albertans commended the Dutch for recognizing that fighting water is a "false war" (19-AB-EcMa), which Dutch participants clarified is accurate only for river flood risk management in specific locations and that coastal flooding is still, and will continue to be, heavily managed by mega-dams.

The second criticism was that these mega-infrastructure projects were a power maneuver to fulfill politicians' ambitions for gaining more votes. Announcements of the projects for High River and Calgary were first made by Premier Redford just days before a leadership review (which she lost) and then were repeated within three weeks of Jim Prentice becoming premier and three days before he called a byelection.[20] Typically, mega-infrastructure solutions are recognized as providing "reassurance—and the political pay off—that more nuanced strategies do not" (Bozikovic, 2015, para. 61). Here, the announcements may have been expedited to

[20] The byelection took place in several constituencies in Calgary where many voters' properties had been damaged in the 2013 floods (McClure, 2014).

provide Albertans with reassurance against future flooding during a time when emotions of fear and loss were still heightened.

But the announcements about the mega-infrastructure projects were met with criticism for not following due process for environmental assessment, technical studies, cost–benefit analysis, or stakeholder engagement (Howell & Markusoff, 2013; Offin, 2014; S. Wright, 2014).[21] These criticisms were particularly strong regarding the Springbank dry dam for Calgary, which Premier Prentice described as "an innovative 'Room for the River' dry reservoir" (GoA, 2014c, para. 4). The Springbank dry dam was not described as an RfR project by any other political figure or in documents by the Alberta government, WaterSmart, or Deltares as an RfR project, and thus the mislabelling was suspected as a political strategy to increase buy-in and pre-empt opposition.[22] It was argued that Premier Prentice's announcement "plac[ed] political expediency before sound policy-making" (McClure, 2014, para. 28). For some Albertans it was a "slap-dash" decision that they contrasted with the "thoughtful transformation" (S. Wright, 2014, para. 11) of the Dutch RfR project in Nijmegen, which involved extensive stakeholder engagement and created a unique urban park, winning numerous awards.

Another reason why some Albertans suspected these decisions were motivated by personal political ambitions was that the expert advisory panel consisted of engineers and architects who were prominent members in the business community. Their mega-infrastructure solutions were perceived as a "conflict of interest" (22-AB-EvC). One interviewee observed:

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[21] Premier Redford's announcement noted that cost–benefit analyses still need to be finalized, whereas Premier Prentice's announcement omitted the need to revisit cost–benefit analyses and instead approved the next steps of environmental assessment and public consultation.

[22] Dry dams, also called off-site detention or off-stream retention measures, make room for water by storing it but do not make space for rivers as functional ecosystems.

> The province engaged an expert panel . . . [who] took a very *aggressive* approach to flood mitigation. . . . They made some really *good friends* and *enemies* because they were presenting that you could somewhat *control the river*. You could hold it all back with lots and lots of upstream structures, dams, which is unusual in a province like ours that tends to *love our headwaters and our wildlife, our rivers*. . . . I think it gave a focal point to stimulate discussion. . . . It got people active and informed and vehement in their position of support. It was quite polarizing. (19-AB-EcMa, emphasis added)

This quote captures how the announced solutions exacerbated the existing divisions in Alberta between stakeholders promoting a structural mitigation to control the river (congruent with HEP) and those advocating for less invasive, nonstructural solutions such as natural mitigation (congruent with NEP), which resulted in mixed frames and messages about flood risk mitigation. It is worth noting that most of the critics of structural mitigation specialized in the environmental sciences and economics/insurance, illustrating conflicting foundational paradigms. Next, I delve into whether infrastructure solutions prevailed or whether space was made for rivers.

Making Space for Rivers?

As indicated in the previous section, the Dutch RfR promotes making space for rivers, including reducing or moving dikes. In addition to the Floodway Relocation Program (GoA, 2013b) described above, Premier Redford announced a dam and diversion for High River in November 2013. The mayor of High River, Craig Snodgrass, was initially wary about the south diversion, which would require a long concrete channel as a form of structural mitigation, citing concerns (rhetorical frame) about impacts on downstream communities (Howell & Markusoff, 2013). Then, in 2014, he fully supported the diversion ("Snodgrass happy with diversion funding," 2014). The mayor exclaimed: "That's the one thing I'm very confident on" ("Mayor Snodgrass confident about mitigation plans," 2014, para. 3). But in 2015, the mayor withdrew his support, echoing the conclusion of Deltares' report that the diversion (and dam) proposed by the Alberta engineering companies "doesn't make sense fiscally or environmentally" (Howell,

2015, para. 7). Diversions (and dams) have the opposite effect of making space for rivers. The mayor's flip in rhetorical and action frames from the diversion to an RfR approach is exemplified in his statement:

> There are things that we can do better and not be spending *ludicrous* [amounts of money] a lot of people want to see, you know they're angry at the river they want to just see big earth movers go in and ramrod this thing and that's a *ridiculous* way of dealing with this. How about we quit building in the river? (Snodgrass, as cited in de Castillo, 2015, para. 8, emphasis added)

Some interviewees suggested the mayor (politics as specialization) flipped frames for political reasons, and the switch created mistrust about personal motives. Regardless of the substantiation of these suspicions, the key point is that Deltares' recommendation for an RfR approach to allow more water to flow through the town conflicted with the diversion that many residents had already settled on, affirming concerns that initial structural solutions can impede the adoption of nonstructural solutions.

To alleviate residents' concerns, the mayor stated: "Don't get stuck on the diversion word as that being the Holy Grail of that having to happen for High River to be protected. . . . We are very, very well protected now" (Snodgrass, as cited in Rushworth, 2015, para. 40). As this quote suggests, High River seemed to be back on track to an RfR approach by moving away from the diversion (and dam). However, in this same press release (Rushworth, 2015), the mayor repeatedly stressed that the flood-mitigation efforts would also involve "highly engineered structures" (para. 32) such as berms and dikes (an action frame) and that the town was safe (indicating a rhetorical frame): "High River is the most well protected town from flooding in Alberta, if not Canada" (para. 36). In fact, as shown in Figure 4.2, the Highwood River is mostly confined with 12 dikes and berms (proposed, currently being constructed, and existing) reaching from one end of the town to the other (Advisian Worley Parsons Group, 2017). That is a

substantial amount of additional infrastructure imposing even more control over a river that has not only frequently overflowed its banks but has also historically jumped channels.

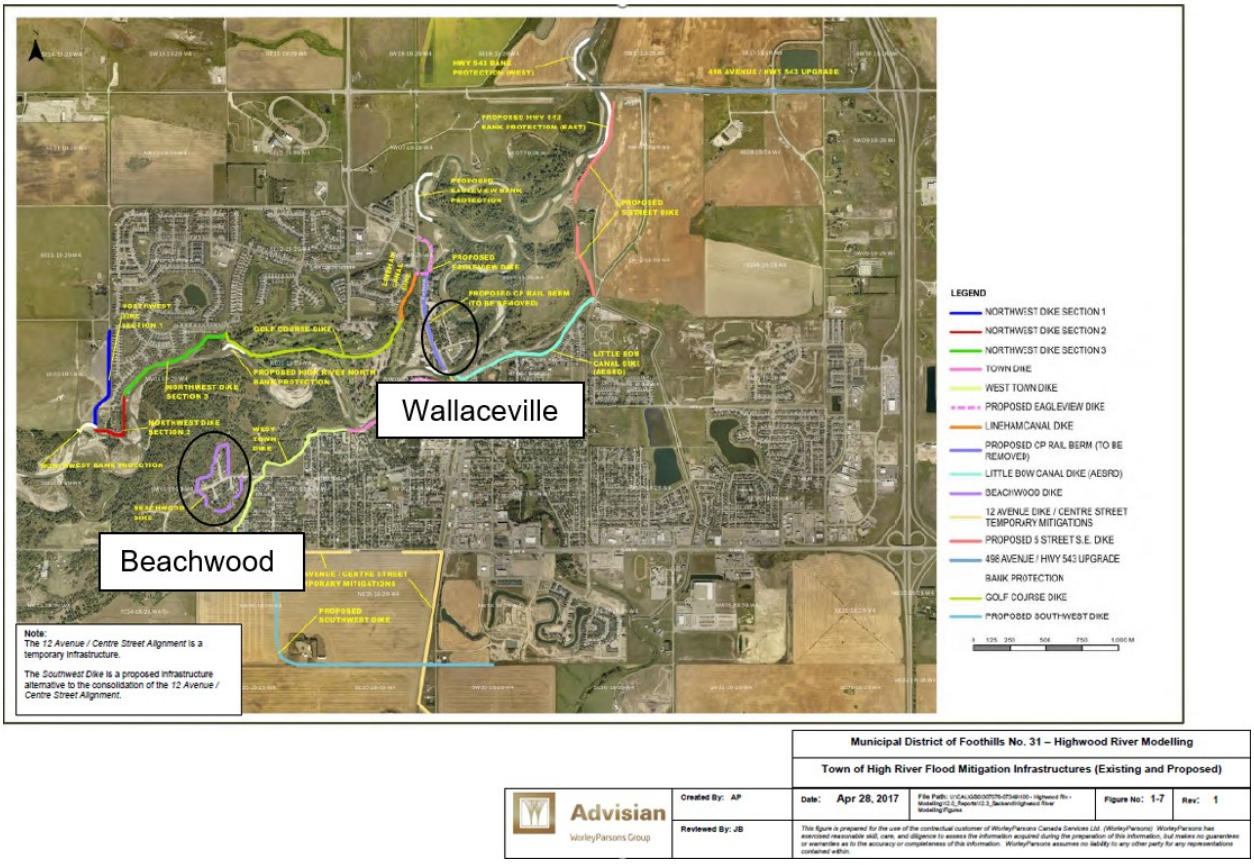

Figure 4.2. Town of High River flood mitigation infrastructures modified to indicate Beachwood and Wallaceville. [23]

At the one-year flood anniversary, the mayor reiterated his stance: “It’s not the river, it’s us. We create our own problems” (as cited in Howell, 2014, para. 26), which could be interpreted as a shift to living with water (a NEP worldview). The mayor’s rhetoric suggests that development is the problem, and actions were taken to remove the two neighbourhoods in the

[23] From *Highwood River Modelling Flood Mitigation Effects Assessment* by Advisian Worley Parsons Group, 2017, p. 67. Copyright 2017 by Advisian Worley Parsons Group.

flood zone. At the same time, the diversion was being replaced with a large berm (Town of High River, 2017b), and within one year of the flood, eight kilometres of dikes had already been built for fighting water with technology (a HEP worldview). The mayor revealed an opposing rhetoric in a subsequent quote on how the dikes and other actions taken to control the Highwood River with infrastructure increased people's confidence about safety, suggesting that the river is also the problem:

> The number one item we [council] had on our plate was to *secure* the *confidence* for our residents, that their homes, their lives, their investments were *safe* and putting in these berms and dikes and all these measures, the decisions we've made, we've seen a real *change in the attitudes* of people in High River. . . . Now that they can physically see it and we're standing on top of finished dikes, now it has changed everything. (as cited in "Dikes and berms everywhere," 2014, paras. 2–3)

These mixed frames developed within one year and originated from a single stakeholder (the mayor). The infrastructure-based solutions are framed as paying off in the currency of confidence and trust in safety. In conjunction with structural solutions, the two river basin reports (Alberta WaterSmart, 2015a, 2015b) recommended protecting wild rivers, restoring natural river systems, and designing mitigation measures that promote healthy aquatic systems and biodiversity. Despite these recommendations, as of November 2018, three upstream options on the Bow River are being assessed to develop and raise three dams and reservoirs—these options do not fit with the RfR approach (and were not labelled as RfR).[24]

In general, Alberta's RfR projects—the High River neighbourhood relocations, and the two river basin RfR pilots—were described by interviewees and the media as returning areas to their "natural state" (03-AB-BP; 30-AB-CC), allowing the river "to do its natural thing" (03-AB-

[24] The three projects are constructing two new reservoirs (New Glenbow Reservoir and New Morley reservoir) and raising an existing dam (Ghost River Reservoir). Additionally, the Springbank dry dam along the Elbow River is scheduled for completion in 2022.

BP) as a way to recapture its "natural flow" (Town of High River, 2018b, p. 3). These rhetorical frames echoed those found in press releases (e.g., "High River's Wallaceville to be bulldozed," 2013). As such, this imagery aligns with narratives of natural mitigation measures and aspects of the Dutch RfR objective of spatial quality. Albertans also discussed rewilding rivers as an alternative flood mitigation measure that extends beyond just making RfR. Rewilding rivers incorporates redesigning curves in sections where rivers had previously been straightened, reconnecting rivers to uninhabited land, regenerating floodplains, building tree shelter belts along rivers, and reforesting catchment areas (Monbiot, 2014a, 2014b).[25] Although rewilding rivers did not receive as much attention as RfR, a discussion series on the topic was created on the Alberta WaterPortal website[26] that described the ecological functions of healthy rivers and contrasted these "softer engineered solutions" (Eden, 2014, para. 6) with hard infrastructural solutions (these measures align respectively with NEP and HEP).

In the Dutch RfR approach, an emphasis is placed on the metacultural frames of floods being caused by nature versus human-induced. Some Dutch scholars have referred to the Dutch RfR as a mixed approach because in most projects the dikes were moved but still constrain the rivers, and critics have noted that there are negative impacts on the environment. Similar to the Dutch RfR, the Alberta RfR project in High River and the two river basin pilots are a mix of mitigation measures, where "maintaining or creating room for the river in Alberta would involve using both the natural landscape and built infrastructure" (Alberta WaterSmart, 2015b, p. ii) involving diversion, conveyance, storage, and local protection. The messaging about mixed solutions (action frames) was repeated in media articles as the remedy "to protect the health of

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[25] Rewilding rivers is an approach that emerged in Britain in the 1990s.
[26] The Alberta WaterPortal Society is a charitable organization promoting research, education, and engagement on water issues.

watersheds and integrate drought, water quality, ecosystem and flood risk concerns" (Derworiz, 2015, para. 9). Environmental scientists and conservationists pointed out that the $21 million set aside by the Alberta government for nonstructural natural solutions such as maintaining wetlands and fostering healthy riparian areas pales in comparison to the $625 million set aside for infrastructure mitigation. As one environmental conservationist stated:

> Budgets speak louder than words, and the Alberta government's valuing of watershed ecology appears to be only *symbolic*. . . . It is relying almost entirely on activities that reduce natural flood and drought resiliency and watershed health, while facilitating ongoing construction in floodplains. (as cited in Derworiz, 2014, para. 11, emphasis added)

In the quote above, the conservationist directly recognized the symbolic utility of concepts (also see Davidson & MacKendrick, 2004). These findings suggest that although application of an RfR approach in Alberta involved a mix of structural and nonstructural mitigation measures, it was heavily skewed to structural mitigation that interferes with ecosystem functions, thus shrinking the space for rivers in urban areas. This outcome is not entirely surprising because historically and currently, Alberta has focused on structural flood mitigation measures (Bryant & Davies, 2017; Morrison et al., 2018; Shrubsole, 2013). To get at the root of the problem, a variety of people working in the environmental field advised Alberta to focus on prevention via avoidance such as through land-use planning and extending floodplains (Derworiz, 2014). Some elected officials also commended the work by individuals and groups focusing on the environment to protect headwaters and made efforts to further their conservation work (e.g., Swann, 2017; Westhead, 2016).

Moving People?

The Dutch RfR promotes making space for rivers, including by relocating buildings in the floodway, which was successfully accomplished in the Netherlands by relocating

approximately 150 homes and businesses. Relocation was also attempted in Alberta when Premier Redford announced the Floodway Relocation Program in August 2013:

> The Redford government is giving homeowners who live in Southern Alberta communities impacted by recent floods the *option* to relocate their families. . . . We simply cannot encourage development in floodways. It is just too *dangerous* and represents an ongoing *risk* to all taxpayers. . . . We want to give homeowners the *choice* to relocate to *safer* areas. . . . Relocating homes out of floodways is a better *long-term solution for all* of us. (GoA, 2013b, paras. 1–5, emphasis added)

Again, the Alberta government was the protagonist, but this time, development in the floodway was identified as the problem and thus the solution was relocation (policy frame).

In the announcement, the Alberta government (2013b) drew on the rhetoric of safety and risk. Removing the neighbourhoods of Beachwood and Wallaceville (social mitigation) increased river conveyance and aligned with an RfR approach. Although the decision was voluntary at the provincial level,[27] High River's Town council warned residents that their properties would be seized if they did not participate in the buyout (Hennel, 2013). Approximately 80% of Wallaceville residents wanted to leave because of frequent flooding (Hennel, 2013). Some residents who were initially upset and reticent to leave changed their minds: "Now when we think about it, [why] were we living in a condo that is below river level? This is *crazy*!" (05-AB-EmB, emphasis added). In contrast, Beachwood residents fiercely contested the decision as only a few homes had been flooded in this upscale neighbourhood built on the floodway as it is protected by a dike (see Dissertation Chapter 3). Even though removal of both neighbourhoods was announced in 2013, it is possible that due to backlash regarding Beachwood (M. Wright, 2013), both Beachwood and Wallaceville were framed retroactively as RfR projects in 2015 in the Town's report (Town of High River, 2015) and in Deltares' report

[27] The Alberta government stated that if eligible homeowners did not participate in the relocation program, they would not qualify for the disaster recovery program to repair or rebuild in future flood events.

(Prinsen et al., 2015), expressing support for the Alberta government's previous decisions for relocation (see Bogdan, in progress).

The BRB and RDRB RfR reports (Alberta WaterSmart, 2015a, 2015b) also recommended removing obstacles such as developments in the floodplain and creating a stronger impetus for relocation. Relocations in Calgary were strongly contested.[28] Overall, the buyouts had only 37% uptake, and thus the Alberta government's effort to move people out of the floodway province-wide as a voluntary measure was unsuccessful. It was criticized as a failure, with recommendations from those with specializations in the environment and economics/insurance that it should have been mandatory (McGillivray, 2017).

Some elected officials also criticized the Floodway Relocation Program, calling it "odious and ill-considered" (Clark, 2015, p. 68), but for different reasons than the environment and economics/insurance specialists. These elected officials advocated for upstream infrastructural mitigation and claimed that once in place, neighbourhoods previously designated as floodway would no longer need to be classified as such and could be resold for development (McGillivray, 2015). These claims are erroneous because the best practice in disaster management in Alberta and many jurisdictions worldwide is to map areas at risk of flooding as such, with or without infrastructure mitigation measures, because such measures are not fail-proof. The claim by some elected officials that certain areas are safe for homes when there is in fact flood risk undermines the Alberta government's efforts to promote safety and prevention. Furthermore, it increases Albertans' vulnerability to flood risks and damages.

[28] Although the Calgary relocation is outside of the scope of this chapter, it would be interesting research to compare how the Calgary and High River relocations were framed in the media and legislative documents.

Regulating Floodplain Development?

The first objective of the Dutch RfR is safety. In the 1990s, prior to the RfR program, the Dutch government created regulations to restrict floodplain development. Similarly, development in Alberta's flood-prone areas was identified as a problem contributing to disaster costs and damages in High River and across Alberta (Auditor General of Alberta, 2015; Bryant & Davies, 2017; Haney & McDonald-Harker, 2016; Hurlbert & Gupta, 2016; Morrison et al., 2018). Recommendations were made to restrict floodplain development after the 2005 southern Alberta floods (Groeneveld, 2006) but were not translated into policy (see Dissertation Chapter 3). Six months after the 2013 floods, the Progressive Conservative Party enacted the Flood Recovery and Reconstruction Act (Bill 27), a policy to limit floodway development (GoA, 2014b). However, the Floodway Development Regulation that supports this Act had still not been put into effect as of April 2019.

The delays in promulgating the regulations and bylaws were partly due to a change in the provincial government in 2015 (almost two years after the flood), with the incoming New Democratic Party wanting to review the decisions before moving ahead. In effect, the change in government diverted the political stream from the problem and policy streams, and thereby destabilized the political conditions, which subsequently interrupted the policy change process. As of this writing, however, four years have passed since the election and the policy window for making changes after a disaster usually closes within 24 months.[29] In addition to this challenge of time and legislation, until provincial regulations are enacted in Alberta, municipalities are in

[29] There was an opportunity for another RfR project in 2016 after wildfires followed by floods destroyed 2,400 homes and caused over $3.5 billion in damages in Fort McMurray, Alberta. For example, a neighbourhood aptly named Waterways burned down and then flooded, but the provincial government did not use existing legislation in the *Water Act* to prevent rebuilding in the floodway. This exemplifies the Alberta Government's history of failing to pass laws to limit development in floodplains (Auditor General of Alberta, 2015).

charge of decisions about land use development, making new developments in flood areas more likely (see Bogdan, Bennett, & Yumagulova, 2018).

Keeping development out of floodways is a continuous struggle even in the Netherlands, where flood safety is an existential issue since two-thirds of the country is below sea level. Regulations continue to be challenged or not enforced by some local authorities through legal and illegal loopholes (Warner et al., 2013). Critics of the Dutch RfR approach such as Warner and van Buuren (2011) have argued that in addition to protection of nature, powerful stakeholders created a discourse of development in the Dutch RfR (e.g., in the Ijsseldelta Zuid project) in which the floodplains were seen as "underexploited economic opportunities" (p. 788), and hence they "negotiated a twist that suits them well" (p. 787). Over time, the Dutch RfR approach has struck a balance between not only flood safety and environmental values but also development. This vision of green growth is indicative of ecological modernization discourse (Warner & van Buuren, 2011). Another example is the Nijmegen RfR project in the Netherlands, which relocated approximately 50 homes but ultimately facilitated Nijmegen's downtown core to grow by a third. The Nijmegen RfR project was frequently mentioned by interviewees and in media articles in Canada. In other words, the RfR approach does promote restricting development in the floodplain, but it is more likely to be adopted if it also makes some room for development elsewhere in exchange.

Dutch interviewees advised Albertans to protect nature and to adopt a more integrated river basin management that integrates, rather than fragments, water management, land management, and economic development.[30] Due to space limitations, rivers in the Netherlands

[30] The Dutch RfR is an example of integrated river basin management characterized by balancing multiple objectives, connecting multiple disciplines, considering all relevant spatial scales (e.g., watersheds to sub-basins),

have multiple functions, combining ecosystems, recreation, and industrial activities, cleverly captured in one Dutch RfR proponent's phrase "Make the cake bigger!" (08-NL-BEv), a strategy (policy frame) which the Dutch recommended for Alberta. An integrated river basin management (policy frame) is congruent with the ecological modernization discourse (rhetorical frame) to "balance" economic development and environmental protection.

The mayor of High River acknowledged that mistakes were made in the past by developing in the floodway: "The Deltares report confirmed what we already knew: No. 1 get out of the way of the river with your development" (as cited in Howell, 2015, para. 8). A bylaw was created in 2011 to restrict future floodway development, and the 2013 flood was framed as providing momentum to enforce these regulations: "From a planning point of view (and this was even before the flood), we're *now* very, very cautious of where and how we build things" (03-AB-BP, emphasis added). High River's revised land use bylaws restrict development in the floodway; however, the Town labelled areas designated as flood fringe and overland flood areas by the provincial government as "restricted development areas," thereby using frames that emphasized development and toned down the flood risks (Town of High River, 2017a).

As noted earlier, restricting development is not a politically popular strategy in Alberta. At the one-year flood anniversary, the mayor made contradictory statements in the following order: "We can't control nature"; "Highwood River is our history and it's our gem . . . we must respect it from now on but we won't let it define us"; and "It's a quickly growing place and will continue to grow" (C. Snodgrass, 2014, personal communication, June 20, 2014; also see

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and incorporating time scales by balancing short- and long-term costs and benefits (Rijke, van Herk, Zevenbergen, & Ashley, 2012; Zevenbergen et al., 2013b).

Rushworth, 2014). And, as if to support this mixed rhetoric, High River annexed land for new development in 2015 (McCracken, 2016; "Southern Alberta town ravaged," 2017).

The BRB and RDRB RfR reports (Alberta WaterSmart, 2015a, 2015b) recommended strengthening and enforcing policy and regulation to stop or minimize development in the floodplains, and additionally, enforcing land use controls in watersheds. However, the river basin reports also noted that "mitigation activities be grounded in respecting our rivers and their many values; and the environmental, social, and economic trade-offs . . . be thoroughly understood" (Alberta WaterSmart, 2015b, p. ii). In all three RfR projects in Alberta, nature, people, development/growth, and safety are framed as not mutually exclusive (rhetorical frame echoing ecological modernization discourse), which fits with the figure of speech, "You can have your cake and eat it, too." In sum, although the detrimental social and environmental consequences of building in the floodway are recognized in Alberta, the development discourse has stalled regulations needed to prevent development in flood-prone areas.

Discussion: Integrating the Dutch RfR Approach in Alberta

My analysis of the data reveals that framing helped to promote the idea of integrating an RfR approach in Alberta, but at the level of practice, in High River and the BRB and RDRB, implementation was selective in terms of moving away from fighting water with structural mitigation to living with water with natural and social mitigation. To some degree, selective implementation is expected: Transferring the Dutch RfR approach to other jurisdictions entails challenges because it is not just a simple technological change but also requires fundamental shifts in paradigms and practices—including changes in culture and governance related to rivers (Zevenbergen et al., 2013a, 2013b). The report assessing possibilities for Dutch–Alberta cooperation on flood mitigation raised questions about the degree to which Alberta would adopt

the Dutch RfR approach: “There is uncertainty as to whether a new, more sustainable approach to flood mitigation will be adopted or whether the business-as-usual approach will return” (Morris et al., 2013, p. 10). In the following sections, I explore two possible explanations for the mixed results in applying the Dutch RfR in Alberta: the RfR approach as (a) incremental environmental change or as (b) business-as-usual toward undeterred development in flood-prone areas. To explore these explanations and assess policy transfer, I apply the two models of Kingdon (1984) and Minkman et al. (2018).

The Momentum for Scaling Up and Systems-Based Approaches

Alberta interviewees perceived the introduction of the three RfR projects as shifting focus away from infrastructure (dams and dikes) toward a more comprehensive, environmentally sustainable flood risk management system across the province. The RfR approach was even seen as countering unsustainable decisions of the past (11-AB-EvEn; 19-AB-EcMa). Specifically, the RfR approach was framed as “mov[ing] focus beyond big infrastructure [and] giving the province’s rivers more room to grow by revisiting property buyouts, preventing future floodplain development and widening riverbanks [as] an effective way to both mitigate future floods and manage watersheds” (Derworiz, 2015, paras. 1–2). This was significant progress according to the Director of WaterSmart: “It’s a big step forward. . . . We can have a different level of conversation now” (as cited in Derworiz, 2015, para. 32).

Furthermore, the RfR approach in Alberta was importantly perceived as not just allowing the river to expand, but also extending the conversation beyond just flood mitigation to a more “rounded” (19-AB-EcMa) dialogue on broader water issues and to continue a diverse “menu of approaches” (22-AB-EvC) to water management. The BRB RfR report concluded that

> adapting the Room for the River program and measures for Alberta offers a well-tested approach for driving productive, watershed-based assessment of mitigation . . . [and promotes a] long-term program for thoughtful and effective water management and flood mitigation throughout Alberta. (Alberta WaterSmart, 2015b, p. 48)

The BRB and RDRB (river basin) RfR reports (Alberta WaterSmart, 2015a, 2015b) also demonstrated that the RfR approach in terms of engaging stakeholders and prioritizing project elements were applicable to other watersheds in Alberta and had the potential to be scaled up geographically to other watersheds.

The vision for a province-wide RfR program is described in the two river basin reports (Alberta WaterSmart, 2015a, 2015b) as incorporating integrated watershed and river management (as suggested by the Dutch) with objectives based on safety and security (to manage floods), water supply (to manage droughts), and water quality (for drinking water, recreation, and healthy ecosystems). Along these lines, Alberta interviewees, especially those who have an environmental specialization in their profession, suggested that the Alberta government develop long-term plans to deal with water issues on a "steady basis rather than [in] the heat of the moment" (19-AB-EcMa) and take into consideration water management in general, not just flood risk management, especially since the greatest disaster threat in Alberta is drought (these suggestions align with the NEP). The perception that the introduction of the Dutch RfR could shift flood management practices in Alberta to be more environmentally sustainable created an opening for incremental change.

Making Room for Nature Requires a Cultural Shift

For the RfR flood mitigation approach to be translated into tangible geographical initiatives, a cultural shift is needed in Alberta. This argument, along with a NEP worldview, is captured in the following quote from an interviewee whose profession included both politics and the environment:

> And not this kind of *mentality* that because we're human and we have so much capacity to do anything, and we do, with a big enough machine and cement we can do anything. . . I think we need to smarten up. . . . In a flood you can, you can get out of the way. . . . We've got to stop. . . . The whole Deltares report, Room for the River, it makes sense. We have to buy into that. We have to embrace that as a community, as a province and country. (25-AB-PEv, emphasis added)

Similarly, a biologist (environment as specialization) argued that "the problem is across a much wider landscape. It should be a wake-up call that we have a whole new paradigm about how we treat our headwaters" (as cited in Derworiz, 2014, para. 14). These findings corroborate those of Shrubsole (2000, 2013), who has argued for the need of a cultural shift, rather than technological change, to reduce flood risks and damages in Canada.

Whereas Albertans praised the Dutch RfR approach, Dutch interviewees were envious of Alberta's wilderness and warned, "Please don't do like the Dutch!" (04-NL-EvB). Given that Alberta still has plenty of natural space for rivers, the Dutch admonished stakeholders to "keep it that way!" (02-NL-GI). The Dutch interviewees were referring to the highly modified landscapes in the Netherlands, which had a long history of building dikes higher and higher until the RfR approach was implemented to lower and move dikes. Deltares also promoted environmental sustainability to protect riparian areas and water quality, as stated in its report (Prinsen et al., 2015): "One should perhaps not fiddle with nature" (p. 36) and "always consider the whole [watershed] catchment, not just the town of High River" (p. 37). Both Alberta river basin RfR reports (Alberta WaterSmart, 2015a, 2015b) emphasized protecting wild rivers, recognizing that unlike the Netherlands, Alberta still has the opportunity to keep rivers "as natural as possible" (Alberta WaterSmart, 2015b, p. 48). In summary, Alberta interviewees had high hopes for applying the RfR approach at the provincial level to facilitate a more environmentally sustainable approach to flood mitigation by making room for not just rivers but also watersheds and nature more broadly. But how do these hopes align with Alberta's dominant culture?

The Dutch RfR resonated with some Albertans, especially those in environmental and economics/insurance professions. These stakeholders have advocated for broad-scale changes to flood and water management, including not developing in floodways, even prior to the 2013 flood.[31] Therefore, this is not an entirely new vision—buying out homeowners located in the floodway is just an expensive extension of this practice (McGillivray, 2015). Stakeholders promoting these nonstructural natural and social mitigation measures echo a social constructionist view (metacultural frame) that the problems and subsequent solutions to flooding disasters are rooted in poor decisions. But not all stakeholders in Alberta have embraced this perspective. Opposition in Alberta to a more comprehensive flood risk management approach was also noted by the Dutch in their report on flood mitigation collaboration:

> Alberta and Calgary government officials expressed a clear desire, as well as a political mandate, to encompass resiliency[32] as they rebuild; non-governmental officials we met with generally expressed the opposite opinion. [Dutch] officials in Canada will have to monitor the nature of this debate, and report. (Morris et al., 2013, p. 12)

The nongovernment officials identified in Morris et al.'s (2013) report were academics, the expert advisory panel appointed by Premier Redford, consultants from various companies, and WaterSmart. The competencies of these stakeholders include engineering, environment, and development. Again, the disciplinary divisions between stakeholders promoting conflicting mitigation measures reveal differences in metacultural frames about human–nature interactions (NEP and HEP) and create mixed messages about solutions to flood risk. As noted earlier, the Dutch recommended that Albertans adopt integrated river basin management that makes room for people, nature, and development (i.e., ecological modernization discourse), which appealed

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[31] For example, the Dutch RfR promotes staying out of the floodways, which aligns with the professional maxim of hydrologists across Canada: "Keep people away from water, not water away from people" (McGillivray, 2015, para. 12).

[32] The term *resiliency* in the report refers to climate change with respect to drought and rain (Morris et al., 2013).

to some Albertans as it does not place limits on growth.

Integrated resource management is a familiar concept to Albertans. Since the 1970s, the Alberta government has reconstructed numerous natural resource initiatives as integrated resource management (IRM)—a policy to reduce the impacts of natural resource development while intensifying industrial land use, especially oil production (Davidson & MacKendrick, 2004). Many of these initiatives, however, did not fit the qualifications of what IRM entails, thereby enabling the government "to maintain credibility while pursuing a mandate of expanded development and regulatory minimization" (Davidson & MacKendrick, 2004, p. 48). Davidson and MacKendrick (2004) concluded that in Alberta, the "political culture does not support a strong regulatory state in land management" (p. 61). Ecological modernization storylines from Alberta's IRM can also be found in High River's growth plan and the two river basins' plans for "balancing" environmental, social, and economic values and trade-offs which, as I have demonstrated, are not balanced because they are heavily skewed to structural mitigation. This bias is not surprising given the findings from Shrubsole (2013) that Alberta and Saskatchewan—the major oil-producing provinces—have focused on structural mitigation whereas other provinces have diversified their flood management strategies.

Despite the appeal of integrated resource management and ecological modernization because they do not place limits on "progress," in some locations in Alberta, safety, nature, and development are incongruous ideals. The result is that these frames can exclude discourses that reveal tensions between economic development and environmental protection, as noted earlier. Additionally, pursuing divergent policies could be a legitimation technique to sustain policy tensions and delay substantive action (Sodero & Stoddart, 2015). Such a legitimation technique

may explain why Alberta's Floodway Relocation Program was unsuccessful and why the Floodway Development Regulation stalled and missed the policy window timeframe.

The lack of effective regulation in natural resource development can be extended to flood risk management, given Alberta's failure to regulate floodway development in 2013 and after previous major floods (Auditor General of Alberta, 2015; also see Dissertation Chapter 3). Instead of passing regulations for preventing flood risks and damages, infrastructure is relied upon for protection and is framed in ways to increase residents' confidence and trust, characteristic of a structural functionalist perspective on disasters, thereby perpetuating a HEP paradigm that technology can control nature. This finding concurs with other research which found that residents in High River perceived flood mitigation structures as providing safety (Haney & McDonald-Harker, 2016). People feeling safe from flooding disasters where they live and work is important for ontological security (Haney, 2017). As social constructionists argue, flood mitigation structures make a place safer, but not entirely safe, because infrastructure can fail—as exemplified in the tragedy of Hurricane Katrina (Freudenburg et al., 2009). Furthermore, there is a possibility of the control paradox in Alberta if powerful stakeholders continue pushing for business-as-usual of undeterred development behind the new flood defence structures—whether this occurs in High River and other parts of Alberta remains to be seen.

To summarize, some stakeholders have promoted a living with water paradigm and accompanying nonstructural mitigation measures such as floodway regulation, mandatory relocation, and keeping rivers wild (consistent with NEP). However, more powerful stakeholders have been pushing for dams and dikes to fight water, which aligns with ecological modernization discourse and HEP; hence, structural mitigation remains the dominant approach to flood risk

management in Alberta. Having illustrated that applying the Dutch RfR approach in Alberta did not result in notable incremental change in practices, I now assess changes in policy.

Assessing Policy Transfer of the Dutch RfR Approach in Alberta

To assess the degree to which the Dutch RfR approach transferred to Alberta first requires criteria for measurement. On the one hand, if the evaluation criteria are based on the reports written by consultants hired by the Alberta government, then the three RfR projects were successful. More specifically, the recommendations to remove obstacles from the floodway, including homes, and other RfR mitigation measures were implemented in High River. The BRB and RDRB RfR pilot projects were also deemed successful in terms of engagement and the process of prioritizing projects. It is important to note that these three RfR projects are limited in geographical scale. On the other hand, if the evaluation criteria are based on the arguments of critical Dutch scholars, then there was room for improvement for nature protection in both the Netherlands and Alberta. Furthermore, numerous Alberta interviewees (especially those working in environmental disciplines), Dutch interviewees, and Deltares encouraged Alberta to implement flood mitigation and water management approaches that protect its wild rivers and natural areas, provide ecosystem functions, and are more in line with the fundamental principles of the rewilding approach (aligns with NEP).[33]

Even though the Alberta government implemented the High River RfR relocation projects and funded the two conceptual river basin RfR projects, the RfR approach has not been implemented at a broader geographic scale in Alberta. Both the BRB (Alberta WaterSmart,

[33] Due to high population density and limited available land, some jurisdictions have permitted development in floodways. Practices for building homes in high-risk flood locations vary across cultures, such as locating the entrance on the second floor (the Netherlands) and building on stilts and floating homes (Asia). In Alberta, there is ample room to develop out of the floodway which many stakeholders, including Deltares, have argued.

2015b) and the RDRB RfR (Alberta WaterSmart, 2015a) reports stated upfront that "the Room for the River pilot process applied in the [respective] Basin and the subsequent Room for the River report are not government policy" (p. i). Instead, the Alberta government's main flood mitigation approach is described in *Respecting Our Rivers: Alberta's Approach to Flood Mitigation* (GoA, 2014d), which outlined initiatives for relocations in flood-prone areas and legislation to limit future floodway development, included infrastructure such as dry dams and diversions, and promoted nonstructural mitigation such as wetland storage, natural river functions, and best land use management practices for headwaters.[34] Both the Respecting Our River (RoR) and RfR approach objectives are to enhance safety and reduce flood-related risks and damages. However, in contrast to Alberta's (RoR and RfR) flood management, in the Dutch version of RfR, relocations were mandatory, floodway regulations were put into effect, and dams and diversions were not permitted because they did not meet the objective of spatial quality.[35] The RDRB report stated that "there are important lessons from the Dutch Room for the River program, but an Alberta program should not be marketed as a 'Dutch initiative'" (Alberta WaterSmart, 2015a, p. iii). Suggestions were made to change the name in Alberta to include words such as "'respect', 'retain', or 'make room for' the rivers" (Alberta WaterSmart, 2015b, p. 42).

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[34] It should be noted that two years prior to the RoR flood mitigation report (GoA, 2014d), the Alberta Government released *Stepping Back From the Water* (2012), which outlined setback limits for developing adjacent to water bodies to protect riparian areas. This is a guideline and has not been translated to policy or regulations.

[35] The RoR (GoA, 2014d) also incorporated some aspects of the spatial quality objective—environmental quality, biodiversity, aesthetics, culture, and recreational value—although they are not as explicit or detailed in the report. In some respects, the Alberta Government's RoR is broader in scope than the Dutch RfR in that the majority of river systems are located in the province, and therefore the government can manage water at the watershed basin level. In the Netherlands, its major rivers originate in other countries, and thus watershed management is either out of Dutch hands or a joint effort.

Based on Minkman et al.'s (2018) model for outcomes of the policy transfer process (successful adoption, formal adoption, or nonadoption), Alberta's RfR projects do not qualify for successful adoption given that none of the four aspects of the RfR approach were fully implemented: (a) shifting away from mega-infrastructure (mega-infrastructure is being built); (b) making space for rivers (two neighbourhoods were relocated but an extensive diking system further constrained the river); (c) moving people (limited uptake of buyouts); and (d) regulating floodway development (not yet put into regulation).

Alberta's RfR approach does not qualify as formal adoption either because it was not officially adopted as a policy; rather, Alberta's main flood mitigation approach is RoR (GoA, 2014d). Nonadoption best describes Alberta's outcome in applying the RfR approach because some policy changes were initiated but then halted. The policy transfer type that best describes the Dutch RfR influence on Alberta's flood management is mere inspiration. In fact, attempts were made prior to the 2013 flood and introduction of the Dutch RfR in Alberta for regulating floodplain development and, more broadly, river basin-level planning, to enhance watershed resiliency. Nevertheless, the Dutch RfR inspiration was insufficient to provide enough momentum to overcome existing barriers and translate these attempts into policies, regulations, and practices across Alberta to shift away from structural mitigation as the dominant approach.

To create a policy change, the three streams of problem, policy (solutions), and politics all need to align (Kingdon, 1984). Both the river (nature) and poor land-use decisions (human nature[36]) were identified as problems that led to Alberta's flood becoming a disaster, yet the majority of successfully implemented solutions targeted controlling the river rather than limiting

[36] The term human nature refers to human decisions and activities and is used to contrast with nature in terms of the natural environment.

human activity. The initial mega-infrastructure announcements activated the mobilization of actors who promoted large infrastructural mitigation to control the river (HEP paradigm) versus those who advocated for less invasive, nonstructural solutions (NEP paradigm), setting up a conflict of frames. The buyouts in Beachwood (and Calgary) were a politically unpalatable decision. It is then not surprising that technological-fix approaches were the main solutions proposed and are currently proceeding.

All of this occurred during a time with tumultuous political conditions. Alberta had four premiers (Redford, Hancock, Prentice, and Notley) within three years and a change in government from the Progressive Conservative Party to the New Democratic Party. Decisions were made without adequate assessment (or consultation), projects were mislabelled as RfR, and politicians changed which projects they supported, fuelling mistrust between politicians and their constituents and between political parties. This mistrust was combined with mixed messages (frames) from different stakeholders for RfR and other flood mitigation projects. In addition, integrated resource management (policy frame) and ecological modernization discourse (rhetorical frame) obfuscated the tensions between diverging policies on economic development (supported by HEP) and environmental protection (supported by NEP). Consequently, the sharp criticisms from stakeholders arguing for more environmentally-sustainable flood management and for regulations to keep development out of floodways were blunted.

Pursuing both of these divergent policies may have sustained policy tensions and delayed substantive action, resulting in dampening the success of the Floodway Relocation Program and languishing of the Floodway Development Regulation (see Dissertation Chapter 3). Even though there was momentum and a mandate at the political level for resilience-based flood risk management, interest groups who were not supportive weakened the political conditions for

developing regulations that would give policies judicial teeth for enforcement in a province that already lacked a culture of supporting strong environmental regulations. The political conditions were messy; therefore, the failures in policy and regulations are not surprising.

Conclusion

In this chapter, I examined how the Dutch RfR approach was perceived and applied to flood risk management policies and practices in Alberta to assess whether the RfR approach triggered a change towards more preventive, environmentally sustainable flood mitigation to reduce disaster risks and damages or whether a business-as-usual approach of undeterred development in flood-prone areas and reliance on structural mitigation measures continued. I analyzed how the Dutch RfR was framed and how these frames were negotiated and contested by different stakeholders. The Dutch RfR consists of four main features: (a) shifting away from mega-infrastructure, (b) making space for rivers, (c) moving people, and (d) regulating floodplain development. Research participants in Alberta perceived the three RfR projects as opportunities to expand this approach into future flood risk management projects across the province, creating momentum for potential incremental changes. Thus, the Dutch RfR concept opened a path for a more comprehensive, environmentally sustainable flood risk management system. It shifted how Albertans perceived flood risk management in terms of new ideas and possibilities for natural and social mitigation, and subsequently served as a model for stakeholders to critically reflect on Alberta's existing approach of building large technological-fix flood defences and failing to regulate or restrict development in the floodway.

However, deeper analysis of how the Dutch RfR approach was applied in Alberta suggests selective implementation of what this approach entails. Based on my research on the three RfR pilot projects after the 2013 flood (and the missed RfR opportunity for Fort McMurray

in 2016), it appears the four characteristics of the Dutch RfR applied in Alberta were rhetorical frames that aligned with only a minimal number of actions characteristic of the Dutch RfR. Further, the RfR label was co-opted for projects that did not share characteristics of the RfR approach. Relocations of neighbourhoods were retroactively labelled as RfR projects in High River, mixed with an extensive diking system to increase control over the Highwood River. There is provincial policy to restrict development in Alberta's floodplains, but accompanying and crucial regulations for enforcement are lacking. Instead of regulations and other nonstructural solutions to promote prevention of disaster risks and damages, costly infrastructure solutions have been prioritized. This technological-fix aligns with HEP, provides limited protection, and can lead to failure and damages greater than before the structural solutions were put in place.

A RoR (GoA, 2014d), rather than RfR approach, has become Alberta's policy strategy for flood risk management. The objectives of both the RoR and RfR approaches are to enhance safety and reduce flood-related risks and damages. However, the stark contrast between Alberta's approaches and the Dutch RfR is that in the Netherlands, relocations are mandatory, floodway regulations are put into effect, and dams and diversions are not permitted because they do not meet the objective of spatial quality. In effect, the Dutch RfR was not adopted in Alberta and at best served as an inspiration for some stakeholders. The ecological modernization discourse and integrated resource management approach extracted from the Dutch RfR of making room for rivers, people, and development, combined with Alberta's messy political conditions after the flood and a political culture that is resistant to regulations (Davidson & MacKendrick, 2004), resulted in limited opportunities for significant reform in flood risk management.

I argue that the frames and framings that were persuasive and succeeded in being translated into implemented policies and practices were those supporting the status quo of undeterred development along with an increase in structural mitigation. Moreover, in the Alberta context, the RfR approach mostly distracted from other approaches, such as regulating floodway development, rewilding rivers, or, furthermore, keeping rivers wild. Undeterred development suited stakeholders in politics and development but was criticized by stakeholders specializing in environment and economics/insurance. An alternative frame expressed by Albertans whose arguments drew from the NEP, as well as by the Dutch, was that Alberta could surpass the Netherlands in environmental protection because natural spaces and wild rivers still exist throughout the province. They suggested that Alberta could become a leader in environmentally sustainable flood risk management.

This chapter makes several scholarly contributions. First, I provide a lens for viewing Alberta's flood risk management approach in a more critical light by contrasting it with the Dutch RfR approach, examining and differentiating the underlying philosophies. A sociological approach to examining frames reveals that flood risk management practices emerge from social and political dynamics. In other words, they are socially produced and are thus changeable. Based on the dominance of structural mitigation practices to fight water, I conclude that Alberta has yet to shift to a social constructionist perspective that argues for a transformation of how society thinks about the causes of disasters and interacts with rivers. Second, I explore the process of taking an inspirational idea (the Dutch RfR approach) to implementing it on-the-ground, identifying and analyzing the inherent challenges to contribute to understanding and addressing them. In doing so, I expand upon the limited scholarship on the "interface between perceptions and management/intervention" (Birkholz et al., 2014, p. 14) in ways that capture

nuances, contestation, and experiences. Third, my research facilitates a broader understanding of the roles of framing in flood risk management and policy transfer by identifying mixed frames, and by providing insights into the power relations between stakeholders through analysis of conflicting frames—topics which are also under-researched (Borah, 2011; Carragee & Roefs, 2004). Fourth, this research adds to the collection of case studies examining the process of transferring the Dutch RfR approach to different jurisdictions. A more nuanced understanding of both best practices and complexities within the Dutch RfR approach could help practitioners and policymakers anticipate challenges and conflicts when it is implemented within specific political and geographical contexts, thereby facilitating its successful adaptation.

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Chapter 5: Conclusion

Flooding is expected to increase in frequency and severity globally with climate change. Even as I write this concluding chapter, a flooding disaster is unfolding in the U.S. Midwest. Six states and over 40 locations have reached record flood levels. The estimated damages are over USD$1 billion in the state of Nebraska alone and continue to climb. Despite attempts in the past to "fight water" with structural measures, over 50 levees have been breached and, in some locations, have been completely destroyed. Indeed, Gilbert White's observation that "floods are 'acts of God,' but flood disasters are largely acts of man" (1945, p. 2), is as true today as it was in the 1940s.

The following commentary by Christine Klein[1] (2019) on the U.S. flooding disaster echoes that of disaster sociologists and managers who have been arguing for decades that natural hazards such as floods only become disasters as a result of the decisions and habits of people, and are thus human-induced disasters:

> The United States has conducted a century-long, mostly failed experiment in flood control. We have straitjacketed the Mississippi and many other rivers with thousands of miles of levees in the quixotic pursuit of an unattainable goal—the *floodless floodplain*. But levees give a false sense of security, triggering risky floodplain development behind them. (para. 4, emphasis in original)

The false sense of trust in flood control structures, which leads to development that would not have otherwise existed, is referred to as the *levee effect* or *control paradox*.[2] Klein concluded: "The key is to rebuild without repeating past mistakes" (2019, para. 9).[3] The familiar

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[1] Christine A. Klein is professor of law at the University of Florida Levin College of Law and the coauthor of *Mississippi River Tragedies: A Century of Unnatural Disaster*.
[2] The levee effect was coined by Gilbert White in 1947 and is well documented (Hutton, Tobin, & Montz, 2017).
[3] It is worth noting that the Mississippi River also had devastating floods as far back as 1927 (White, 1945) and more recently in 1993 and 2008 (Freudenburg, Gramling, Laska, & Erikson, 2008).

pattern of "flood, rinse, repeat" (McGillivray, 2017, para. 1) is as applicable in Canada as it is in the U.S. But if flooding is known to be the most costly and common natural hazard in both Canada and the U.S. (Klein, 2019; Office of the Parliamentary Budget Officer, 2016), why do flooding problems continue to occur? Why have we not learned from our past mistakes?

My research addressed these questions by investigating how perceptions of, and practices related to, flooding are shaped by sociopolitical factors. My research was conducted in the province of Alberta, which is important considering that Alberta has been labelled as "ground zero" (McGillivray, 2016b, para. 2) for catastrophic losses in Canada. Despite this situation, there is limited peer-reviewed scholarship on the social construction of flooding disasters in Alberta. Preventing future disasters requires an in-depth understanding of the social forces that produce them and then action to reduce risks and damages (Tierney, 2014). This research contributes to scholarship that emphasizes the need to understand and, subsequently, intervene in the social production of flooding risks and damages, and their continued proliferation. I accomplished this contribution by examining the interface between perceptions and practices (management/intervention) which previous studies have not examined; by doing so, my research reveals nuances, contestations, and varied experiences that make flooding problems challenging to address (Birkholz, Muro, Jeffrey, & Smith, 2014).

In the sections below, I synthesize the findings from Chapters 3 and 4, which I analyzed through the threaded situation analysis (TSA) approach I developed in Chapter 2. I highlight how sociopolitical factors, especially power, are shaping perceptions and practices related to flooding disasters across three main themes: (a) shifting from emergency management to risk reduction,

(b) shifting culture from framing disasters as caused by nature to that caused by human nature,[4] and (c) shifting risk and responsibility from government to governance. I then consider the theoretical contribution of the TSA approach. Next, I reflect on the methodological considerations and contributions of my research. Based on my findings, I provide recommendations for changes in approaches to flood risk governance. Finally, I outline my steps for knowledge mobilization before presenting concluding comments.

Main Findings and Their Significance

Theme 1: Shifting From Emergency Management to Risk Reduction: Moving From Status Quo to Safety

The *Sendai Framework for Disaster Risk Reduction 2015–2030* (United Nations Office for Disaster Risk Reduction [UNISDR], 2015a, 2015b) emphasizes risk management across all the disaster phases and promotes prevention to reduce exposure, rather than focusing on protection measures such as structural defences characteristic of the previous *Hyogo Framework* (UNISDR, 2005). In Alberta, the dominant flood mitigation strategy has been to build structural defences to resist water and then implement emergency disaster programs if flooding occurs, rather than prevention via avoidance (Morrison, Noble, & Westbrook, 2018). Shortly after the 2013 flood, both structural and nonstructural mitigation measures were proposed in the province. The costly mega-infrastructure projects proposed for High River included a dam and a diversion, both of which were cancelled. The shift from structural to nonstructural measures appears to have started after the 2013 flood, when the Alberta government approved three projects labelled as Room for the River (RfR)—in the Town of High River and the Bow River and Red Deer

[4] The term human nature refers to human decisions and activities and is used to contrast with nature in terms of the natural environment.

River Basins (see Dissertation Chapter 4, “Making Room for Nature? Applying the Dutch Room for the River Approach to Flood Risk Management in Alberta, Canada”). Alberta interviewees perceived the introduction of these three RfR projects as shifting focus away from infrastructure toward a more comprehensive, environmentally sustainable flood risk management system across the province. Assessments by Alberta WaterSmart (2015a, 2015b) supported this notion and concluded that the RfR approach had the potential to be scaled up geographically.

The High River RfR project included relocating two neighbourhoods, but the Highwood River was further controlled by dikes and other infrastructure after the 2013 flood, thus making less room for the river. These flood control structures were framed as symbols of protection and security by politicians and development stakeholders in order to increase confidence and promote further growth and development in the town. In contrast, interviewees with a science or environmental background, as well as those with expertise in emergency management, insurance, or economics, argued for protecting nature with natural mitigation such as making room for rivers, protecting people with social mitigation through relocation, and restricting development in flood-prone areas. They cautioned against placing excessive trust in flooding infrastructure, which is expensive to build and maintain, and which will eventually fail. These stakeholders also raised concerns about the levee effect. As such, clear divisions between different stakeholder groups’ perceptions and proposed solutions emerged during this research.

The three RfR pilot projects in Alberta were deemed a success by the media and reports (Alberta WaterSmart, 2015a, 2015b). But with further analysis I demonstrated that Alberta’s implementation of the four main features of the Dutch RfR was selective. The first feature of the Dutch RfR approach is shifting away from mega-infrastructure—in Alberta, several large dams and reservoirs continue to be built. The second feature of making space for rivers was minimally

met by relocating two neighbourhoods in High River, but an extensive diking system further constrained the river. The third feature of moving people out of the floodway with buyouts was not nearly as successful in Alberta as it was in the Netherlands because of low uptake. Fourth, the Netherlands created regulations to restrict floodplain development even before applying its RfR program; in contrast, a similar regulation has not been put into effect in Alberta as of April 2019. That being said, selective implementation of the Dutch RfR approach in Alberta is understandable as it is challenging to transfer a program developed for the Netherlands to other jurisdictions.

My research illustrates that Alberta's application of the RfR approach was chiefly rhetorical. The RfR application could most accurately be described as inspirational but lacking adoption because policy changes were initiated but then halted. Regardless of how inspiring the Dutch RfR may have been, it was insufficient to provide enough momentum to translate these attempts into policies, regulations, and practices across Alberta. Moreover, in the Alberta context, the RfR approach mostly served to distract stakeholders from other approaches such as regulating floodway development, rewilding rivers, or, for that matter, keeping rivers wild. In Chapter 4, I identified that a main barrier to shifting from a fighting water to a living with water paradigm is that the dominant frames were those of powerful stakeholders opposing regulation to restrict floodway development, thereby supporting the status quo of undeterred development and advocating for more structural mitigation to justify developing in flood-prone areas. These practices do not align with the four main features of the RfR approach.

The role of powerful stakeholders shaping the direction of flood management in Alberta was also a prominent theme in Chapter 3, "Unraveling the Social Construction of the 2013 Flooding Disaster in High River, Alberta, Through the Threaded Situation Analysis Approach."

Unlike the discussions and debates about the RfR projects that were made visible and amplified in the media, the role of powerful stakeholders is less perspicuous in influencing the policies and practices that increased the vulnerability of flood risk in High River in ways that also apply across Alberta. I identified three practices routes operating in Alberta that created barriers to implementing nonstructural measures which would have decreased flood vulnerability. First, the initial emergence but then prompt disappearance of flood risk notification on land titles because of pressure from homeowner associations, the real estate industry, developers, and private industry. Second, the 2006 Groeneveld report was suppressed and not released until 2011, as was a 2002 draft flood mitigation strategy, thereby stalling regulations and flood mitigation activities that could have prevented further building in the floodway and, thus, reduced flood risks and damages from the 2013 flood. Based on the Groeneveld report, small municipalities supported the recommendation to restrict floodway development because it reinforced their decisions to refuse development permits and limited their liability. In contrast, large municipalities, which already had numerous developments in riverside areas, opposed this recommendation. And third, promulgating floodway regulations and updating of flood maps languished, also contributing to lack of transparency about flood risk and delaying implementation of nonstructural measures to reduce future damages. Recall that after the 2013 flood, there was significant momentum for change with the Flood Recovery and Reconstruction Act to restrict development in the floodway. Yet, the Floodway Development Regulation that supports this Act has not been promulgated to date (April 2019). Therefore, currently there is no provincial regulation prohibiting municipalities in Alberta from building in floodways.

A significant concern arising from my research findings is that relying predominantly on structural mitigation for flood protection and languishing on enacting regulations to restrict

development in the floodways increase vulnerability to risks and damages. Also, inaccurate claims by some elected officials about the level of safety provided by structural mitigation to justify developing in flood hazard areas (see Dissertation Chapter 4) can result in disasters such as that unfolding currently in the U.S. Midwest and in New Orleans during the 2005 Hurricane Katrina, among other incidences. Here in Alberta there does not appear to be a significant shift occurring from status quo (defence) to safety by reducing risks through avoidance as recommended in the Sendai Framework. As such, the province is likely to continue to be ground zero for disasters and continue to experience financial losses through disaster assistance payments, especially since the federal government is decreasing its contributions (Government of Canada, 2013). Additionally, the province's wealth was weakened in 2015 and 2016 when oil prices plunged, causing a recession. Alberta may reach a point when it can no longer justify spending money on disaster payouts, especially if relying on a carbon economy becomes unviable in a future with anthropogenic global warming.

Theme 2: Shifting Culture From Framing Disasters as Caused by Nature to that Caused by Human Nature[5]

To understand flooding issues, it is important to ask "what 'cultures' are being promoted through current practices?" (Shrubsole, 2000, p. 64). Currently, structural mitigation to fight water dominates in Alberta. The Dutch RfR approach created recognition for some stakeholders of the need for a cultural shift away from fighting water towards a living with water paradigm to give rivers space and, more broadly, to make room for nature across the province and beyond. Prior to the introduction of the Dutch RfR approach, those promoting more environmentally

[5] The term human nature refers to human decisions and activities and is used to contrast with nature in terms of the natural environment.

sustainable flood mitigation, watershed management, and natural resource management had expressed this paradigm for decades. For example, hydrologists across Canada have been advocating to "keep people away from water, not water away from people" (McGillivray, 2015, para. 12). In Canada, reducing flood risks and damages does not require more technological advancement but rather "a change in the culture and the institutional arrangements for flood risk management at all levels" (Shrubsole, 2013, p. 117).

In Chapter 4, I provided insight into the conflicting worldviews or paradigms (metacultural frames) about human–nature interactions that shape perceptions and practices related to flood risk management in Alberta. The differing frames promoting conflicting mitigation measures (structural versus nonstructural) arose from disciplinary divisions between stakeholders. Some stakeholders, especially those specializing in the environmental sciences, emergency management, economics, and insurance, promoted nonstructural mitigation measures (social and natural mitigation). These stakeholders advocated for a more holistic and system-based approach to flood risk management province-wide. Their arguments echo that of the new ecological paradigm (NEP), which states that humans are interdependent with many other species (nonanthropocentric or biocentric). Although ecological limits may be stretched with technological innovation (such as dams and dikes), unintended consequences ensue because ultimately, ecological laws cannot be repealed. Thus, the NEP aligns with a social constructionist perspective that frames the solutions to disasters as placing limits on humans rather than on nature. Nevertheless, more powerful stakeholders, including those specializing in politics and development, were more successful in influencing the implementation of structural measures to control rivers, which continue to be dominant practices in flood risk management. The arguments of these powerful stakeholders align with the human exemptionalism paradigm

(HEP), which states that humans are distinct from other species and progress can continue without limit because all problems can be solved through society and technology. HEP aligns with a structural functionalist perspective that frames solutions to disasters as humans controlling nature; thus, both are fundamentally anthropocentric (Catton & Dunlap, 1978).

To increase the appeal of the RfR approach in Alberta, all three of the pilot projects were characterized as a mix of structural and nonstructural measures (Alberta WaterSmart, 2015b, p. ii). Therefore, Alberta's version of RfR is an example of the ecological modernization discourse claiming to "balance" economic development and environmental protection. Evidence from my research indicates that this mix of structural and nonstructural mitigation is heavily skewed towards structural mitigation in Alberta (Theme 1). The ecological modernization discourse appears to borrow from NEP in terms of people and nature being in harmony and from HEP in terms of fixing environmental issues with technology, but NEP and HEP are fundamentally incompatible paradigms (see Dissertation Chapter 4). I argue that the ecological modernization discourse obfuscated the tensions between diverging policies on economic development (supported by HEP) and more progressive environmental protection (supported by NEP). This critique about the ecological modernization discourse concealing inherent contradictions between continuous growth and environmental limits whilst giving the impression that unlimited green growth is possible has also been expressed in relation to the Dutch RfR (Warner & van Buuren, 2011) and Alberta's integrated resource management (Davidson & MacKendrick, 2004). In effect, the ecological modernization-type discourses amplified the voices of interest groups in Alberta who opposed much-needed regulations to restrict floodway development in a province that already lacked a political culture for strong environmental regulations.

Although I did not examine cultural aspects in Chapter 3 with as much detail as in Chapter 4, the underlying growth machine logic provides insight into the prioritization of short-term profit as the guiding value. For communities to become safer, a cultural shift is needed in which not only profit, but also sustainability, guides values (Mileti, 1999). The Sendai Framework, for example, promotes the need to shift towards a culture of disaster prevention (UNISDR, 2015a, 2015b). To reduce disaster risks and damages, a cultural shift in relation to human–nature interactions is needed in Alberta that also translates into policies and practices.

There are several notable contradictions in Alberta that have increased its vulnerability. First, there is a strong anti-regulation culture, yet it is the province with the highest reliance on disaster payouts from governments. Second, there is a strong anti-climate change attitude among the population and resistance to carbon tax from both citizens and the provincial government,[6] even though scientists have linked the magnitude of the 2013 southern Alberta flood and the 2016 Fort McMurray fire to climate change (Pomeroy, as cited in Coorsh, 2013; Flannigan, as cited in Schwartz, 2016). These contradictions in Alberta's pro-development and anti-regulation culture, as well as the rate of human-induced "natural" disasters have contributed to a socially, environmentally, and economically unstable condition that, when triggered by an atmospheric event, can climax into a perfect storm. Extreme events such as floods, fires, and even droughts are expected to increase in the prairie provinces with climate change (Institute for Catastrophic Loss Reduction, 2012).

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[6] Only 54% of Albertans believe there is conclusive or solid evidence that climate change is occurring; in contrast, the Canadian average is 61% (Ecofiscal Commission, 2018). Alberta is currently failing to meet its targets for reducing greenhouse gas emissions and is expected to fall short of reaching Canada's emission targets (Wood, 2018). Additionally, the current government has dropped out of the federal government's climate change tax plan aimed at reducing greenhouse gas emissions (Dawson, 2018).

So, how can a cultural shift be achieved? As noted earlier, approaches to disasters have evolved over time from a structural functionalist perspective to a social constructionist perspective (as described in Dissertation Chapter 1). The social constructionist perspective facilitated a social turn in how disasters are understood and approached, moving away from merely managing emergent disasters to reducing disaster risks through prevention (Raju & da Costa, 2018). If this logic is followed and combined with Perrow's (2007) observation about the concentration of powerful economic stakeholders in influencing decisions related to disasters, then a cultural transformation could potentially be achieved through a shift in the balance of power.

In Alberta, that would mean shifting political influence from stakeholders advocating for undeterred development towards stakeholders whose discourse aligns with a NEP and social constructionist perspective. This shift would involve giving more voice and influence in decision-making to those who continue to advocate for nonstructural social and natural mitigation measures targeting long-term, comprehensive land-use planning and natural resource management. These stakeholders tend to have expertise in emergency management, insurance, science (including hydrologists and ecologists), and academic scholarship. If this cultural shift occurs, perhaps then Alberta could reduce its reliance on structural measures and tip towards social and natural mitigation, thereby further diversifying its strategies. This would not be an easy task as the formulation, adoption, and implementation of hazard mitigation is an intensely political process (Prater & Lindell, 2000). I outline options for facilitating a cultural shift through changes in the distribution of risk and responsibility next.

Theme 3: Shifting From Government to Governance: More Balanced Apportionment of Risk and Responsibility

The Sendai Framework shifts responsibility for disaster risk reduction from a heavy, top-down government approach and makes it "everyone's business" (Raju & da Costa, 2018, p. 286). Spreading the responsibility for risk subsequently requires collaboration and coordination across all levels of government and with a range of private and public stakeholders, including engaging and empowering local authorities and residents, to improve disaster prevention by reducing vulnerability and strengthening accountability (Raju & da Costa, 2018; UNISDR, 2015b).

To fully adopt the Sendai Framework, Canada needs to overcome significant governance barriers such as the fragmented distribution of responsibility to manage disaster risk and limited stakeholder engagement and public awareness (Bogdan, Bennett, & Yumagulova, 2018; Haque, Kolba, Morton, & Quinn, 2002; Henstra & Thistlethwaite, 2017c). In Canada, a "flood is the responsibility of a patchwork quilt of entities" (McGillivray, 2016a, para. 14), but currently there is insufficient coordination and communication between and among them (Henstra & Thistlethwaite, 2017b; Shrubsole, 2013). As noted earlier, municipalities are in charge of development permits in Alberta, but the provincial government funds the majority of mitigation projects to reduce flood vulnerability at the local level, whereas provincial and federal governments provide disaster payments. This misalignment in benefits and costs is problematic.

An important finding from my research is the reversal of power in the provincial government and municipal governments in Alberta. Legally, municipalities are considered creatures of the provinces; however, politically, it appears that the Province of Alberta is a creature of the municipalities in terms of development regulations. The current political dynamics are such that there is also a strong bottom-up influence from municipal governments

and nongovernmental stakeholders in Alberta's flood risk governance. Scholars have tended to critique top-down approaches (Ashley et al., 2012; Haque, 2000). My research contributes to the less-often critiqued bottom-up approaches (Prater & Lindell, 2000; Shrubsole, 2000, 2013; Tierney, 2014). A mixed centralized–decentralized style of governance has been shown to successfully reduce flood risks (Grimes, Goos, Little, & Shannon, 2007; Hegger, Driessen, & Bakker, 2018; Rijke, van Herk, Zevenbergen, & Ashley, 2012). In Alberta, reducing flood vulnerability requires that the provincial government strengthen its role in promulgating and enforcing province-wide regulations to restrict floodway development in order to prevent municipalities from issuing development permits in flood-prone areas. Provinces such as Ontario and countries such as the Netherlands have achieved this level of accountability (see Henstra & Thistlethwaite, 2017a).

A common barrier to changing practices to reduce flood risk is a lack of resources (Hegger et al., 2016). One of the main reasons municipalities resist regulations that restrict development and the release of flood hazard maps is that they fear reduced property values and revenues from sales and taxes. Potential lost revenues are unappealing for municipalities because of pressure to increase amenities and services to residents and the rising costs of aging infrastructure. At the same time, provincial funding continues to decline. This financial fear seems unsubstantiated given that studies have shown that disclosing flood risk only marginally and temporarily reduces property prices (see Henstra & Thistlethwaite, 2018; Shrubsole, Green, & Scherer, 1997).

The responsibility of reducing flood risks and damages may be spread throughout society but, as I demonstrate in Chapter 3, risk apportionment in Alberta is divided in a way that is not fair, accountable, or transparent when there is lack of access to accurate information, including

flood risk maps, and lack of regulation and enforcement. The findings from my research corroborate those of Perrow (2007) that powerful political and economic stakeholders—in this case, municipal authorities, homeowner associations, the real estate industry, developers, and private industry—opposed regulations intended to reduce risks and suppressed criticism (see for example Groeneveld, 2006), which resulted not only in increased vulnerability to future risks for themselves, but also for others who are unaware and did not consent. Opposition from these powerful political and economic stakeholders to the Alberta government's recommendation to limit floodway development, to release flood hazard maps, and to place notification on land titles about flood risk also illustrate Molotch's (1976) growth machine logic of undeterred development.

The misalignment in risk apportionment in Alberta (also see Bogdan et al., 2018) identifies how the costs of disaster damages are spread across society but the benefits are concentrated for those with political and economic power. This finding is consistent with those of Freudenburg et al. (2008) who elaborated that misaligning risk apportionment in combination with hiding risks allows for the circular evasion of responsibility or the "circular liability crisis" (Freudenburg et al., 2008, p. 1023). More specifically, municipalities that permitted development in flood-prone areas or the real estate industry that did not provide information on the flood risks are not held responsible, leaving property owners and renters (and subsequently taxpayers and insurance holders) to pay for damages. This misalignment in risk apportionment creates socially unjust conditions by concentrating benefits in the hands of a few powerful stakeholders while spreading out the risks and costs to others. This circular liability crisis manifests as implicated stakeholders pointing fingers at other stakeholders, which was also a common finding in my research.

Similar to Tierney (2010, 2014) and Freudenburg and colleagues (2008, 2009), my research also raises concerns about the growth machine logic driving poor land use planning in flood-prone areas and environmental degradation. As noted above and in previous chapters, economic development and environmental protection are described as compatible in ecological modernization discourse, but this view is not supported by empirical evidence (see Foster, 2012). Rather, much research has demonstrated that the push for unlimited economic growth has increased environmental degradation, including increased greenhouse gas emissions and natural resource degradation. Freudenburg et al. (2008) also illustrated in their landmark study of Hurricane Katrina and the Mississippi River floods that human hazard-creation activities are conducted in the name of economic development, but result in damaging both the environment and, ironically, the economy. If the causes and consequences of disasters were accounted for and internalized in terms of environmental and social costs, and those who were responsible for making decisions that increased vulnerability were held financially responsible, then the risks would be more transparent and stakeholders would likely make different decisions. In conclusion, the shift from government to governance requires engaging and empowering stakeholders as well as establishing a more balanced apportionment of risk and responsibility as indicated in the Sendai Framework.

Theoretical and Analytical Contributions

In Dissertation Chapter 2, "Examining Flood Risk Governance by Bringing Perceptions and Practices Into Dialogue in the Threaded Situation Analysis Approach," I developed the TSA approach to address the theoretical and analytical limitations of existing frameworks (SARF, IRGC, and STAR-FLOOD) for assessing flood risk governance.[7] I did so by interfacing practice-

[7] See Chapter 2 for details.

based approaches and frame/framing analysis. I argued that facilitating a dialogue between these two enhances understanding of the complexity of flood risk governance in ways that using just one of these approaches might miss. A practice lens allowed for the examination of which ideas and policies are chosen out of all the options and how they are implemented on-the-ground. Practice-based approaches also provided the ontological concepts needed to empirically investigate practices through the elements of materials, meanings, and competencies, as developed by Shove, Pantzar, and Watson (2012), as well as rules, actors' roles, and actors' interactions (Goffman, 1974; Schatzki, 2016; Lave and Wenger, as cited in Wenger, 2010). To address the limitations of practice-based approaches for analyzing meanings and social interactions, I drew from the work of Dewulf et al. (2009), who distinguished between frames and framing (respectively). I also applied Schön and Rein's (1994) conceptualization of frames as problem definition and remedy promotion.

In the TSA approach, I reconstruct and reorganize factors identified as critical in the literature pertaining to water, flood, risk, and/or disaster governance. These factors are actors (roles, interactions as framing, and power dynamics); social structure (including formal and informal rules and institutions) and contexts (physical); and practices and their constituted elements (materials, meanings as frames, competencies). I accomplish this reconstruction with five maneuvers that are consistent with the governance literature and with inflections from critical realism. For example, I de-conflate (or reverse the collapsing of) actors, culture, and structure from practices and thereby reject the flat ontology of practice-based approaches. Also, I place situation rather than practices as the unit of analysis. A *situation* arises when actors, structure/context, and practices come together in an arrangement specific to a time and place. I examine each component (and their subcomponents) in the TSA approach, rather than collapsing

or subsuming them. With these five maneuvers, I move away from the metatheoretical foundations that characterize practice-theoretical traditions and distinguish the TSA approach from other approaches to assessing flood risk governance.

Even though I do not adopt the flat ontology characteristic of many practice-based approaches, I examine the interplay between agency and structure. Furthermore, I demonstrate that when investigating governance, it is critical to analyze not just practices but also additional concepts to gain insights into power dynamics that would have otherwise been missed. Specifically, I do so by incorporating a macrosociological perspective to examine structure (rules and institutions) and context (geographical features), as well as a microsociological perspective to examine stakeholders' roles and interactions. For example, growth machine logic echoes in the speech of the mayor of High River about the town's plan to continue growing even though it is located in an alluvial fan prone to flooding. By attending to this agency–structure interplay, I recreate the situation that shaped the actors' decisions and actions while recursively the actor shaped the situation.

I test the application of the TSA approach in Chapter 3. I did so by examining three situations which I found were sufficient to provide insights into the causes and conditions that contributed to building two neighbourhoods in designated high-risk flood zones and, consequently, how vulnerability to the flooding disaster was socially constructed. Similar patterns and analytic themes emerged from these three situations to those found in other empirical research (as described in Theme 3). I focused on components in the TSA approach that Shove et al. (2012) have not attended to such as actors; their roles, responsibilities, and interactions; rules; and power dynamics. Applying the TSA approach allowed me to identify actors, who are often decentered in practice-based approaches, and by doing so I was able to

determine their roles and how they have interpreted and negotiated them. I argue that these power dynamics would not have been revealed if actors and their roles and interactions had not been investigated. As I have demonstrated, rules (which Shove et al. also subsume) need to be examined in detail because how they are intended often differs from how they are implemented, which is due in part to influence from key stakeholders. For example, the informal practice of municipal governments signing off on a flood map before the provincial government publishes it. I focused on the practice routes identified by Shove et al. of emerging and disappearing, and I also proposed the new practice routes of suppressing and languishing.[8] Suppressing and languishing explain how some practices became dominant over others and also capture deliberate and wilful attempts by actors to influence practices that Shove et al.'s approach admittedly misses.

In Chapter 4, I applied the TSA approach by mainly focusing on frames to clarify meanings, framing in terms of whether actors agree or disagree with one another on frames, competencies/expertise of actors based on their professional roles, and practices. Doing so highlighted the clear divisions in perceptions and priorities that emerged between different stakeholder groups based on their expertise. The TSA approach provided tools for systematically describing and analyzing the complexities of flood risk governance that may have otherwise remained obfuscated. For example, analysis using the TSA approach revealed that despite the rhetoric about applying the Dutch RfR approach in Alberta, the frames that became dominant

[8] I define *suppressing* as a practice route that occurs when a practice could emerge or alter but is prevented directly or indirectly from doing so either by human actors or by other factors; hence, it stays dormant. I characterize *languishing* as a practice route in which components of a situation have emerged to some degree but have not gained enough traction to persist or to be effective; they have not disappeared but remain dormant.

were those of powerful stakeholders supporting the status quo of undeterred development and advocating for an increase in structural mitigation rather than nonstructural measures.

In summary, the TSA approach was a valuable framework for *describing* and *analyzing* flood risk governance in this case because it incorporates many of the critical variables of governance. Nevertheless, it is limited in its ability to *explain* social phenomena in terms of conditions, causes, and consequences. This is because the TSA approach is an analytical or heuristic model rather than an explanatory model; thus, it does not identify causal mechanisms of phenomena (see Dissertation Chapter 1). Consequently, other explanatory concepts (or analytic themes) were also needed, including circular liability crisis, the growth machine, and the concentration of political and economic power. These explanatory concepts were compatible with my findings. To assess whether change occurred in policies and practices, I drew on models of policy transfer such as Kingdon's (1984) multiple streams approach and Minkman, van Buuren, and Bekkers' (2018) policy transfer model. A more in-depth analysis of power would be worthwhile. Overall, creating a dialogue between perceptions and practices in the TSA approach has offered an analytical framework for the exploration of much-needed research on the interface between perceptions and practices (as management/intervention). Additionally, I demonstrate that applying the TSA approach can prove valuable in providing a deeper understanding of the nuances, contestation, and varied experiences related to flood risk governance. These insights are necessary to understand the governance challenges for reducing disaster risks and damages.

To further test the TSA approach I developed, it could be applied to case studies from other jurisdictions and other types of disasters. A potential area for innovation for the TSA approach is to present it to a focus group of decision-makers involved in flooding issues and receive feedback on the benefits and limitations of this model. These stakeholders could use the

TSA approach for their own purposes to analyze flood risk governance and facilitate discussion about the complexities of flood risk governance for policy-making.

Methodological Reflections and Contributions

I chose to conduct a case-study approach to provide rich insights into how flooding disasters are socially constructed. A case-study approach also allowed me to further develop my analytical framework (TSA approach) and to identify analytical themes (as described above). The conclusions from my case study are validated by a number of other studies that have found similar patterns and, in doing so, support my thematic generalizations (Stallings, 2007). More specifically, my research findings align with those found in other case studies on the sociopolitical factors influencing disasters such as the circular liability crisis (Freudenburg et al., 2008, p. 1023), the growth machine (Molotch, 1976, p. 309), and the concentration of political and economic power (Perrow, 2007). The analytic generalizations learned, such as languishing or suppressing of practices, may apply to other cases or a variety of situations (disaster types and locations) to some extent depending on the sociopolitical contexts. The thick descriptions I provided strengthen the analytical generalizability of this case study from which other researchers can determine if the findings are transferable (Merriam, 1998). Nevertheless, in-depth insights into the complexities of flood risk governance in Alberta are important regardless of the extent of generalizability because they identify existing barriers to reducing flooding risks and damages, and hence, opportunities for addressing them.

The diverse data sources—interviews, observations and field notes, policy documents (legislative transcripts, reports, and supplementary materials), and media articles—provided different angles for obtaining information. As such, I was able to weave together disparate pieces of information into a more comprehensive picture of flood risk governance in Alberta. The

interviews were invaluable because participants divulged information that I would not have been able to find elsewhere and also illuminated complicated stakeholder dynamics. The (communicative) internal validity of interview findings was strengthened through member checks by sharing the interview transcripts with participants who wanted a copy to review (Kvale, 2007).[9] Although not all participants asked to remain anonymous, I chose to keep the names of all participants confidential due to the power dynamics between stakeholders and the relatively small number of key informants who specialize in areas related to flooding in Alberta and the Netherlands.

The legislative transcripts revealed the specific issues to which elected officials were committed and their communication strategies to advance these issues, frustrations not just about current but also past decisions (some issues have been ongoing for decades), and the quality of relationships between and among political parties. Rather than using Nvivo 11 Pro, using NVivo 12 Plus, which has social network analysis tools, would have allowed for a more complex analysis of stakeholder interactions. Legislative transcripts are less commonly used in disaster studies than media documents even though they are publicly available, suggesting that they are an underutilised data source that could complement more common data sources to enhance the robustness of research (Sodero, 2016). In contrast to reports and supplementary materials which are often not accessible beyond a few years of the disaster event (or not at all if they are not released), legislative transcripts are publicly available online dating back to 1972. Reviewing transcripts from 1995 to 2018 provided insight into how and why flooding issues continue to reoccur. Reviewing legislative transcripts over this 23-year period, a time frame in which elected

[9] Of the 38 Alberta participants, 7 made minor modifications to their transcript. Of the 11 Dutch participants, 2 made minor corrections.

officials frequently changed and numerous floods occurred, confirmed that flooding problems originate in the social order due to political-economic factors and that individual actors perpetuate these trends. Therefore, a detailed, in-depth examination of the agency–structure interplay was justified to gain insight into the challenges of flood risk governance.

Together, the interviews, observations and field notes, policy documents, and media articles provided information that is not readily available but was critical for understanding the power dynamics between stakeholders and why certain decisions were made and practices implemented. These four data sources provided insight into the "the messy, dynamic, and fundamentally unscientific elements of crisis and disaster [such as] . . . modes of power, control, and alienation" (Sementelli, 2007, p. 506).

Recommendations

There is no shortage of recommendations from scholars, various levels of governments, and consultants on how to address flooding across the disaster phases. For example, research has shown that flooding issues can be addressed through effective governance by enhancing dialogue and collaboration between stakeholders, clarifying roles and responsibilities, improving transparency and accountability, coordinating policies and practices at all governmental levels, and mixing centralized and decentralized governance.[10] These recommendations are also reflected in "after action" or "lessons learned" reports published following the 2013 Alberta flood (Auditor General of Alberta, 2015; Kovacs & Sandink, 2013):[11]

- update flood hazard maps and mapping guidelines;
- designate flood hazard areas;
- complete floodway development regulations;

[10] See for example Driessen, Hegger, Bakker, Van Rijswick, and Kundzewicz (2016); Ek et al. (2016); Haque et al. (2002); Hegger et al. (2018); and Rijke et al. (2012).

[11] An in-depth review of the recommendations after the 2013 flood is out-of-scope in this research. See Appendix K for a list of reports.

- implement the recommendations from the Groeneveld (2006) report, including prohibiting the sale of Crown lands in designated floodplains;
- consider increasing the design flood criteria from a 100-year standard to 200-year (British Columbia), 500-year (Saskatchewan), or 700-year (Winnipeg, Manitoba) standards;
- actively communicate the flood risk to homeowners in the floodway and the flood fringe;
- promote collaboration between municipal governments, the insurance industry, and residents to promote actions that reduce the risk of urban flooding such as by-laws, regulations, and financial incentives to flood-proof homes; and
- mandate municipalities to release stormwater flood risk information.

In short, flood disasters continue to reoccur not due to a shortage of ideas or recommendations but rather as a result of deeper, more complex social dimensions of governance. These dimensions include the fundamental assumptions underlying how flooding problems are framed and subsequently the solutions proposed, and the power dynamics of stakeholders that determine whose ideas become dominant and implemented in practice. But these deeper, more complex issues are rarely addressed or even captured in post-disaster reports. When these reports are created and disseminated for rhetorical purposes, they get labelled as "fantasy learning documents" (Birkland, 2009, p. 147).

Drawing from the work of Donahue and Tuohy (2006), I identify three primary reasons why some of the key lessons from flooding disasters have not been implemented or have not been implemented effectively in Alberta with regard to restricting development in flood-prone areas and mandating transparency about flood risk.[12] First, access to information is an issue. Politicians and practitioners may not access scholarly publications on flood risk governance due to journal subscription fees and lack of awareness. Second, a lack of coordination and

[12] Donahue and Tuohy (2006) identified the following areas for lessons to be learned following disasters: uncoordinated leadership, failed communications, weak planning, resource constraints, and poor public relations. One of the barriers to learning these lessons is lack of motivation for change; political traction is needed, which diminishes once the initial emergency is over, public concern settles, and media attention wanes.

cooperation due to imbalanced power dynamics between stakeholders has resulted in the fragmentation of roles and responsibilities regarding flood risk maps and regulations, as described in Theme 3 (and Dissertation Chapter 3). The third reason is a lack of motivation for change. Elected officials aim for quick wins and are unlikely to make decisions that powerful stakeholder groups criticize and that may result in the loss of political support. As I argued in Chapter 3, avoiding politically unpalatable decisions may benefit powerful stakeholder groups that constitute a small percentage of the population, but they do not represent the majority of citizens who bear the cost of flood damages through unequal risk apportionment. It is challenging to engage sufficient numbers citizens to create and sustain political will for changing flood risk management practices if those practices encounter opposition from vocal and influential industry and citizen groups.

The challenge of engaging sufficient number of citizens arises from several conditions. The majority of Albertans and more broadly Canadians living in flood prone areas are not even aware of their flood risk, revealing a lack of transparency and accountability (see Dissertation Chapter 3). Additionally, being preoccupied with everyday and more immediate concerns, citizens are not likely to care enough about an issue to act unless they perceive it as an immediate threat to their life or assets. Finally, public engagement designed in ways that citizens and groups feel is not meaningful (and furthermore is tokenistic) discourages further participation (Bogdan et al., 2018; Haque et al., 2002; Sinclair, Diduck, & Fitzpatrick, 2008).

Having provided three explanations for why previous recommendations on addressing flooding issues have not been (successfully) implemented, what practical insights for policy and practice can I share based on my research? I begin by noting that a case study does not solve public problems nor resolve political conflicts. Rather, “it widens our understanding of

alternatives from which to make choices and interpret events" (Stallings, 2007, p. 79). Therefore, my suggestions are intended to highlight alternatives and opportunities to overcome the barriers currently faced. Reducing flooding risks and damages in Alberta requires multiple shifts as outlined earlier: (a) shifting from emergency management to risk reduction: status quo to safety; (b) shifting culture from framing disasters as caused by nature to that caused by human nature; and (c) shifting from government to governance: more balanced apportionment of risk and responsibility.

To achieve these three shifts, changes are needed in the sociopolitical dimensions, especially the power dynamics, to transform flood risk governance. Power dynamics can be changed through legislating roles and responsibilities (formal rules)—this is expedient, but given that it is often politically unpalatable, can be reversed just as quickly. A more difficult but enduring change in power dynamics requires a deeper shift in social interactions and social norms (informal rules). Research in Canada and other countries illustrates that two-way authentic dialogue among the full range of stakeholders and a collective or social learning[13] approach have been deemed successful to reconcile diverse views and demands and to develop shared understandings of problems and potential solutions in flood management (Ashley et al., 2012; Haque et al., 2002; McCarthy, Crandall, Whitelaw, General, & Tsuji, 2011; van Herk, Zevenbergen, Ashley, & Rijke, 2011). Innovative approaches such as serious games, including role-playing games, are well-established techniques for exploring natural resource management issues and policy development, including for wicked problems.[14]

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[13] Social learning allows for individuals to transcend the pursuit of their own interests and seek common ground.
[14] See for example Bots and van Daalen (2007); Furber, Medema, and Adamowksi, 2018; and Salvini, Van Paassen, Ligtenberg, Carrero, and Breg (2016). For instance, the Netherlands used a role-playing game in designing its RfR program.

Knowledge Mobilization

I have disseminated findings from my doctoral research in three publications, at 15 conferences, and during 10 invited talks, webinars, and panels, to academic and nonacademic audiences nationally and internationally. I presented on my initial research ideas at the 2014 Canadian Water Resources Association conference, which was attended by a few academics but mostly government representatives and practitioners in the water sector. I received valuable feedback from participants that helped to shape my research questions and overall design. Subsequently, I presented my research findings on the High River case study and from research on the Dutch RfR program at numerous conferences and research institutions. Feedback from participants has been invaluable in increasing my understanding of these topics, including the stakeholder dynamics. To further disseminate my research with the nonacademic community, I will develop a summary report on the main findings and make it available on my personal website.

I will submit Chapter 2, in which I develop the TSA approach, to one of two potential journals. *Public Organization Review* has a range of interests, including organizational theory, change, policy, and management. Arts, Leroy, and van Tatenhove (2006) introduced their policy arrangements approach in this journal. I will also consider *Global Environmental Change*, which publishes theoretically and empirically rigorous articles that advance the human and policy dimensions of global environmental change. Wiering et al. (2017) published the STAR-FLOOD's assessment framework in this latter journal. Chapter 3, on application of the TSA approach to gain insight into the social construction of the 2013 flooding disaster in High River, may be suitable for the *Journal of Risk Research*, similar to the work of Boholm, Corvellec, and Karlsson (2012), as the journal publishes theoretical and empirical research. I plan to submit

Chapter 4 to the *International Journal of River Basin Management*, which has a cross-disciplinary approach to river basin management and welcomes submissions related to river basin management and governance. This journal has published numerous articles on RfR (including Rijke et al., 2012). Further elaborating on findings in Chapter 4, another forthcoming publication is an examination of the role of ideas and expertise for adapting Dutch RfR projects in Alberta, "Frame Effectiveness as a Strategy for Politically Unpalatable Decisions in Flood Risk Management" (Bogdan, in progress). Frame effectiveness occurs when certain groups' values and interests become dominant in messaging, which can lead to gains in valuable resources to further their agenda (Krogman, 1996). All four journals are peer-reviewed.

I have published my research findings focusing on the role of public engagement in recovering from the 2013 flood through a comparative case study of High River and Calgary in *Community Engagement in Post-Disaster Recovery* (Bogdan et al., 2018). My coauthors and I found that the interaction with the public in Alberta was limited to merely informing, reflecting a general lack of transparency. In these Alberta communities, a critical opportunity was missed for stakeholders to negotiate a shared understanding of risk and build social capacity to collectively address flooding. In contrast, through my visiting scholarship, I found that many stakeholder engagement techniques applied in the Netherlands, such as role-playing simulation games to shift perceptions and positions, were best practices and also socially innovative, which enhanced the success of its RfR program.

In an additional publication analyzing the same comparative case study of High River and Calgary, my coauthors and I explored narratives (frames) of research participants and their communities at the early recovery stage (Bogdan, Bennett, & Yumagulova, in progress). Although some studies on collective narratives post-disaster have found that a focus on

individual and self-reliance strategy proved to be the faster and more effective approach to recovery, we found that narratives focusing on short-term individual actions such as heroes and helping hands may have discouraged a collective approach during the early recovery phase to prevent or minimize future disasters related to historic and systemic development issues (Bogdan et al., in progress).

Another avenue for mobilizing my research findings was through a community disaster preparedness workshop. A common theme that emerged in my research on flood risk governance was that, according to participants, most residents were not better prepared for future disasters, even after the town of High River had experienced a record-breaking flood. Even though it was not part of my research plans, I codesigned the We're Ready! Pilot Project with High River community volunteers and another researcher. We're Ready! was a team effort to bring together theory and practice in the field of disaster management. The objective was to facilitate neighbourhoods in designing and implementing their own disaster plan through community-building activities. Enhancing community connections and building participation are key because communities with strong social ties are more resilient, and disaster preparedness programs are more successful when they are community-driven. As a team, we implemented and evaluated two one-day workshops (33 participants). We're Ready! focuses on developing neighbourhood-based plans and thus differs from typical emergency preparedness approaches in Canada that tend to target individuals or households.[15] Participants asked for more opportunities for disaster training and within one year, there were three spin-off activities. The We're Ready! team was invited to present at the 2017 Resilient Calgary Symposium 2017. The We're Ready! Pilot

[15] The low-budget activities can be adapted by anyone and are available for free on the We're Ready! website that I fund (www.wereready.org).

Project was made possible by in-kind support from the Town of High River and a generous grant from the Centre for Community Disaster Research at Mount Royal University.

Concluding Comments

Although triggered by an atmospheric event, the causes and consequences of flooding disasters are not natural. Rather, they are a result of human nature, which can be traced back to the social order and practices stemming from cultural, legal, political, and economic factors that increase vulnerability. This research provides insights into the social roots of flooding problems in High River but also has relevance for other locations in Alberta and elsewhere. Perhaps the most significant theme from my findings is that the dominant culture of development suppresses socioecological flood risk governance. This suppression has resulted in a lack of regulations to restrict development in flood-prone areas. The push for development has also resulted in structural mitigation continuing to be dominant at the expense of nonstructural measures such as social and natural mitigation. Even the application of the RfR approach—which was initially perceived as inspiring a shift away from infrastructure toward a more comprehensive, environmentally sustainable flood risk management system—was chiefly rhetorical.

The consequence of these actions has been the concentration of economic benefits for a small number of elite while spreading of the risks and costs of flooding to the rest of society. However, these decisions appear economically profitable only if social and environmental costs are externalized and evasion of responsibility is abetted. Eventually, these social and environmental costs will add up to the point they can no longer be ignored. The pervasive cultural belief that technology can control nature, such as by attempting to create “floodless floodplains” (Klein, 2019, para. 4) to make room for more development, will continue to be brought into question with repeat disasters.

Among the many voices calling for vulnerability reduction is that of Don Barnett, former Mayor of Rapid City, South Dakota, who shared in a 1976 speech the devastating story of the 1972 flooding disasters in his constituency. His key argument: Keep people out of the floodways (Barnett, 1976). Whereas previous floods had resulted in the deaths of fewer than 10 people, the subsequent building of homes in the floodway behind flood infrastructure resulted in 272 deaths and injured over 3,000 people. Barnett also shared a story of hope, about "how a floodplain can be managed to make it safe for this generation and future generations" (1976, p. 2), through safe and productive land use practices, and beautiful outdoor recreation areas and parks.[16] As Barnett, the Dutch, and others have argued, there are other options to developing in flood-prone areas to make room for rivers. Achieving this new vision requires a shift in paradigm from fighting water to living with water. Moreover, it requires a deeper transformation in the relationship between people and nature that acknowledges interdependence. As scientists predict more catastrophic floods, droughts, and other disasters if the rate of greenhouse gas emissions is not halted, the very survival of humans depends on ensuring our planet's ecological integrity.

[16] After the 1972 flood, 1,100 families and 125 commercial and industrial businesses were successfully relocated.

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Appendix A: Classification and Definition of Flood Risk Management

Table A1 shows the four types of flood risk management strategies.

Table A1

Four Types of Flood Risk Management Strategies

Strategy	Strategy intent	Examples of practices (tactics)
Flood preparation	The preparation phase focuses on risk reduction and prevention. It involves a level of readiness to respond to emergency situations through strengthening technical and managerial capacities of governments, organizations, and communities.	• identifying hazards, calculating risk factors • forecasting, monitoring • developing policies, preparing plans • creating actor networks • conducting emergency training and exercises • developing emergency communication and warning systems • identifying human and material resources • providing information on hazards, emergency risks, and counter-measures • flood alerts and warnings
Flood response	The response phase efforts to minimize the hazards created by a disaster through triage and stabilization such as search and rescue, emergency relief, construction of emergency structures, and initial repairs to damaged infrastructure.	• search and rescue • evacuation • emergency relief (food, shelter) • construction of emergency structures • initial repairs to damaged infrastructure
Flood recovery	The recovery phase focuses on rebuilding and is distinct from the response phase in focusing on a longer post-disaster time frame. During this phase, efforts are focused on returning to normal or even better through short and long-term activities. During recovery operations, there are opportunities to increase prevention and preparedness, and consequently to reduce vulnerability.	• resource procurement • cleaning debris • reconstructing major infrastructure • remediating or rebuilding homes • programs and grants for temporary housing • social and mental health services • studies on review of causes and extent of damage (e.g. technical reviews, impact studies) • planning short and long-term • analyzing lessons learned
Flood mitigation	The mitigation phase involves on-going and sustained actions to eliminate or reduce the probability of a disaster event and/or minimize the impacts once the event occurs. The effectiveness of mitigation depends on enforcement and implementation of ongoing activities well in advance of disasters, such as incorporating policies aimed at reducing risk into daily decision making.	• developing and enforcing policies and regulations (e.g. zoning, building use regulations and safety codes) • land-use management • flood proof buildings • public education • hazard source control (e.g. wetland preservation and reforestation) • enforcement of legislation and regulations • mapping

Note. The various disaster phases are not necessarily linear and can overlap. Also, the strategies do not fall into distinct categories in real life. They are delineated in this chapter for illustration purposes. Adapted from *Facing Hazards and Disasters: Understanding Human Dimensions* by the National Research Council (2006).

Appendix B: Floodway and Flood Fringe Zones

Floodway and flood fringe zones are illustrated in Figure B1.

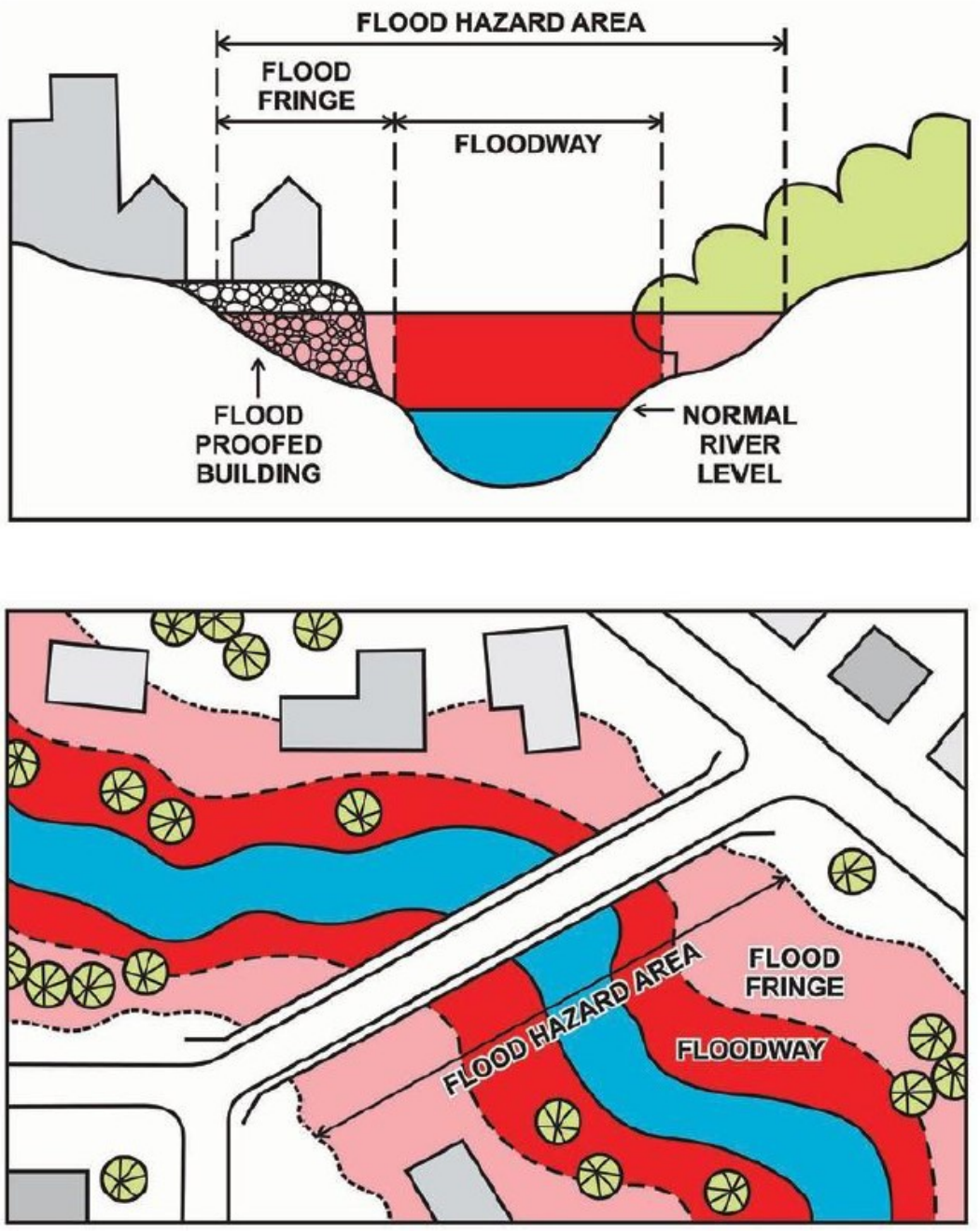

Figure B1. An illustration of floodway, flood fringe, and flood hazard zones.

From "Flood Hazard Identification Program: Floodway and Flood Fringe Zones" by Government of Alberta (2014).

Appendix C: Research Ethics Approval

The original project received research ethics approval from the University of Alberta Research Ethics Board on March 10, 2015, and was updated on December 15, 2016, to include research in the Netherlands. The following is the most recent research ethics approval.

Notification of Approval (Renewal)

Date:	February 5, 2019
Principal Investigator:	Eva Bogdan
Study ID:	Pro00055258
Study Title:	Flooding Discourse: Perceptions and Practices of Flood Management in Alberta and the Netherlands
Supervisor:	Kenneth Caine
Sponsor/Funding Agency:	SSHRC - Social Sciences and Humanities Research Council SSHRC

RSO-Managed Funding:

Project ID	Project Title	Speed Code	Other Information
n/a	Flooding discourse: Perceptions and practices of the 2013 flood management in High River, Alberta		

Approved Consent Form:

Approval Date	Approved Document
12/15/2016	Information Letter and Consent Form for Netherlands
12/15/2016	Information Letter and Consent Form for NL Focus Group
10/3/2015	Information Letter and Consent Form

Approval Expiry Date: Tuesday, February 4, 2020

Thank you for submitting this renewal application. Your application has been reviewed and approved.

This re-approval is valid for one year. If your study continues past the expiration date as noted above, you will be required to complete another renewal request. Beginning at 30 days prior to the expiration date, you will receive notices that the study is about to expire. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Sincerely,

Stanley Varnhagen, PhD.
Chair, Research Ethics Board 1

Note: This correspondence includes an electronic signature (validation and approval via an online system).

Appendix D: Telephone and Email Scripts

Telephone and Email Script for Alberta

My name is Eva Bogdan, and I am a PhD graduate student at the University of Alberta.

I would like to invite you to participate in a study on views of, and options for, flood management, decision-making, and participatory processes in the context of flooding in High River, Alberta. The term flood management encompasses policies and practices developed to prevent, manage, and reduce the impact of disasters and can be divided into four phases: preparedness, response, recovery, and mitigation (Henstra & McBean, 2005). The overall purpose of this research is to contribute to understanding of local-level responses to natural disasters.

Your participation in this project will help in better understanding the following: interactions of different levels of government, organizations, private sector, citizens, scientists, media, and others involved in flood management; the public engagement process; decision-making processes in choosing between various types of flood management; how flood management changed or did not change since the Alberta 2005 flood; and, what influence flood management might have on future risks of flooding.

This study aims to benefit the Town of High River as well as others involved in the development and implementation of plans and policies by municipalities and institutions related to flood management, by contributing and having access to the research findings. I also hope that you will personally benefit from reflecting on these aspects of flooding and flood management.

The interview process will begin in March 2015 and is expected to be completed in May or June, 2015, and will require spending 1–1.5 hours in a personal interview with me. I will ask about your involvement in the 2005 and/or 2013 Alberta floods and aspects of flood management. Participation will be completely voluntary, and you will have the right to withdraw from the study or refuse to answer any of the questions.

Email variation: Please let me know if you would like more information or if you have any questions regarding this study before deciding if you are interested in participating. I have attached the information letter as well as the questions, which are open-ended and fairly general.

Telephone variation: Would you like more information, or do you have any questions regarding this study before deciding if you are interested in participating?

Telephone and Email Script for the Netherlands

My name is Eva Bogdan, and I am a PhD student at the University of Alberta (Edmonton, Alberta, Canada) conducting a case-study comparison of perceptions and practices of flood management in Alberta and the Netherlands. For the Dutch context, I am interested in the design and implementation processes of Room for the River projects in the Netherlands and their transferability to Alberta.

I would like to invite you to participate in a study on views of, and options for, flood management, decision-making, and participatory processes in Room for the River projects in the Netherlands. The overall purpose of this research is to contribute to understanding of the social dimensions of flood management for disaster risk reduction.

Your participation in this project will help in better understanding the following aspects: interactions of different levels of government, organizations, private sector, citizens, scientists, media, and others involved in flood management; the public engagement process; decision-making processes in choosing between various types of flood management practices; how flood management changed or did not change in the Netherlands; and, what influence flood management might have on future risks of flooding.

This study aims to benefit those involved in Room for the River projects as well as others involved in the development and implementation of plans and policies by municipalities and institutions related to flood management in the Netherlands and Alberta, by contributing and having access to the research findings. I also hope that you will personally benefit from reflecting on these aspects of flood management.

The interview process will begin in January 2017 and is expected to be completed in April 2017 and will require spending 1–1.5 hours in a personal interview with me. I will ask about Room for the River projects you are or were involved in and your observations of the above-mentioned aspects. Participation will be completely voluntary, and you will have the right to withdraw from the study or refuse to answer any of the questions. There will also be an opportunity to participate in a focus-group/workshop with other Room for the River stakeholders to share your learnings from projects, to learn about flood management in Alberta, and to discuss transferability of Room for the River to Alberta.

Email variation: Please let me know if you would like more information or if you have any questions regarding this study before deciding if you are interested in participating. I have attached the Information Letter and Consent Form as well as the interview questions, which are open-ended and fairly general.

Telephone variation: Would you like more information, or do you have any questions regarding this study before deciding if you are interested in participating?

Appendix E: Information Letters and Consent Forms

UNIVERSITY OF ALBERTA
Sociology
Faculty of Arts

Room 5-21 HM Tory Building
Edmonton, Alberta, Canada T6G 2H4
www.ualberta.ca/sociology Tel: 780.492.5234
Fax: 780.492.7196

Information Letter and Consent Form for Alberta

Perceptions and Practices of Flood Management in High River, Alberta
Eva Bogdan (Principal Investigator), Department of Sociology, University of Alberta
Funded by the Social Sciences & Humanities Research Council

You are invited to participate in my research project on flood management in the Town of High River, the municipality hardest hit by Alberta's 2013 floods. Flooding is an environmental event that involves complex social and political issues, with many different views and interests. This interview is part of a research project looking at different views of, and options for, flood management, decision-making, and participatory processes. The overall purpose of this research is to contribute to understanding of local-level responses to natural disasters.

I ask you to be in this study because you may have been involved as a decision-maker or advisor in flood prevention, management, response, and recovery during the Alberta 2005 and/or 2013 floods or in land use management which influences flooding. Your participation in this project will help in better understanding the following: interactions of different levels of government, organizations, private sector, citizens, scientists, media, and others involved in flood management; the public engagement process; decision-making processes in choosing between various types of flood management; how flood management changed or did not change since the Alberta 2005 flood; and, what influence flood management might have on future risks of flooding. This study aims to benefit the Town of High River as well as others involved in the development and implementation of plans and policies by municipalities and institutions related to flood management, by contributing and having access to the research findings.

I also hope that you will benefit from the research by reflecting on these aspects of flooding and flood management and from the findings of the study. There is minimal risk to you by participating, other than potential feelings of stress when recalling flooding and the associated challenges during various phases of disaster management, especially during the response and recovery phases. These phases are not the main focus of the research, rather, the focus is on prevention and mitigation phases. The risks of participating will be no greater than those encountered in everyday life.

Participation in this research is *completely voluntary*. I will conduct the interview as part of my PhD research. The interview will be informal (conversational) and will probably take 1-1.5 hours. I will ask about your involvement in the 2005 and/or 2013 Alberta floods and aspects of flood management. The interview can take place at a time and location of your choosing. *If you do not feel comfortable* responding to particular questions during the interview, please simply indicate this during our interview.

I would like to *audio record* the interview in order to make sure I do not miss or misunderstand what you say, but will only do so if you give permission. I will also take some written notes. Your identity will be protected by changing names and other identifying information in all records and documents and by aggregating data. If you want to be identified (i.e., have your real name used) in publications, please indicate below. If you are interested, I will send a typed transcript of the interview for you to review (as

indicated below). Audio recordings and any written notes or documents from this interview will be kept on a password-secure computer and in a locked filing cabinet in my office. Access to data will be limited to myself and my two academic co-supervisors. If transcribers are hired, they will sign an agreement to keep your information confidential and secure. Identifiers will be destroyed following completion of this research (expected in Spring 2017) in a way that ensures privacy and confidentiality.

You have the right to withdraw from the research project without providing a reason and without consequences. If you decide you want some part or all of your interview withdrawn from the study, please contact me within one month after your interview. The interview process will begin in March and is expected to be completed in May or June 2015. The information collected during interviews will be used by me for dissertation, research articles, presentations, and teaching. The data may also be used in future research, but if this is the case it will have to be approved by a Research Ethics Board.

If you have questions or concerns about the interview or the research project as a whole, please ask at the time of the interview, or contact me at [telephone number] or [email address]. My academic supervisors, Dr. Ken Caine ([email address; telephone number]) and Dr. Mary Beckie ([email address; telephone number]), can also be contacted.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board 1 at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615.

Consent

By signing below, I indicate that I have read and understood the above information, and that I consent to participate in this research project. I have had an opportunity to ask questions about the research. I understand that I can choose not to answer any or all of the questions that are asked and can stop the interviews or withdraw from the research. I consent to the researcher using the results of my interview for the purposes specified above.

_____ _____ _____

Interviewee's Name Interviewee's Signature Date

Please initial below for any items to which you agree:

_____I consent to the interview being audio recorded ***OR*** _____I do NOT consent to audio recording and would prefer that the researcher only took hand written notes. ***(initial only one)***

_____ I would like for my name and identity to be used in this research project, and give permission to do so.

_____I do not want to review my transcripts ***OR*** _____ I would like to review my transcripts. ***(initial only one)***

_____I would like a copy of a report summarizing the findings of this research.

If you would like further information on documents produced from research findings (e.g., publications), please contact me at [email address].

Name of Interviewer _____

Signature of Interviewer _____ Date_____

Principal Research Investigator:
Eva A. Bogdan
Department of Sociology
University of Alberta
Edmonton, AB
[email address]

Supervisors:
Dr Ken Caine, Department of Sociology
Dr. Mary Beckie, Faculty of Extension
University of Alberta, Edmonton, AB
[email address; telephone number]
[email address; telephone number]

UNIVERSITY OF ALBERTA
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Fax: 780.492.7196

Information Letter and Consent Form for the Netherlands

Perceptions and Practices of Flood Management in Alberta and the Netherlands
Eva Bogdan (Principal Investigator), Department of Sociology, University of Alberta
Funded by the Social Sciences & Humanities Research Council

You are invited to participate in my research project on flood management in the Netherlands and Alberta. Specifically, I am interested in the design and implementation processes of Room for the River[1] (RfR) projects in the Netherlands and their transferability to Alberta. Historically, both Alberta and The Netherlands have focused on physical infrastructure approaches to flood mitigation. However, following catastrophic flood risk in the 1990s, the Dutch government developed the RfR Program, breaking from their 1000-year tradition of structural engineering approaches of 'fighting the water' to 'living with water.' In Alberta, the high cost of the 2013 flood disaster (estimated at $6 billion) and a growing sensitivity to the implications of climate variability triggered reassessment of costly structural solutions and exploration of other approaches, leading to an RfR pilot program (with the support of Dutch research institution Deltares) in some of the most impacted regions. Unlike transferable technological change, RfR requires fundamental institutional, governance, and cultural change, and hence is more challenging to implement.

Flooding is an environmental event that involves complex social and political issues, with many different views and interests. This interview is part of a research project looking at different views of, and options for, flood management, decision-making, and participatory processes. The overall purpose of this research is to contribute to understanding of the social dimensions of flood management for disaster risk reduction.

I ask you to be in this study because you may have been involved as a decision-maker or advisor in the Room for the River (RfR) projects or in land use management which influences flooding. Your participation in this project will help in better understanding the following aspects: interactions of different levels of government, organizations, private sector, citizens, scientists, media, and others involved in flood management; the public engagement process; decision-making processes in choosing between various types of flood management; how flood management changed or did not change in the Netherlands; and, what influence flood management might have on future risks of flooding. This study aims to benefit those involved in Room for the River projects as well as others involved in the development and implementation of plans and policies by municipalities and institutions related to flood management in the Netherlands and Alberta, by contributing and having access to the research findings.

I also hope that you will benefit from the research by reflecting on these aspects of flood management and from the findings of the study. There is minimal risk to you by participating, other than potential feelings of stress when recalling flooding and the associated challenges during various phases of disaster management, especially during the response and recovery phases. These phases are not the main focus of the research, rather, the focus is on prevention and mitigation phases. The risks of participating will be no greater than those encountered in everyday life.

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[1] The RfR program is a spatial planning process for creating space for water during high-flow events to improve flood safety while also incorporating values for environmental protection, recreation, and aesthetics.

Participation in this research is *completely voluntary*. I will conduct the interview as part of my PhD research. The interview will be informal (conversational) and will probably take 1-1.5 hours. I will ask about your observations of Room for the River projects you are/were involved in. The interview can take place at a time and location of your choosing. *If you do not feel comfortable* responding to particular questions during the interview, please simply indicate this during our interview.

Interviewees and others interested will also be invited to participate (also *completely voluntary*) in a focus group/workshop held in the Netherlands in April (location and date still to be determined). The focus group participants will have an opportunity to exchange information on their respective RfR projects in order to learn from each other. I will present a brief summary of my findings from the Alberta and the Dutch interviews and then we will have a discussion comparing and contrasting the findings and the transferability of RfR to Alberta.

I would like to *audio record* the interview in order to make sure I do not miss or misunderstand what you say, but will only do so if you give permission. I will also take some written notes. If you wish to remain anonymous, your identity will be protected by changing names and other identifying information in all records and documents and by aggregating data. Other measures will also be taken if you wish to not disclose your participation in the individual interviews during the focus group. If you want to be identified (i.e., have your real name used) in publications, please indicate below. If you are interested, I will send a typed transcript of the interview for you to review (as indicated below). Audio recordings and any written notes or documents from this interview will be kept on a password-secure computer and in a locked filing cabinet in my office. Access to data will be limited to myself and my two academic co-supervisors. If transcribers are hired, they will sign an agreement to keep your information confidential and secure. Identifiers will be destroyed following completion of this research (expected in Spring 2019) in a way that ensures privacy and confidentiality.

You have the right to withdraw from the research project without providing a reason and without consequences. If you decide you want some part or all of your interview withdrawn from the study, please contact me within one month after your transcript was sent to you. Or if a transcript was not request, one month after the interview. The interview process will begin in January and is expected to be completed in April 2017. The information collected during interviews will be used by me for dissertation, research articles, presentations, and teaching. The data may also be used in future research, but if this is the case it will have to be approved by a Research Ethics Board.

If you have questions or concerns about the interview or the research project as a whole, please contact me at [telephone number] or [email address]. My academic supervisors can also be contacted

<u>Netherlands:</u>
Dr. Jan van Tatenhove [email address] [telephone number]
Dr. Frans Klijn [email address] [telephone number]

<u>Canada:</u>
Dr. Ken Caine [email address] [telephone number]
Dr. Mary Beckie [email address] [telephone number]

If you feel significant stress after participating in this interview, please contact the Mental Health Care professionals suggested by the Dutch government which can be found at https://www.government.nl/topics/mental-health-services/question-and-answer/help-for-mental-health-problems or +31 (0)77 465 6767 or find the nearest mental health service provider near you at https://www.zorgkaartnederland.nl/ggz.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board 1 at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615.

Consent

By signing below, I indicate that I have read and understood the above information, and that I consent to participate in this research project. I have had an opportunity to ask questions about the research. I understand that I can choose not to answer any or all of the questions that are asked and can stop the interviews or withdraw from the research. I consent to the researcher using the results of my interview for the purposes specified above.

_____ _____ _____

Interviewee's Name Interviewee's Signature Date

Please initial below for any items to which you agree:

_____I consent to the interview being audio recorded ***OR***
_____I do NOT consent to audio recording and would prefer that the researcher only took hand written notes. ***(initial only one)***

_____ I would like for my name and identity to be used in this research project, and give permission to do so ***OR*** _____ I wish to remain anonymous

_____I do not want to review my transcripts ***OR***
_____ I would like to review my transcripts. ***(initial only one)***

_____I would like a copy of a report summarizing the findings of this research.

If you would like further information on documents produced from research findings (e.g. publications), please contact me at [email address].

_____I am interested in the focus group/workshop and wish to be contacted for participating

Name of Interviewer _____

Signature of Interviewer _____ Date_____

Principal Research Investigator contact information:
Eva A. Bogdan
Department of Sociology
University of Alberta
Edmonton, AB
[email address]

Appendix F: Interview Guides

Interview Guide for Alberta

1. Please describe your involvement in the 2005 and/or 2013 floods in the Town of High River. This can be direct or indirect involvement in flood management or in land-use practices which influence flooding. What were/are some of your day-to-day activities that involve aspects of flood management (e.g. planning, operations, technical aspects, enforcement of rules and regulations, designing or interpreting policy, engaging or responding to various stakeholders etc.)? Stakeholders includes those impacted by, and who impact, flood events and flood management, such as different levels of government, organizations, private sector, citizens, scientists, media, and others.
2. Please tell me about some of the different views and suggestions on how to manage the 2013 flood. Which of these options (e.g. structural and nonstructural approaches) were or will be implemented? Have these options changed from the time shortly after the flood event to now (2 years later)? Have these options changed since the 2005 flood?
3. What were some factors that helped the implementation of these options? What were some factors that hindered them?
4. In your mind, what do you think changed between 2005 and 2013 floods, if anything?
5. What would be the ideal flood management in Alberta?
6. What opportunities were there for stakeholders after the 2005 and 2013 floods to provide input or express their views and suggestions on flood management? Which stakeholders provided input? What effect do you think the stakeholder engagement had? How do these stakeholders influence each other as well as policy?
7. How were flood management decisions and decision-making processes received by various stakeholders regarding the 2013 flood? Is this different from the 2005 flood? How was the involvement of different stakeholders in flood management received?
8. What role did media play in the discussions on the flood event and flood management?
9. What do you think is the relationship between scientific predictions of flooding in this region and municipal, provincial, and federal government receptivity to these warnings? What short-term and long-term predictions have shaped flood-related policies in this region, if at all?
10. Have there been changes to the landscape that may have influenced the frequency and intensity of floods in this region? Have there been changes to land-use practices that may have increased the consequences of flooding in this region?
11. Do you think there will be flooding again in High River? Do you expect *preparation* to be different for the next possible flood? If yes, how? If no, why not? If flooding occurs again in High River, what do you think the *response* by governments, organizations, private sector, scientists, media, and citizens will be?
12. Looking back, what would have been useful to know for flood management or the process of deciding on flood management?
13. What documents or resources can you suggest for me to review to further understand flood management in High River and generally in Alberta?
14. What do you think would be useful outputs from this research? How can this research benefit the participants, Town, and others?

15. Is there anyone you suggest I contact for interviewing?
16. Is there anything you would like to add that is important for understanding flood management in High River?

Interview Guide for the Netherlands

1. Please describe your involvement in the Dutch Room for the River (RfR) project. This can be direct or indirect involvement in flood management or in land-use practices which influence flooding. What were/are some of your day-to-day activities that involve aspects of flood management (e.g. planning, operations, technical aspects, enforcement of rules and regulations, designing or interpreting policy, engaging or responding to various stakeholders etc.)? Stakeholders includes those impacted by, and who impact, flood events and flood management, such as different levels of government, organizations, private sector, citizens, scientists, media, and others.
2. 36 RfR projects have been implemented in The Netherlands. What are the next steps? Will there be more RfR projects?
3. What were some factors that helped the implementation of RfR? What were some factors that hindered them?
4. In your mind, what do you think changed between the 1953 flood disaster, 1993 & 1995 flood scare, and now, if anything?
5. What would be the ideal flood management in the Netherlands?
6. What opportunities were there for stakeholders of RfR projects to provide input or express their views and suggestions on flood management? Which stakeholders provided input? What effect do you think the stakeholder engagement had? How do these stakeholders influence each other as well as policy?
7. Please describe some of the RfR flood management decisions and decision-making processes. How were these decisions and processes received by various stakeholders? How was the involvement of different stakeholders in flood management received? What role did media play in the discussions on the flood event and flood management?
8. What do you think is the relationship between scientific predictions of flooding in this region and municipal, provincial, and federal government receptivity to these warnings? What short-term and long-term predictions have shaped flood-related policies in this region, if at all?
9. Have there been changes to the landscape that may have influenced the frequency and intensity of floods in this region? Have there been changes to land-use practices that may have increased the consequences of flooding in this region?
10. Do you think there will be (severe?) flooding again in the Netherlands ? Do you expect *preparation* to be different for the next possible flood? If yes, how? If no, why not? If flooding occurs again in the Netherlands, what do you think the *response* by governments, organizations, private sector, scientists, media, and citizens will be?
11. Looking back, what would have been useful to know for flood management or the process of deciding on flood management?
12. What documents or resources can you suggest for me to review to further understand RfR and flood management generally in the Netherlands?
13. What do you think would be useful outputs from this research? How can this research benefit the participants, Netherlands, and others?
14. Is there anyone you suggest I contact for interviewing?
15. Is there anything you would like to add that is important for understanding flood management in The Netherlands?

Appendix G: Participant Selection, Classification, and Interview Analysis

Participants or interviewees were selected based on their decision-making or advisory roles in flood management, including representatives from government (federal, provincial, municipal), community-level organizations, scientific institutions, media, and the private sector (see Tables G1 and G2). The representatives of these institutions were targeted because they have expertise or specialized knowledge and training related to various aspects of flood management, and since this group affects the activities of all others in society. For example, government employees write policies that are turned into rules and regulations, engineers build dams, and NGOs run programs, potentially directly or indirectly influencing the daily lives of citizens. Other researchers have interviewed citizens about how the 2013 flood in High River impacted them personally, which is not the focus of this research.

One of the challenges of this research is that the institutions/organizations listed in Tables G1 and G2 may not represent the voices and decisions of all stakeholders, especially those considered marginalized. To address this limitation, I inquired about decision-making and participatory processes, such as public engagement workshops. Interviewees discussed having had multiple disciplinary expertise or specializations over the course of their careers. This diversity in disciplines broadened their perceptions and experiences, leading to a broader understanding of multiple viewpoints and interests. Interviewees were not asked directly during the interviews about their various disciplinary specializations, instead I inferred these pieces of information from the interviews, participants' job titles, or by searching for information on the internet such as LinkedIn. Interviewees were categorized into a maximum of two specializations (the order of the specialization does not represent a hierarchy).

For the Alberta case study, as shown in Figure G1, environment specialists made up the largest proportion of interviewees (16%) with management as the second highest (13%). In contrast, in the Netherlands it was bureaucracy specialists (36%) and engineers (14%). It is not surprising that I was introduced to these types of specialists in the Netherlands because they are familiar with the Room for the River program and projects. As shown in Figure G2, Dutch bureaucracy specialists were three times more represented amongst the interviewees than those in Alberta (12%). Alberta bureaucrats were more hesitant to be interviewed and were more cautious about what information they communicated which is understandable given that emotions and scrutiny regarding the 2013 flood were still heightened at the time of the interviews (2015).

Table G1

Description of Interviewee Expertise Classifications

Expertise classification	Description of expertise
Bureaucracy	Administration positions for which interviewees were hired to work in government at all levels (municipal, provincial, federal). Bureaucracy also includes academic research positions focusing on policy, governance, and administration.
Politics	Positions for which interviewees are elected in government at all levels (municipal, provincial, federal).
Communication	Journalists, reporters, photographers, writers, and radio hosts.
Development and building	Developers and building contractors including construction and remediation.
Economics & money	Economics, business, insurance, investments, and finances.
Emergency management	Emergency management degrees or positions.
Engineering	Professional engineering designation or degree in engineering, including civil engineering, and water resource engineering.
Environment	Environment includes environmental resource management, environmental policy analysis, sustainability and natural sciences such as ecology, biology, agriculture, hydrology, etc.
Land use	Land-use specialists and planners.
Management	Includes vice president, insurance management, involvement in management committees, flood recovery management, and others (not including emergency management).
Other	Other refers to other areas of specialization or unassigned which means the categorization in Specialization 1 suffices or I do not know what other areas of specialization they have.

Table G2

Distribution of Expertise Among Alberta & Dutch Interviewees

	Alberta interviewees (*n* = 38)		Dutch interviewees (*n* = 11)	
Expertise	Frequency	Percentage	Frequency	Percentage
Environment	12	16%	2	9%
Management	10	13%	2	9%
Bureaucracy	9	12%	8	36%
Economics & money	9	12%	1	5%[a]
Communications	9	12%	1	5%[a]
Politics	7	9%	n/a	n/a
Other	6	8%	3	14%
Engineering	6	8%	3	14%
Development & building	3	4%	n/a	n/a
Land use	3	4%	2	9%
Emergency	2	2%	n/a	n/a
TOTAL	76	100%	22	100%

[a] Figures are rounded.

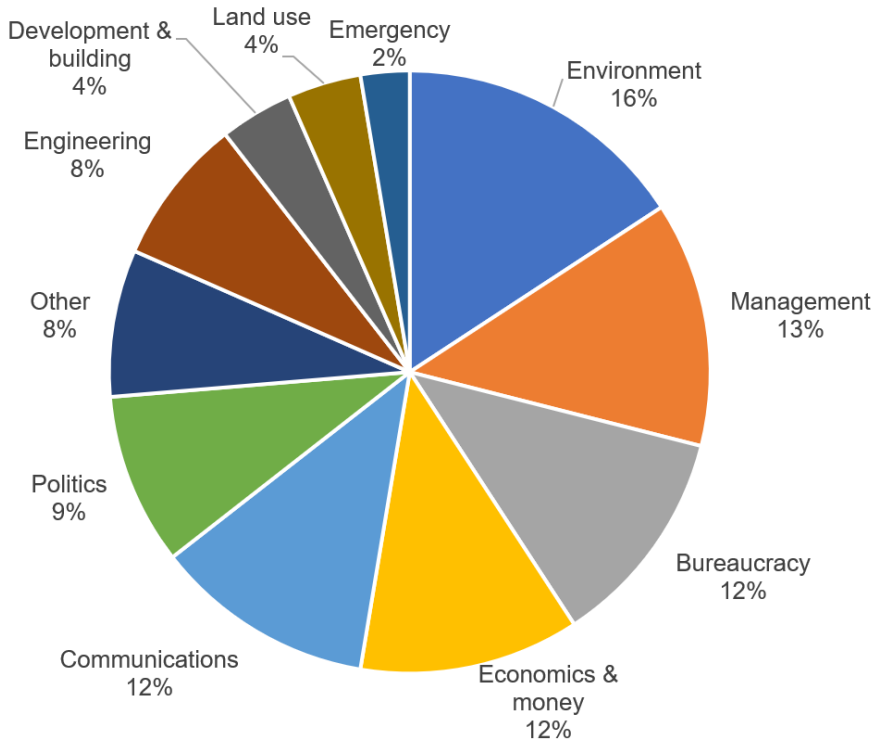

Figure G1. Proportion of expertise among Alberta interviewees.

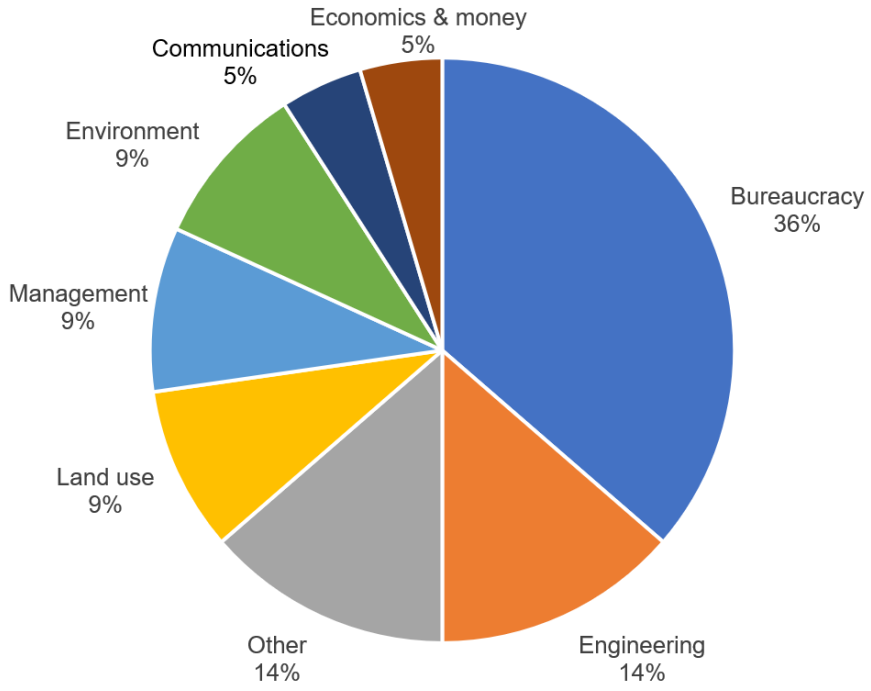

Figure G2. Proportion of expertise among Dutch interviewee (figures are rounded).

In contrast, the Dutch were proud of their Room for the River program and were enthusiastic about promoting it. For the Dutch, engineering and other made up the second largest groups, each with 14% of interviewees, including for the Room for the River program which still applies engineering principles and approaches. In Alberta, only 8% of my interviewees were engineers, and they tended to further specialize in hydrology. Unlike in Alberta, I did not interview anyone in the Netherlands with expertise in politics, emergency management, economics and money, or development and building. In Alberta, seven participants had politics as specialty, meaning they were either still in politics or had retired from it. Given that the 2013 flood is controversial, I am fortunate to have had the chance to interview this group. It was an eye-opening experience in terms of the challenges faced by those in politics as they need to consider a broad range of stakeholder interests in their decision-making and the importance of political maneuvering. I interviewed only three interviewees with specialization in development and building. This group had valuable insights as described in Chapter 4, and it would be beneficial to learn more about their perspective with regards to flooding issues. Interviewing participants with economics and money as specializations, such as those working in the insurance and banking industry (12%), provided insight into the complex role of finance in risk management and risk apportionment.

Communication specialists included journalists, reporters, and photographers in Alberta (12%) who were familiar with the sequence of events and captured the experience of the flooding in ways that etched the stories of devastation into the hearts and minds of those who were not there. In the Netherlands, I interviewed only one communication specialist who was an expert in public engagement, and I was profoundly impressed with how the Dutch approach negotiation and conflict resolution—so much so, that I am finding ways to keep learning about it and applying it.

Among the Alberta participants, I interviewed 28 men and 10 women (74% and 26%, respectively). Among the Dutch participants, I interviewed nine men and two women (82% and 18%, respectively). A more balanced gender representation amongst the interviewees in Alberta and the Netherlands would have been ideal. This is a challenge because women tend to be underrepresented in higher-level decision-making roles such as managers and directors, and in the sciences including engineering. The majority of interviews were conducted face-to-face except for two interviews in Alberta which were conducted by phone because the participant lived in another province. Alberta interviews lasted between 30 and 330 minutes for a total of 3,243 minutes (or 54.1 hours), with an average of about 1.5 hours per interview (based on 35 interviews). Dutch interviews lasted between 39 and 223 minutes for a total of 1,123 minutes (or 18.7 hours), with an average of about 1.9 hours per interview (based on 10 interviews).

Interviews were digitally recorded, transcribed, coded, and analyzed using NVivo 10, 11, and 12 Pro (http://www.qsrinternational.com/ products_nvivo.aspx). Out of the 38 Alberta interviewees, 13 (34%) asked to be anonymous. Out of the 11 Dutch interviewees, none of them asked to be anonymous (0%). Even though not all interviewees asked to remain anonymous, I chose to keep all names confidential due to the power dynamics between stakeholders and the relatively small number of key informants who specialize in areas related to flooding in Alberta and the Netherlands.

Appendix H: Legislative Document Selection and Analysis

I analyzed three types of legislative documents: (a) Hansard transcripts, (b) Votes and Proceedings, and (c) Committee of Supply Records. *Hansard transcripts*, also referred to as legislative transcripts, are the official, written, verbatim reports of the debates of elected officials during formal sittings in the legislature or parliament. The *Votes and Proceedings* are the meeting minutes of the House. It is a summary of what was done, and the decisions and votes on House business. Votes and Proceedings differ from Hansard, which is a complete transcript of what was said in the House. The *Standing Committee on Public Accounts (PAC) Reports* provide information on financial expenditures, signalling the priorities of the Government of Alberta. The PAC Reports are based on the work of the Standing Committee on Public Accounts composed of 15 Members of the Legislative Assembly (MLAs). The Committee reviews the public accounts of the province and reports of the Auditor General of Alberta.

These three types of legislative documents are available online at the Legislative Assembly of Alberta website.[1] I searched for the term *High River*. I also searched for the term flood* with the asterisk (*) indicating that flood is a stem word and can include flooded, flooding, floods, floodway, etc. For each document reviewed, I recorded the type of legislative document, date, and summary of the topic pertaining to flooding in a spreadsheet. I manually coded a minimum of 20% of the documents relevant to flooding in High River or Alberta.[2] The grouping of timeframes reflect the Legislative Assembly online library system.

I did not analyze information which referred to flooding other than in High River, for example, I omitted Cypress flood in 2010, Fort McMurray flood in 2013 and 2016, the flood in the Miseracordia Hospital due to technical errors, or general discussions of flood which did not add to understanding of the causes and consequences of flooding in High River. I also did not focus on the problems associated with the response phase of the flood (including the controversial response by the RCMP) or the Disaster Recovery Program offering financial compensation for flood victims—these topics made up a large portion of the search hits but are out of scope for my dissertation.

2013 High River Flood

Based on the most relevant topics, I purposively selected about 20% of Hansards for analysis from each time range pertaining to the 2013 flood. For Hansards between 2012 and 2014, I selected documents based on the number of text search hits, relevance to discussions from the PAC and Votes and Proceedings Reports, and chose documents published before the flood, first session after the flood, in the middle of flood recovery, and towards the end of 2013. In some situations, I selected more than 20% of the documents for coding and in-depth analysis if the document clarified an issue, further added to enhancing understanding of a specific issue,

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[1] Hansards: http://www.assembly.ab.ca/net/index.aspx?p=han&section=doc&fid=1
Votes & Proceedings: http://www.assembly.ab.ca/net/index.aspx?p=vp&section=doc&fid=2
Public Accounts Committee: http://www.assembly.ab.ca/net/index.aspx?p=pa&section=doc&fid=29

[2] I manually coded the legislative documents rather than using the autocode function of Nvivo because the documents contain a range of issues that are discussed during the legislative sessions which do not pertain to the 1995, 2005, and 2013 floods in Alberta.

or introduced a new but relevant issue. In total, I coded 64 legislative documents pertaining to the 2013 High River flood (see Table H1).

Table H1

Summary of Legislative Documents Pertaining to the 2013 Flood in High River, Alberta

Type of legislative document	First session after flood	Last session reviewed	Search terms	Documents found referencing the search terms				
				Date	Hits	# of docs	# coded	% analyzed
Hansard transcripts	Oct. 28, 2013	April 19, 2018	Flood* AND High River	May 23, 2012–Dec. 4, 2013	2,321	35	8	
				Mar. 3, 2014–May 8, 2014	651	29	6	
				Nov. 17, 2014–Mar. 26, 2015	251	9	2	
				Jun. 11, 2015–Dec. 10, 2015	157	9	3	
				Mar. 8, 2016–Dec. 13, 2016	106	8	5	
				Mar. 2, 2017–Dec. 13, 2017	100	8	3	
						98	27	27.5%
Votes and Proceedings	Oct. 28, 2013	Nov. 29, 2017	Flood*	May 23, 2012–Dec. 4, 2013	25	11	9	
				Mar. 3, 2014–May 8, 2014	25	7	5	
				Nov. 17, 2014–Mar. 26, 2015	23	6	4	
				Jun. 11, 2015–Dec. 10, 2015	6	3	2	
				Mar. 8, 2016–Dec. 13, 2016	6	4	2	
				Mar. 2, 2017–Dec. 13, 2017	3	3	2	
						34	24	70.6%
Standing Committee on Public Accounts	Nov. 20, 2013	Nov.14, 2017	Flood*	May 30, 2012–Dec. 4, 2013	2	2	0	
				Mar. 5, 2014–May 29, 2014	7	3	1	
				Nov. 18, 2014–Mar. 24, 2015	77	3	3	
				Jun. 25, 2015–Feb. 4, 2016	94	5	3	
				Mar. 15, 2016–Feb 28, 2017	78	5	4	
				Mar. 7, 2017–Dec. 12, 2017	20	4	2	
						22	13	59.1%

Note. In the table, *denotes a stem word.

Other legislative documents also examined include:

1. Bill 27: Flood Recovery and Reconstruction Act. First session, 28th Legislature, 62 Elizabeth II. 2013. Retrieved from http://www.assembly.ab.ca/ISYS/LADDAR_files/docs/bills/bill/legislature_28/session_1/20120523_bill-027.pdf
2. Conservation Authorities Act, R.S.O. 1990, c. C.27. Retrieved from https://www.ontario.ca/laws/statute/90c27
3. Constitution Act, 1867. Retrieved from Justice Laws website: https://laws-lois.justice.gc.ca/eng/Const/page-4.html#h-19
4. Emergency Management Act, Revised Statutes of Alberta (2000, c. E-6.8). Retrieved from http://www.qp.alberta.ca/documents/Acts/E06P8.pdf
5. Municipal Government Act, R.S.A. 2000, c. M-26. Retrieved from http://www.qp.alberta.ca/documents/Acts/m26.pdf

6. Water Act: Revised Statutes of Alberta 2000 Chapter W-3. Retrieved from http://www.qp.alberta.ca/documents/Acts/w03.pdf

2005 High River Flood

I examined all 18 legislative documents (Hansards, Votes and Proceedings, Committee of Supply Records) for the 2005 flood which occurred over three events (June 6, 9, and 16) which indicated search terms flood* and High River were found. I coded those that were relevant (n = 6). Surprisingly, Hansards from 2005–2007 did not mention flooding in High River even though the damage was $400 million with 11,000 applicants for the Disaster Recovery Program which exceeded the total sum of all previous programs in the last ten years (Hansard, 2005 Nov. 17). To expand the database, I conducted a search for the 2005 time period for only the search term flood* which resulted in 47 hits in 24 documents. One document had 11 hits whereas the remaining 23 documents ranged from 1–4 hits. Based on my experience analyzing the 2013 documents, those with the most hits for search term yielded the most relevant data, therefore I only included the one document in 2005 with 11 hits. I coded a total of six legislative documents pertaining to the 2005 High River flood, as depicted in Table H2.

Table H2

Summary of Legislative Documents Pertaining to the 2005 Flood in High River, Alberta

Type of legislative document	First session after flood	Last session reviewed	Search terms	Documents referencing search terms				
				Date	Hits	# of docs	# coded	% analyzed
Hansard	Nov. 15, 2005	Dec. 4, 2007	Flood* AND High River	Mar. 1, 2005–Dec. 1, 2005	6	2	1	
				Feb 22, 2006–Aug. 31, 2006	23	3	0	
				Mar. 7, 2007–Dec. 4, 2007	42	7	4	
				Feb. 4, 2008	0	0	0	
						12	5	41.7%
Votes and Proceedings	Nov. 15, 2005	Mar. 7, 2005	Flood*	Mar. 1, 2005–Dec. 1, 2005	2	2	0	
				Feb 22, 2006–Aug. 31, 2006	0	0	0	
				Mar. 7, 2007–Dec. 4, 2007	0	0	0	
				Feb. 4, 2008	0	0	0	
						2	0	0%
Standing Committee	Nov. 16, 2005	June 4, 2008	Flood*	Mar. 9, 2005–Nov. 30, 2005	0	0	0	
				Mar. 1, 2006–Aug. 30, 2006	0	0	0	
				Mar. 14, 2007–Nov. 28, 2007	6	3	1	
				Apr. 23, 2008–Dec. 3, 2008	1	1	0	
						4	1	25.0%

Note. In the table, *denotes a stem word.

1995 High River Flood

Searching for flood* AND High River resulted in only two Hansard documents from 1995–1996. Therefore, I decided to search for only flood* in the three types of legislative documents. For the 1995–1996 Hansards, I reviewed all documents but coded only those with the most number of hits. I reviewed all of the remaining legislative documents which had hits as there were relatively few, but only coded those that were relevant (see Table H3). I coded a total of eight documents for the 1995 High River flood.

Table H3

Summary of Legislative Documents Pertaining to the 1995 Flood in High River, Alberta

Type of legislative document	First session after flood	Last session reviewed	Search terms	Documents referencing search terms				
				Date	Hits	# of docs	# coded	% analyzed
Hansard	Oct. 11, 1995	Dec. 2, 1998	Flood*	Oct. 11, 1995–Nov. 1, 1995	84	18	5	
				Feb. 10, 1997–Feb. 11, 1997	0	0	0	
				Apr. 14, 1997–Dec. 10, 1997	9	1	2	
				Jan. 27, 1998–Jan. 29, 1998	14	3	0	
					107	22	7	31.8%
Votes and Proceedings	Feb. 13, 1996	N/A	Flood*	Feb. 13, 1995–May 16, 1995	0	0	0	
				Feb. 13, 1996–Aug. 27, 1996	4	3	0	
				Feb. 10, 1997–Feb. 11, 1997	0	0	0	
				Apr. 14, 1997–Dec. 10, 1997	3	3	0	
					7	6	0	0%
Standing Committee	Oct. 25, 1995	May 28, 1997	Flood*	Feb. 22, 1995–Nov. 1, 1995	5	2	0	
				Mar. 27, 1996–May 22, 1996	0	0	0	
				Apr. 23, 1997–Dec. 10, 1997	6	2	1	
				Feb. 4, 1998–Dec. 2, 1998	3	3	0	
					16	7	1	14.3[b]

Note. In the table, *denotes a stem word. [b] The proportion of documents coded fell below the targeted 20%. This is because only one document met the selection criteria for coding.

I examined a total of 128 legislative documents that fit into the three categories of (a) Hansard transcripts, (b) Votes and Proceedings, and (c) Committee of Supply Records. I coded them pertaining to the 2013 (n = 64), 2005 (n = 6), and 1995 (n = 8) floods. Of those legislative documents examined, I coded a total of 78. The percentage of documents coded varied from 33–67%, as depicted in Table H4.

Table H4

Total Number of Legislative Documents Analyzed

Topic	Range of dates for documents	Examined	Coded	Percentage coded
2013 flood	May 23, 2012–Dec. 13, 2017	88	64	73%
2005 flood	Mar. 1, 2005–Dec. 3, 2008	18	6	33%
1995 flood	Feb. 13, 1995–Dec. 2, 1998	22	8	36%
TOTAL	1995–2018 (23 years)	128	78	61%

Appendix I: List of Legislative Documents

The following legislative documents were all manually coded in-depth in Nvivo as noted in Appendix H. The documents are divided into three sections: (a) Hansard transcripts, (b) Votes and Proceedings, and (c) Committee of Supply Records.

Hansard Transcripts

Province of Alberta, Legislative Assembly of Alberta:

(1995, March 23). "Environmental Protection." *Edited Hansard*. 23rd Legislature, 3rd Session, 6:00 p.m., (pp. 121–146).

(1995, October 12). "Oldman River Dam." *Edited Hansard 1919*. 23rd Legislature, 3rd Session, 1:30 p.m. (pp. 1919–1920).

(1995, October 17). "Supplementary Estimates 1995-96." *Edited Hansard 1970*. 23rd Legislature, 3rd Session, 8:00 p.m. (pp. 1969–1982).

(1995, October 18). "Supplementary Estimates 1995-96." *Edited Hansard 2021*. 23rd Legislature, 3rd Session, 8:00 p.m. (pp. 2013–2028).

(1995, October 24). "Bill 45 Appropriation (Supplementary Supply) Act, 1995 (No. 2)." *Edited Hansard 2147*. 23rd Legislature, 3rd Session, 8:00 p.m. (pp. 2145–2154).

(1997, May 15). "High River Flood Control." *Edited Hansard 591*. 24th Legislature, 1st session. 1:30 p.m. (pp. 591–592).

(1998, December 2). "Irrigation Canal Repair." *Edited Hansard 2272.* 24th Legislature, 2nd Session, 1:30 p.m. (pp. 2271–2272).

(2005, November 17). "Flood Disaster Relief." *Edited Hansard 1708*. 26th Legislature, 1st Session, 1:30 p.m. (pp. 1708–1709).

(2007, March 20). "Bill 20 Appropriation (Supplementary Supply) Act, 2007." *Edited Hansard 233*. 26th Legislature, 3rd Session, 1:00 p.m. (pp. 232–237).

(2007, March 20). "Bill 3 Climate Change and Emissions Management Amendment Act, 2007." *Edited Hansard 233*. 26th Legislature, 3rd Session, 1:00 p.m. (pp. 241–248).

(2007, April 5). "Flood Preparedness." *Edited Hansard 440*. 26th Legislature, 3rd Session, 1:00 p.m. (pp. 440–441).

(2007, May 30). "Environment." *Edited Hansard 1412*. 26th Legislature, 3rd Session, 1:00 p.m. (pp. 1411–1416).

(2007, June 12). "Bill 30 Disaster Services Amendment Act, 2007." *Edited Hansard 1714*. 26th Legislature, 3rd Session, 1:00 p.m. (pp. 1713–1716).

(2012, May 30). "Flood Risk Management in Southern Alberta." *Edited Hansard 92*(5). 28th Legislature, 1st Session, 1:30 p.m. (pp. 92–97).

(2013, March 21). “New School Construction Priorities.” *Edited Hansard 1686*(40). 28th Legislature, 1st Session, 1:30 p.m. (p. 1686).

(2013, October 28). “Flood in Southern Alberta.” *Edited Hansard 2481*(60). 28th Legislature, 1st Session, 1:30 p.m. (pp. 2481– 2483).

(2013, October 28). “Flood Mitigation.” *Edited Hansard 2481*(60). 28th Legislature, 1st Session, 1:30 p.m. (p. 2486).

(2013, October 28). “Flood Recovery.” *Edited Hansard 2481*(60). 28th Legislature, 1st Session, 1:30 p.m. (pp. 2492–2493).

(2013, October 28). “Flood Recovery and Reconstruction Act.” *Edited Hansard 2481*(60). 28th Legislature, 1st Session, 1:30 p.m. (p. 2495).

(2013, October 29). “Flood Mitigation.” *Edited Hansard 2516*(61). 28th Legislature, 1st Session, 1:30 p.m. (p. 2516–2517).

(2013, October 29). “Flood-related Insurance Claims.” *Edited Hansard 2516*(61). 28th Legislature, 1st Session, 1:30 p.m. (p. 2519).

(2013, October 29). “Flood Recovery Contracts.” *Edited Hansard 2516*(61). 28th Legislature, 1st Session, 1:30 p.m. (pp. 2523–2528).

(2013, October 29). “Tabling Returns and Reports.” *Edited Hansard 2516*(61). 28th Legislature, 1st Session, 1:30 p.m. (pp. 2526–2524).

(2013, October 29). “Bill 27 Flood Recovery and Reconstruction Act.” *Edited Hansard 2549*(62e). 28th Legislature, 1st Session, 7:30 p.m. (pp. 2549–2550).

(2013, October 29). “Bill 27 Flood Recovery and Reconstruction Act.” *Edited Hansard 2549*(62e). 28th Legislature, 1st Session, 7:30 p.m. (pp. 2549–2550).

(2013, November 5). “Flood Mitigation.” *Edited Hansard 2717*(65a). 28th Legislature, 1st Session, 1:30 p.m. (pp. 2717–2718).

(2013, November 5). “Bill 27 Flood Recovery and Reconstruction Act.” *Edited Hansard 2717*(65a). 28th Legislature, 1st Session, 1:30 p.m. (pp. 2732–2744).

(2013, November 26). “Bill 27 Flood Recovery and Reconstruction Act.” *Edited Hansard 3128*(74e). 28th Legislature, 1st Session, 7:30 p.m. (pp. 3128–3141).

(2014, March 4). “Table Returns and Reports.” *Edited Hansard 31*(2). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 20–25).

(2014, March 4). “Consideration of His Honour the Lieutenant Governor’s Speech.” *Edited Hansard 31*(2). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 26–41).

(2014, March 5). “Consideration of His Honour the Lieutenant Governor’s Speech.” *Edited Hansard 65*(3a). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 64–67).

(2014, April 10). “Flood Recovery and Mitigation in High River.” *Edited Hansard 406*(16). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 406–407).

(2014, April 10). “Flood Recovery and Mitigation in High River.” *Edited Hansard 406*(16). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 409–410).

(2014, April 14). “Rural Flood Damage Payments.” *Edited Hansard 432*(17). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 432–433).

(2014, April 14). “Written Questions.” *Edited Hansard 432*(17). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 436–438).

(2014, April 14). “Motions for Returns.” *Edited Hansard 432*(17). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 442–443).

(2014, April 15). “Flood Recovery and Mitigation in High River.” *Edited Hansard 470*(18). 28th Legislature, 2nd Session, 1:30 p.m. (pp. 470–471).

(2015, March 12). “Flood Mitigation.” *Edited Hansard 603*(19a). 28th Legislature, 3rd Session, 1:30 p.m. (p. 603).

(2015, March 12). “Bill 17 Appropriation (Supplementary Supply) Act, 2015.” *Edited Hansard 603*(19a). 28th Legislature, 3rd Session, 1:30 p.m. (pp. 612–619).

(2015, March 23). “Bill 18 Appropriation (Interim Supply) Act, 2015.” *Edited Hansard 791*(25e). 28th Legislature, 3rd Session, 7:30 p.m. (pp. 791–792).

(2015, June 16). “Flood Damage Mitigation on the Bow and Elbow Rivers.” *Edited Hansard 15.* 29th Legislature, 1st Session, Day 2, 1:30 p.m. (pp. 15–16).

(2015, June 16). “Flood Recovery.” *Edited Hansard 15.* 29th Legislature, 1st Session, Day 2, 1:30 p.m. (pp. 21–22).

(2015, June 17). “Interim Supply Estimates 2015-16 (No. 2) General Revenue Fund and Lottery Fund. *Edited Hansard 41.* 29th Legislature, 1st Session, Day 3, 1:30 p.m. (pp. 50–71).

(2015, June 18). “2013 Southern Alberta Flood.” *Edited Hansard 96.* 29th Legislature, 1st Session, Day 4, 1:30 p.m. (p. 96).

(2015, June 18). “Flood and Drought Damage Mitigation.” *Edited Hansard 96.* 29th Legislature, 1st Session, Day 4, 1:30 p.m. (p. 96).

(2015, June 18). “Flood Damage Mitigation in High River.” *Edited Hansard 96.* 29th Legislature, 1st Session, Day 4, 1:30 p.m. (pp. 100–101).

(2015, June 18). “Flood Damage Mitigation.” *Edited Hansard 96.* 29th Legislature, 1st Session, Day 4, 1:30 p.m. (pp. 101–102).

(2016, March 16). “Flood Recovery and Mitigation.” *Edited Hansard 229.* 29th Legislature, 2nd Session, Day 6, 1:30 p.m. (pp. 229–230).

(2016, March 16). “Consideration of her Honour the Lieutenant Governor’s Speech.” *Edited Hansard 229.* 29th Legislature, 2nd Session, Day 6, 1:30 p.m. (pp. 235–239).

(2016, March 16). “Bill 3 Appropriation (Supplementary Supply) Act, 2016.” *Edited Hansard 229.* 29th Legislature, 2nd Session, Day 6, 1:30 p.m. (pp. 244–249).

(2016, December 12). “Downstream Water Security.” *Edited Hansard 2509.* 29th Legislature, 2nd Session, Day 61, 1:30 p.m. (pp. 2509–2515).

(2017, May 15). “Flood Damage Mitigation in High River.” *Edited Hansard 1039.* 29th Legislature, 3rd Session, Day 33, 1:30 p.m. (pp. 1039–1040).

(2017, May 17). “Emergency Preparedness.” *Edited Hansard 1130.* 29th Legislature, 3rd Session, Day 35, 1:30 p.m. (pp. 1130–1131).

(2017, May 18). “Logging in Kananaskis Country.” *Edited Hansard 1178.* 29th Legislature, 3rd Session, Day 36.

Votes and Proceedings

Province of Alberta, Legislative Assembly of Alberta:

(2012, May 30). “Members’ Statements.” 28th Legislature, 1st Session, No. 6, 1:30 p.m. (p. 1).

(2013, October 28). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 59, 1:30 p.m. (p. 5).

(2013, October 29). “Tabling Returns and Reports.” 28th Legislature, 1st Session, No. 60, 1:30 p.m. (p. 2-4).

(2013, October 29). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 60, 1:30 p.m. (p. 8).

(2013, October 30). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 61, 1:30 p.m. (p. 5).

(2013, November 4). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 63, 1:30 p.m. (pp. 6–7).

(2013, November 5). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 64, 1:30 p.m. (pp. 3–7).

(2013, November 6). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 65, 1:30 p.m. (pp. 4–10).

(2013, November 25). “Tabling Returns and Reports.” 28th Legislature, 1st Session, No. 71, 1:30 p.m. (pp. 2–3).

(2013, November 25). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 71, 1:30 p.m. (pp. 4–5).

(2013, November 26). “Government Bills and Orders.” 28th Legislature, 1st Session, No. 72, 1:30 p.m. (pp. 5–6).

(2014, March 3). “Speech From the Throne.” 28th Legislature, 2nd Session, No. 1. [no time] (pp. 3–12).

(2014, March 18). “Tabling Returns and Reports.” 28th Legislature, 2nd Session, No. 10, 1:30 p.m. (pp. 3–14).

(2014, April 10). “Members’ Statements.” 28th Legislature, 2nd Session, No. 16, 1:30 p.m. (p. 1).

(2014, April 14). “Written Questions.” 28th Legislature, 2nd Session, No. 17, 1:30 p.m. (pp. 2–8).

(2014, April 15). “Members’ Statements.” 28th Legislature, 2nd Session, No. 18, 1:30 p.m. (pp. 1–2).

(2014, November 17). “Introduction of Bills (First Reading). 28th Legislature, 3rd Session, No. 1. (p. 13)

(2014, November 20). “Tablings to the Clerk.” 28th Legislature, 3rd Session, No. 4, 1:30 p.m. (pp. 2–5).

(2014, December 10). “Tablings to the Clerk.” 28th Legislature, 3rd Session, No. 15, 1:30 p.m. (p. 3)

(2015, March 17). “Tablings to the Clerk.” 28th Legislature, 3rd Session, No. 20, 1:30 p.m. (pp. 2–3).

(2015, June 16). “Members’ Statements.” 29th Legislature, 1st Session, No. 2, 1:30 p.m. (p. 3).

(2015, June 18). “Members’ Statements.” 29th Legislature, 1st Session, No. 4, 1:30 p.m. (p. 1).

(2016, May 26). “Tabling Returns and Reports.” 29th Legislature, 2nd Session, No. 34, 1:30 p.m. (pp. 6–7).

(2016, December 12). “Tabling Returns and Reports.” 29th Legislature, 2nd Session, No. 61, 1:30 p.m. (pp. 3–4).

(2017, March 2). “Tabling Returns and Reports.” 29th Legislature, 3rd Session, No. 1, 1:30 p.m. (pp. 2–3).

(2017, March 13). “Tabling Returns and Reports.” 29th Legislature, 3rd Session, No. 6, 1:30 p.m. (pp. 2–3).

(2017, November 29). “Members’ Statements.” 29th Legislature, 3rd Session, No. 58, 1:30 p.m. (pp. 5–6).

Committee of Supply Records

Province of Alberta, Legislative Assembly of Alberta, Standing Committee on Public Accounts:

(1997, May 28). 24th Legislature, 1st Session, 8:30 a.m. (pp. 45–54). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/238f9261-850e-49ca-83de-2462ac224c30/1/doc/

(2007, April 11). *Executive Council*. 26th Legislature, 3rd Session, 8:30 a.m. (pp. 39–50). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/771cb1e7-8c1a-4c01-b53a-34dc391407f9/1/doc/

(2014, May 7). 28th Legislature, 2nd Session, 8:30 a.m. (pp. 335–336). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/36d5a6c6-6d5a-41da-9939-3badcdfa5017/1/doc/

(2015, March 17). *Environment and Sustainable Resource Development*. 28th Legislature, 3rd Session, Day 35, 8:30 a.m. (pp. 429–439). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/fdd6ef6a-5549-4f08-a3d9-de3f3773aa41/1/doc/

(2015, March 23). 28th Legislature, 3rd Session, 6:16 p.m. (pp. 441–448). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/fcb81274-23ad-4938-ab8f-fd815051b759/1/doc/

(2015, March 24), 8:30 a.m. (pp. 449–460). *Infrastructure Treasury Board and Finance*. 28th Legislature, 3rd Session. Retrieved from http://www.assembly.ab.ca/Documents/isysquery/624f2d12-acdf-433a-b085-a4b9e67261f4/1/doc/

(2015, September 30). 29th Legislature, 1st Session, 2:38 p.m. (pp. 13–23). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/c55b5f34-2f6e-4416-87c7-ec7a93a5ff36/1/doc/

(2015, October 20). 29th Legislature, 1st Session, 1:00 p.m. (pp. 25–35). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/664f7302-6376-448a-95ea-f4cbaa3b98de/1/doc/

(2015, October 20). 29th Legislature, 1st Session, 2:32 p.m. (pp. 37–43). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/a8c790a8-2087-45ff-b886-77f0007cd018/1/doc/

(2016, March 15). 29th Legislature, 2nd Session, 8:30 a.m. (pp. 145–154). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/adca13fa-2412-4b9f-85d5-bc4e64298e2d/1/doc/

(2016, October 4). *Alberta Health Services, Executive Council, Health, and Municipal Affairs*. 29th Legislature, 2nd Session, 8:30 a.m. (pp. 201–223). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/52428811-c587-4d3a-aa75-1e80861918c9/1/doc/

(2017, January 24). *Environment and Parks*. 29th Legislature, 2nd Session, 9:00 a.m. (pp. 281–319). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/557e95da-3992-49b7-a7a4-64473c15f486/1/doc/

(2017, February 28). *Children's Services, Infrastructure, Transportation, and Treasury Board and Finance*. 29th Legislature, 2nd Session, 9:15 a.m. (pp. 321– 361). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/31b9439f-7485-4ce4-8a83-3bebe42c4fb0/1/doc/

(2017, September 6). *Treasury Board and Finance*. 29th Legislature, 3rd Session, 1:00 p.m. (pp. 459–479). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/1ba0c7d0-d45c-4e25-a965-53ad50b82921/1/doc/

(2017, November 14). *Municipal Affairs*. 29th Legislature, 3rd Session, 8:30 a.m. (pp. 583–593). Retrieved from http://www.assembly.ab.ca/Documents/isysquery/9e0c49bd-e270-4e54-a0c1-d05ab1b22d8d/1/doc/

Appendix J: Report Selection and Analysis

I examined 108 reports, as listed in Appendix K. I reviewed 90 reports and identified the remaining 18 reports to be the most relevant for further in-depth analysis and coded them in Nvivo as indicated by an asterisk (*). The reports were categorized into type of review, scale of authoring organization, and topic of focus, as described in Table J1.

Table J1

Summary of Report Analysis

Categories	No. of reports	Percentage of total reports
Type of review		
Reviewed	90	83%
Coded	18	17%
Total	108	
Scale of authoring organization or institution		
Local	21	19%
Provincial	56	52%
National	23	21%
International	8	7%
Topic of focus		
2013 flood	38	35%
2005 flood	1	1%
1995 flood	0	0%
General flood/water	28	26%
Not specific to flood/water	41	38%

The majority of reports (52%) were authored by provincial Government of Alberta governmental ministries and departments. The remaining reports were authored by national organizations or institutions (21%) such as the Government of Canada, local organizations or institutions (19%) such as the Town of High River, and international organizations (7%) such as the United Nations. While a sizeable percentage of the articles (35%) focused on the 2013 Alberta flood, a large proportion focused on the general topics of disasters and land use, among others (38%). I reviewed one report (2%) on the 2005 flood. I did not find reports on the 1995 Alberta flood.

Appendix K: List of Reports

The following reports were examined. Those indicated by an asterisk (*) were coded for in-depth analysis in Nvivo as noted in Appendix J.

1. Advisian Worley Parsons Group. (2017, May 3). *Highwood River modelling flood mitigation effects assessment*.
2. Alberta Emergency Management Agency. (2015). *Review and analysis of the Government of Alberta's response to and recovery from 2013 floods.*
3. Alberta Emergency Management Agency. (2018, June 7). *Overland flood insurance FAQ*.
4. Alberta Land Institute. (2014). *A guide to property rights in Alberta*.
5. Alberta Urban Municipalities Association & Alberta Municipal Services Corporation. (n.d.). *Municipal land use planning*.
6. Alberta Urban Municipalities Association & Alberta Municipal Services Corporation. (2017). *Municipal planning hub*.
7. Alberta WaterPortal. (n.d.-a). *Watershed adaptation and resilience*. Alberta Environment and Parks.
8. Alberta WaterPortal. (n.d.-b). *What is a 1-100 year flood?*
9. Alberta WaterPortal. (2013) *How are flood maps created in Alberta?*
10. Alberta WaterPortal. (2017). *How water is governed: What is room for the river?*
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13. *Alberta WaterSmart. (2013a, August 2). *The 2013 great Alberta flood: Actions to mitigate, manage and control future floods*. Calgary, Canada: Author.
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15. *Alberta WaterSmart. (2013c, August 2). *The 2013 great Alberta flood: Actions to mitigate, manage and control future floods: Additional feedback from water experts and Albertans*. Calgary, Canada: Author.
16. Alberta WaterSmart. (2014a, March 31). *Bow Basin flood mitigation and watershed management project*. Calgary, Canada: Author.

17. Alberta WaterSmart. (2014b, December 19). *Room for the River pilot in the Bow River basin: Advice to the Government of Alberta.* Calgary, Canada: Author.

18. *Alberta WaterSmart. (2014c, April 24). *The 2013 great Alberta flood: Progress report on actions to mitigate, manage and control flooding*. Calgary, Canada: Author.

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38. *Government of Alberta. (2013c, December). *Resilience and mitigation framework for Alberta floods*.

39. Government of Alberta. (2013d, July 18). *Southern Alberta 2013 floods: The provincial recovery framework*.

40. Government of Alberta. (2014a). *Building better communities: Municipal Government Act review.*

41. Government of Alberta. (2014b, December 10). *Flood hazard identification program*.

42. *Government of Alberta. (2014c). *Flood mitigation – High River* [Fact sheet].

43. Government of Alberta. (2014d, May 7). *Flood recovery erosion control program grants*.

44. Government of Alberta. (2014e, November 4). *Overview of Bill 27, floodway development regulation consultation*.

45. Government of Alberta. (2014f, February). *Respecting our rivers: Alberta's approach to flood mitigation*.

46. Government of Alberta. (2014g). *Update Bill 27 & Floodway Development Regulation (FDR)*.

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48. Government of Alberta. (2017, February). *South Saskatchewan regional plan: 2014–2024*.

49. Government of Alberta. (2018a). *Alberta provincial electoral divisions: Compiled from the 2016 census of Canada*.

50. Government of Alberta. (2018b, July 15). *Flood hazard identification program—Overview*.

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52. Government of Canada. (2013a). *Flood damage reduction program*.

53. Government of Canada. (2013b). *Fourth annual national roundtable on disaster risk reduction: Building blocks of resilience: Local, National and global perspectives*.

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69. *Morris, D., ten Wolde, H., Liu, J., Diaz, J. A. (2013). *The 2013 southern Alberta flooding: Background and assessment of possibilities for Dutch–Canadian cooperation on floodplain management and flood-risk mitigation efforts.*

70. Multihazard Mitigation Council. (2017). *Natural hazard mitigation saves: 2017 interim report.* Washington, DC: National Institute for Building Sciences.

71. Munich RE. (2017). *Year of the floods: Natural catastrophes 2016: Analyses, assessments, positions.*

72. National Research Council. (2006). *Facing hazards and disasters: Understanding human dimensions.* Washington, DC: National Academies Press.

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77. *Prinsen, G., Klijn, F., & van Duijne, H. (2015). *Review of flood mitigation proposals for High River (Alberta, Canada)*.

78. Public Safety Canada. (2017, May). *An emergency management framework for Canada: Third edition*.

79. Public Safety Canada. (2018). *National disaster mitigation program (NDMP)*.

80. Rijkswaterstaat. (n.d.). *Room for the River for a safer and more attractive river landscape.*

81. Rijkswaterstaat & UNESCO-IHE. (2015). *Tailor made collaboration: A clever combination of process and content.* Utrecht, The Netherlands: Author.

82. Ross, I. (2016). *Town of High River southwest dike*.

83. Rural Municipalities of Alberta. (2017, April 27). *Update on proposed floodway development regulation*.

84. Rutten, B. (2015). *Flood recovery in High River: Themes and directions*. Conference Board of Canada.

85. Sandalak, B. A., Nicolai, A., & The Urban Design Laboratory. (2003, November). *The town of High River: Open space plan*. High River, Canada: Town of High River.

86. Sturgess, K. (2015, October 16). *Flood and drought: What's next for watershed management?*

87. Thislethwaite, J., Henstra, D., Peddle, S., & Scott, D. (2017, April). *Canadian Voices on changing flood risk: Findings from a national survey*.

88. Town of High River. (n.d.). *Flood mitigation requirements explained*. High River, Canada: Author.

89. Town of High River. (2011). *Bylaw No. 4306: Land use bylaw*. High River, Canada: Author.

90. *Town of High River. (2014a). *After action report: June 2013 flood.*

91. Town of High River. (2014b, April). *Council action plan: 2014–2015*. High River, Canada: Town of High River.

92. Town of High River. (2014c). *Long-term recovery plan: Town of High River.* High River, Canada: Author.

93. Town of High River. (2014). *High River housing assessment study – November 2014*. High River, Canada: Author.

94. Town of High River. (2015a). *Bylaw No. 4364: For the purpose of establishing off-site levies*. High River, Canada: Author.

95. *Town of High River. (2015b). *Report to citizens on renewal activities (to January 2015).* High River, Canada: Author.

96. Town of High River. (2015c). *Strategic plan (2015–2017)*. High River, Canada: Author.

97. Town of High River. (2015d). *Strategic plan (2019–2022)*. High River, Canada: Author.

98. Town of High River. (2016). *Strategic plan (2015–2017)*. High River, Canada: Author.

99. Town of High River. (2017). *Bylaw No. 4510: Land use bylaw*. High River, Canada: Author.

100. Town of High River. (2018a). *Return Beachwood to undeveloped state.* High River, Canada: Author.

101. Town of High River. (2018b). *Return Wallaceville to undeveloped state.* High River, Canada: Author.

102. Town of High River. (2018c). *VitalSigns. Report 2018: rooted in people*. High River, Canada: Author.

103. Town of High River (Committee of the Whole). (2018). *The status of the proposed southeast annexation*. High River, Canada: Author.

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105. United Nations Office for Disaster Risk Reduction. (2015a). *Global assessment report on disaster risk reduction 2015*.

106. United Nations Office for Disaster Reduction. (2015b). *Sendai framework for disaster risk reduction 2015–2030*.

107. Weaver, L. & Cheuy, S. (2014a). *High River collective impact summit: Accelerating community change*. Tamarack Institute.

108. Weaver, L. & Cheuy, S. (2014b). *High River collective impact summit: Accelerating community change – day II*. Tamarack Institute.

Appendix L: Mass and Alternative Media Selection and Analysis

Many newspapers are available in electronic form through FACTIVA (https://global.factiva.com/) and Canadian Newsstand (http://www.proquest.com/products-services/canadian_newsstand.html). I searched for media articles in three locations: FACTIVA, *The High River Times* news website, and Google search. The selection criteria for the media articles were the presence of one or more of the following terms: flood, High River, Wallaceville, Beachwood, Deltares, Dutch, Room for the River, relocation, Flood Recovery and Reconstruction Act, and Municipal Government Act, and 2013 Alberta flood.

I examined 113 mass and alternative media articles (including press releases and letters to the editor and opinion sections), as listed in Appendix M. I reviewed 56 (50%) media articles or and identified the remaining 57 (50%) media articles to be the most relevant for further in-depth analysis based on whether it clarified or added to an issue, enhanced understanding of a specific issue, or introduced a new but relevant issue. I applied a qualitative textual analysis rather than quantitative content analysis of the media articles. The media articles were categorized into type of review, scale of authoring organization, and topic of focus as described, in Table L1.

Table L1

Summary of Media Analysis

Categories	No. of media articles	Percentage of total media articles
Type of review		
Reviewed	56	50%
Coded	57	50%
TOTAL	113	
Scale of authoring organization or institution		
Local	50	44%
Provincial	21	19%
National	39	35%
International	3	3%
Topic of focus		
2013 flood	66	58%
2005 flood	4	4%
1995 flood	0	0%
General flood/water	37	33%
Not specific to flood/water	6	5%

The majority of media articles (44%) were authored by local news outlets such as *High River Times*, *The Calgary Herald*, and *The Edmonton Journal*. This is not surprising given that the issue of flooding issue is often localized. The remaining media articles were authored by national (35%), provincial (19%), and international (3%) news outlets. Alternative media sources included *Alberta Views*. While the majority of articles focused on the 2013 Alberta flood (58%), a large proportion of articles focused on the general topic of water and floods (33%). I did not find news articles relevant for the 1995 flood. I reviewed four (4%) media articles on the 2005 flood. Interestingly, but not surprising, is that the topic of focus is distributed similarly to the reports listed in Appendix J. The further a disaster event is in the past, the more difficult it is to find information since it is less relevant as time goes on and new incidences receive attention.

Appendix M: List of Mass and Alternative Media Articles

The following media articles were examined. Those indicated by an asterisk (*) were coded for in-depth analysis in Nvivo. Retrieval links have been omitted.

1. 2012 Calgary flood study foresaw June's devastation. (2013, December 10). *Huffington Post*.
2. *Accuracy of Alberta flood zone maps questioned. (2013, July 16). *CBC News*.
3. *Alberta announces grants for natural flood mitigation projects. (2015, November 13). *Calgary Herald.*
4. Alberta Association of Municipal Districts and Counties. (2017, April 21). Update on proposed floodway development regulation.
5. Alberta could have reduced flood damage, critics say: Government failed to act on report shelved after disastrous 2005 flood. (2013, June 24). *CBC News*.
6. Alberta flood report outlines how province can improve disaster response. (2015, December 11). *CBC News*.
7. Alberta takes big steps to protect against future. (2013, November 21). *Government of Alberta*.
8. Alberta to support relocation from floodways. (2013, August 22). *Government of Alberta*.
9. *Bass, B. (2014, November 15). Avoiding flood damage. *Calgary Herald*.
10. *Boudjikanian, R. (2017, May 12). Move on, rebuild smarter, elsewhere: flood lessons learned in parts of Alberta. *CBC News*.
11. *Bozikovic, A. (2015, July 17). Shelters from the storm: Preparing cities for a changing climate – before it's too late. *The Globe and Mail*.
12. Bozikovic, A. (2017, July 8). Urban design in the time of climate change: making a friend of the floods. *The Globe and Mail*.
13. Building strong, flood-resilient communities. (2018, May 1). *Government of Alberta*.
14. Canadian Intergovernmental Conference Secretariat. (2017, May 26). *Federal/provincial/territorial ministers met to discuss emergency management.*
15. Canadian Underwriter. (2015, March 12). Alberta government needs to update flood mapping guidelines, formalize training for pipeline regulatory staff: Auditor General.
16. *ClimateWire. (2012, January 20). How the Dutch make "Room for the River" by redesigning cities. *Scientific American*.
17. Conservationists say flood mitigation will cause more problems. (2014, May 1). *CBC News*.
18. Coorsh, K. (2013, June 22). Alberta under water: The 4 factors that led to massive flooding. *CTV News*.
19. Dawson, T. (2018, August 31). Notley promises to drop climate change plan—what now? *National Post.*

20. *De Castillo, C. K. (2015, June 20). High River's mayor calls Highwood River diversion canal plan ludicrous. *Global News.*

21. *De Castillo, C. K. (2018, July 24). 'High River will never flood again': Construction underway on new floodgate in Alberta town. *Global News*.

22. Deacon, J. (2014, February 24). 53 local homeowners have accepted buyouts. *High River Times*.

23. Delta Programme Commissioner. (2014, June 24). Canadian province of Alberta asks Delta Commissioner for flood mitigation advice.

24. Derworiz, C. (2014, May 5). Nature the answer to managing floods: Healthy watersheds the key, experts say. *Calgary Herald.*

25. *Derworiz, C. (2015a, August 25). Councillor at odds with water expert. *Calgary Herald*.

26. *Derworiz, C. (2015b, January 12). Room for the river report moves focus beyond big infrastructure. *Calgary Herald.*

27. Derworiz, C. (2015c, August 24). Water expert concerned about proposed CalgaryNEXT location. *Calgary Herald*.

28. Derworiz, C. (2016, June 29). Southern Alberta flood in 2013 brings valuable lessons. *Calgary Herald*.

29. Dikes and berms everywhere. (2014, June 12). *Okotoks Online*.

30. Eden, L. (2014, February 25). Rewilding our rivers: The floodplain—The river's room to breathe [Blog post]. *Alberta WaterPortal*.

31. *Feil, D. (2015, June 24). Elbow River partnership talks flood mitigation. *Cochrane Times*.

32. Fletcher, R. (2013, November 26). Scientists pan Alberta's massive dam plan for Elbow River. *Metro*.

33. *Flood debate timely for campaign. (2007, September 25). *High River Times.*

34. Former mayor says Beachwood buyout "unethical." (2013, November 13). *High River Online*.

35. Forrest, M. (2017, May 10). Federal government cutting back on disaster assistance as floods become more severe. *National Post*.

36. Fortney, V. (2018, June 19). Fortney: 'I was a bit crazy to take it on,' says the mayor who helped High River get back on its feet. *Calgary Herald*.

37. Ghosh, I. (2017, May 19). 'It's part of who we are now': High River mayor reflects on 2013's devastating floods. *CBC Radio*.

38. Gilmore, S. (2017, May 10). It's time we stopped paying for your river view. *Maclean's*.

39. Government of Alberta. (2013a, November 21). Alberta takes big steps to protect against future flooding. [Press release].

40. Government of Alberta. (2013b, August 22). Alberta to support relocation from floodways. [Press release].

41. Government of Alberta. (2013c, September 26). New funding earmarked for flood hazard studies [Press release].

42. *Government of Alberta. (2013d, October 28). Protecting Albertans from future floods. [Press release].

43. Government of Alberta. (2013e, July 28). Redford government introduces measures to build safer and stronger communities [Press release].

44. Government of Alberta. (2013f, August 16). Redford government responds to Albertans' feedback on flood policy [Press release].

45. Government of Alberta. (2013g, July 21). Redford government to rebuild communities with advice from Albertans. [Press release].

46. Government of Alberta. (2014, September 26). Prentice government speeds flood recovery efforts. [Press release].

47. *Government of Alberta. (2015, March 11). Government acting on Auditor General's report. [Press release].

48. *Harris, K. (2017a, May 11). 'Rebuild better:' Justin Trudeau says Canada must brace for more storm devastation from climate change. *CBC News*.

49. *Harris, K. (2017b, May 14). Spend more on disaster planning to save in emergency relief, evaluation says. *CBC News*.

50. *Hennel, L. (2013, December 26). High River homeowners could have properties seized if they refuse Alberta's offer to buy flood-ravaged land. *National Post*.

51. *High River flood protection gets $30M boost from province. (2015, November 2). *CBC News*.

52. *High River homes sacrificed during flood, says official in video. (2013, July 30). *CBC News.*

53. *High River launches campaign to shift public perceptions 3 years after flood. (2016, September 23). *CTV News.*

54. High River's Wallaceville to be bulldozed for flood mitigation: Community prone to flooding to be returned to natural state. (2013, December 23). *CBC News.*

55. *Hodgson, G. (2018, January 15). How we can better mitigate flood risk in Canada. *The Globe & Mail.*

56. Howell, T. (2014a, June 23). High River flooding took toll on former mayor. *Calgary Herald*.

57. Howell, T. (2014b, June 23). High River residents will never forget the river's power. *Calgary Herald.*

58. *Howell, T. (2015a, November 3). $30M for High River flood plan; Berm building among measures to prevent a repeat of 2013 disaster. *Edmonton Journal*.

59. Howell, T. (2015b, June 20). Highwood River diversion canal not warranted, says High River mayor. *Calgary Herald.*

60. *Howell, T., & Markusoff, J. (2013, November 21). Province considering flood diversion around High River and dry dam on Elbow River. *Calgary Herald.*

61. Insurers zero in on flood-prone areas: New tool to help municipalities set priorities in spending on stormwater sewers. (2014, July 2). *CBC News*.

62. Johnsrude, L. (2014, April). Are we ready for the next flood? *Alberta Views*, *7*(4), 30–36.

63. *Kaufmann, B. (2016, November 2). Alberta's food plain mapping gets failing grade in university study. *Calgary Herald*.

64. *Komarnicki, J. (2013, August 17). Province alters plan to tag land titles of homes in floodways and flood fringes. *Calgary Herald.*

65. *Mayor Snodgrass confident about mitigation plans. (2014a, February 12). *High River Online*.

66. McClure, M. (2014, October 19). Report says reservoir costs higher than future flood damage. *Calgary Herald.*

67. *McClure, M. (2015, March 25). High River flood diversion expensive and unsound: Report. *Calgary Herald*.

68. McCracken, D. (2016, September 20). Red Tail rise still moving forward. *High River Online.*

69. *McGillivray, G. (2015, November 19). Making room for the river [message posted to InsBlogs].

70. McGillivray, G. (2016). Flood governance in Canada: Who's minding the store? *Canadian Underwriter*.

71. *McGillivray, G. (2017, May 7). Flood. Rinse. Repeat: The costly cycle that must end. *The Globe and Mail*.

72. McGillivray, G. (2018, May 5). To stop Alberta's natural events from becoming disasters. *The Globe and Mail.*

73. *Monbiot, G. (2014, January 13). Drowning in money: The untold story of the crazy public spending that makes flooding inevitable. *The Guardian.*

74. Murray, D., & Francois, L. (2014). In search of a risk-based flood policy in Canada: Will we learn from intense floods? *WaterNews, 34*(1), 7–10.

75. *O'Donnell, S. (2013, August 13). Flood risk won't be noted on land titles. *Edmonton Journal.*

76. Offin, S. (2014, September 26). Calgary's mayor critical of Prentice's flood announcement. *Global News*.

77. *Paperny, A. M. (2013, June 23). Alberta government failed to act on flood prevention report. *Global News.*

78. *Pearson, H. (2018, June 19). Calgary flood 5 years later: Nature's power and the long-lasting impacts on southern Alberta rivers. *Global News*.

79. *Petition sent out to lower the northwest berm. (2014, October 15). *High River Online*.

80. Piovesana, A. (2013, August 26). BLOG | Floodway or fringe? High River neighbourhood divided. *CBC News*.

81. Press, J. (2017, May 9). Documents show many cities wary of mapping, publicizing food risks. *Ottawa Citizen.*

82. Province announces grants for natural food mitigation projects. (2015, November 13). *Calgary Herald*.

83. *Rocher, E. (2006, October 12). Still up the river. *High River Times*.

84. *Rocher, E. (2013, August 21). Climate change played a role in High River flood. *Okotoks Western Wheel.*

85. *Rushworth, K. (2013, November 19). Times chronicles community's flood history. *High River Times*.

86. Rushworth, K. (2014, June 21). Community's strength honoured at High River flood commemoration. *High River Times*.

87. *Rushworth, K. (2015a, April 27). 'Flood emotion' removed from Red Tail Rise discussion; Snodgrass. *High River Times.*

88. *Rushworth, K. (2015b, April 7). Residents must not be stuck on diversion concept; Craig Snodgrass. *High River Times.*

89. Snodgrass happy with diversion funding. (2014c, September). *High River Online*.

90. Southern Alberta town ravaged by 2013 flood sees development as promising sign. (2017, June 8). *The Canadian Press*.

91. *Southerland, S. (2016, June 21). Three years later: What caused the 2013 Alberta floods? *The Weather Network.*

92. *Spears, T. (2017, October 5). Flood planning: Why we get it wrong time after time. *Calgary Herald.*

93. *Stark, E. (2015, September 7). NDP to announce food mitigation plans in the 'not so distant future': Mason. *Calgary Herald.*

94. *Stewart, B. (2016, October 6). Rebuilding Fort McMurray homes on flood plain a 'poor decision,' says hydrologist. *CBC News.*

95. Stolte, E. (2016, November 9). Edmonton releases food maps for 100 neighbourhoods. *Edmonton Journal.*

96. *Study for Beachwood flood mitigation. (2007, April 2). *High River Times*.

97. *Suzuki, D. (2013, June 6). Is Alberta flooding a sign of climate change? *Huffington Post.*

98. *Tanner, A., & McKenzie, S. (2018, May 6). Damage from flooding doesn't have to be inevitable. *The Conversation.*

99. *Taylor, L. (2015, July 29). The meaning behind 'High River' is not what you think. *High River Online*.

100. Town of High River. (n.d.). High River is simply unstoppable.

101. Town of High River. (2017a). Return Beachwood to undeveloped state.

102. Town of High River. (2017b). Return Wallaceville to undeveloped state.

103. Town of High River. (2017c, July 18). Update on southwest dike.

104. Town of High River. (2018, June 30). High River is ready for a new chapter.

105. *Van Tighem, K. (2013, July/August). Safeguarding the source. *Alberta Views, 16*(6), p. 28–35.

106. *West, D. (2014, October 3). Provincial government takes action to protect Albertans. *Sun Media Corporation.*

107. *White, R. (2017, February 17). Flood homes sold. *The Canadian Press.*

108. *Wingrove, J. (2013, June 23). Alberta shelved major flood report for six years. *The Globe and Mail.*

109. Wood, J. (2018, June 16). Five years after devastating flood, Calgary remains vulnerable to repeat event. *Calgary Herald*.

110. Wright, M. (2013, November 14). Demolition threat upsets communities: Areas with little flood damage want to be spared. *Calgary Herald.*

111. Wright, S. (2014, September 29). Calgary blindsided by Premier Prentice's flood mitigation plan. *Rabble.*

112. *Zimonjic, P., Roman, K., & Simpson, K. (2017, May 9). One way to battle future flooding: Stop building on flood plains, say experts. *CBC News.*

113. Zuluela, P. (2015, June 24). Council identifies four top priorities for 2015–2017. *High River Times.*

Appendix N: Nvivo Coding Themes

An Nvivo code summary report (see Figure N1) indicates that the final coding tree included 21 parent nodes and 207 child and child-child nodes (due to space limitations, child-child nodes are not displayed below). Text search (TS) indicates autocoding was conducted in addition to manual coding.

- Name
- Response by Group Interview
- Response by Query Results (in more than main documents)
- Response by Questions
- Response by Themes
  - Agency
  - Competence
    - Arts and entertainment
    - Communication
    - Community and social services
    - competence expertise -TS
    - Computer sciences
    - Education
    - Emergency management
    - Engineering-related
    - finance-related
    - Government-related
    - Health & medicine
    - Historical or background knowledge
    - Legal expertise
    - Management (general)
    - Natural sciences
    - Other
    - Planning and design
    - Social sciences
  - Contacts to investigate
  - Culture
  - Events
  - Frames
  - Good quotes
  - Good Stuff
  - Governance
  - high river (TS)
  - Impact and outcomes
    - Barrier
    - Facilitator
  - Knowledge source
  - Materials
    - Body-related
    - Document-related
    - Emergency-related
    - Housing-related
    - Infrastructure-related
    - Map-related
    - Money-related
    - Nature-related
    - Other materials
    - Science-related
  - Meanings
    - Bodily experience

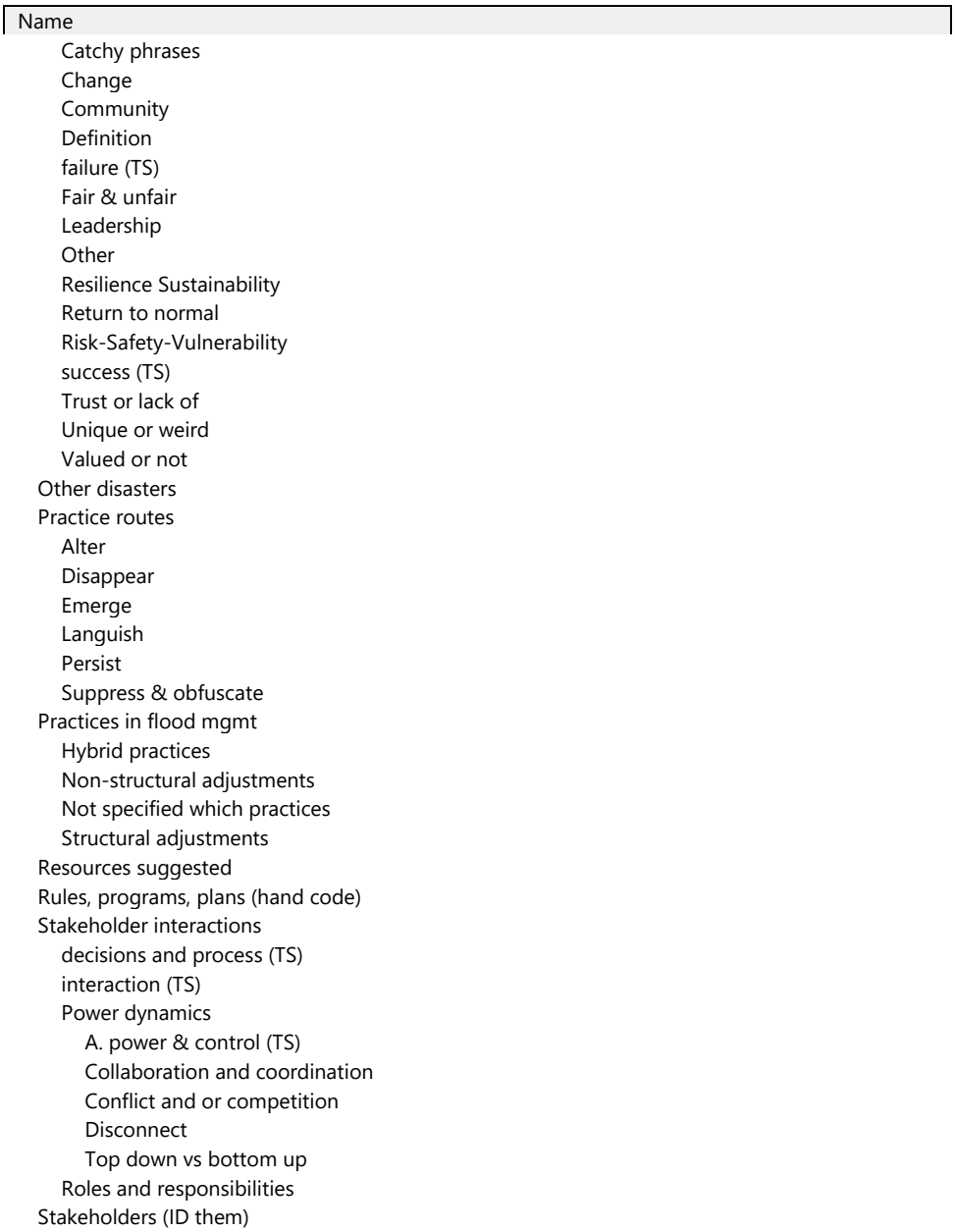

Figure N1. Screenshot of Nvivo code summary report.