Flood Risk Management in Canada: A Political Discourse Analysis

by

Danielle Marie Lebre

A thesis

presented to the University of Waterloo

in fulfillment of the

thesis requirement for the degree of

Master of Environmental Studies

in

Sustainability Management

Waterloo, Ontario, Canada, 2021

AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Floods are Canada's most frequent and expensive natural catastrophe; they are associated with the largest losses of any climate-related disaster in Canada (Nastev & Todorov, 2013). As the impacts of climate change take effect and urban exposure to flood-prone regions increases, the costs associated with flooding are projected to increase to a level that is no longer socially or economically feasible (Sandink, 2009). As a result, policymakers in Canada are facing mounting pressure to better manage flood risk. Flood Risk Management (FRM) is an approach that is widely cited in flood policy literature as a robust framework to mitigate the risks associated with flooding. FRM encompasses several key elements that define it as an effective flood policy directive and asserts an overall shift to risk-based management practices (Henstra & Thistlethwaite, 2017a). Despite widespread support within flood policy research, the uptake of FRM in Canada remains slow and there has been little research done to determine how political leaders understand these measures and their objectives. This research aims to determine how flooding is being discussed as a policy issue within the Canadian political sphere, through examining how Canadian political discourse frames flooding as a policy problem, and the role of FRM in political discourse in practice.

A content analysis on flood discourse from the Hansard Index of the Canadian House of Commons examined connections between political discourse on floods and FRM framing, through determining the presence or absence of variables that indicate effective FRM dialogue. A codebook was developed based on key indicators from flood policy literature to explore this relation, and contained the following categories, (1) Flood Identification, (2) Party Speaking on Flooding, (3) Problem Framing, (4) Climate Change Framing (5) Flood Risk Management Focus, and (6) Stakeholder Identification. A statistical analysis was then performed to determine the relation between the ideology of Canadian political parties and FRM frames.

The results indicate that despite the recent shifts in discourse that is proactive to FRM, there remains several policy considerations that need to be met to effectively implement sustainable flood management policy, including stakeholder diversification, consideration for vulnerable populations, and a need for more political discourse frames which are consistent with FRM literature. Further, flood discourse is largely event-based, rather than risk based. indicating that discussions surrounding flooding are initiated by the occurrence of a flood event. The results also show that major political events are drivers of a change in discourse, and that political representation and ideology influences flood discourse.

This study contributes to an improved understanding of FRM in practice in Canada, and the elements of FRM that are prevalent within political discourse and those that remain priorities to implement a robust flood management framework in Canada. This research could be expanded upon to evaluate management practices for other climate-related phenomenon, as well as determine FRM uptake at other levels of government in Canada and internationally.

Key Words: Flood risk management, political discourse, content analysis, public policy

ACKNOWLEDGEMENTS

I would like to start off by thanking my research supervisor, Dr. Jason Thistlethwaite for giving me the opportunity to complete this study, and for everything that he has done for me while pursuing my degree. The guidance that he has provided throughout the course of completing my Master's thesis has been invaluable. I would also like to thank Dr. Daniel Henstra for all of his support and assistance throughout the course of my research. I will forever be grateful for the opportunity to have assisted Dr. Thistlethwaite and Dr. Henstra with research projects that have allowed me to dive deeper into the field of climate change and risk management. I would also like to thank Dr. Michael Wood for his role as a reader on my thesis committee.

Thank you to all of my amazing peers in Climate Risk Research Group (CRRG). Completing my degree during a pandemic posed its challenges, but there was always comfort in knowing that I could rely on the CRRG team for any assistance and support. Specifically, I would like to thank Truzaar Dordi for his assistance with my statistical analysis, for his help in learning the software needed for my content analysis, and for his willingness to teach other students how to master these programs. I would also like to thank, and congratulate, my fellow SEED Masters students in the CRRG, Leah Whittaker and Sandra Biskupovic. I am so grateful to have been able to share my graduate student experience with you.

Thank you to my friends and family who are always there to offer their support. To my parents, thank you for always believing in me. Without you and your encouragement throughout all of my studies, none of this would have been possible. Thank you to my siblings, Matthew and Lauren, who were navigating the challenges of remote learning alongside me.

Finally, I want to extend my thanks to everyone at SEED. To all of my professors, administrators, and colleagues at the EGSA, thank you for everything that you do to make this possible. To my SEED MES cohort, we began this journey together and I will always be grateful to have completed my research alongside such a talented and inspirational group of students.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Floods are associated with the largest social and economic losses of any climate-related phenomenon in Canada (Nastev & Todorov, 2013). Average annual rainfall is surpassing historical norms, and as the effects of climate change continue to proliferate and urban exposure to flood-prone regions increases, health impacts and property damages linked to floods will continue to grow (Burn & Whitfield, 2016). Beyond property damage, other significant consequences include strains on public services such as power outages, transportation delays and backlogs (Armenakis & Nirupama, 2014).

Increases in drought, extreme rainfall, high temperatures and strong winds are expected as global climates continue to change. Canadian flood management infrastructure has been implemented with the assumption that climatic conditions are predictable and repetitive. Consequently, structural defenses and overland flood control infrastructure are inadequate to mitigate severe flooding events. Residents in flood-prone regions are likely to experience more frequent and severe damages from flood events, including home flooding, damaged infrastructure, sewer overflows and higher instances of stormwater runoff. These damages are becoming fiscally and socially unsustainable and are overwhelming governmental flood management programs (Sandink, 2009).

Increasingly, decision-makers are facing pressure to manage flood risk better. Flood Risk Management (FRM) is an approach that is highly cited in academic literature as an effective policy framework for managing increased instances of severe flood events (Koslov, 2019; Thistlethwaite, 2017). Despite these technical frameworks being widely apparent in academic literature, FRM implementation remains inconsistent across Canada due to a lack of political uptake (Calamai & Minano, 2017). Moreover, with an absence of understanding on how political

leaders understand these measures and their objectives, insurers, high risk communities and FRM advocates lack appropriate guidance on their roles and responsibilities in reducing flood risk.

To date, research on public opinion and media discourse has found little evidence of FRM in practice (Thistlethwaite et al., 2019). It is unclear whether Canadian politicians are discussing flooding as a policy problem, and the extent to which outcomes of flood policy research are apparent in political discourse. There has also been little research undertaken to understand how political ideologies in Canada align with FRM, and the factors that act as the impetus for flood discussion in government forums such as parliament. This study aims to provide insight on these matters, through addressing the following questions:

1. How does Canadian political discourse frame flooding as a policy problem?
2. What is the role of FRM in Canadian political discourse in practice?

This research aims to determine how flooding is being discussed as a policy issue among key decision-makers in the Canadian political sphere. To begin, this study develops a literature review that examines flood management practices in Canada and the influence of discourse on flood policy. Part one of the literature review begins by describing flooding as a policy problem in Canada, historic practices in Canadian flood policy, and how they have developed over time. The main criticisms of Canadian flood management strategies are also summarized to provide context for the need for a more sustainable approach to disaster policy. FRM theory is then introduced as a framework that is widely regarded in flood policy literature. The role that it currently plays in Canadian flood management is then examined.

The latter part of the literature review focuses on discourse theory, and the role of media and policy discourse in determining flood policy outcomes. Specifically, this chapter examines the use of discourse tools such as framing, political ideology, and legitimization to determine the

salience of flooding as a policy problem. Further, it examines the roles of key actors, such as politicians and decision-makers, the media, and the general public, in prioritizing flooding and its associated policy problems within discourse.

The third chapter of this study outlines the methods that have been used throughout the course of the study. Specifically, this study examined parliamentary discourse among politicians within the Canadian federal government. Using records collected from the Hansard Index, a database that documents parliamentary dialogue, a keyword search using the word "flood" informs the analysis. This research employs a content analysis, using a codebook containing predetermined variables informed by the literature review, to evaluate how Canadian politicians are discussing flooding and the degree to which these discussions align with the principles of FRM. The codebook focuses on six primary categories identified as pertinent to effective FRM discourse based on findings from the literature review, including (1) Flood Identification, (2) Party Speaking on Flooding, (3) Problem Framing, (4) Climate Change Framing (5) Flood Risk Management Focus, and (6) Stakeholder Identification. The results from the content analysis were then evaluated using statistical analysis to determine significant relationships between flood risk framing and political ideology.

The fourth chapter of this study contains the findings of this research and a discussion of the results. Organized using the predetermined categories stated above, the results outline the variables that are catalysts for discussions on flooding (such as location, representation in parliament, flood occurrences), the elements of FRM that are most prevalent in policy discourse, the alignment of FRM principles with policy discourse, as well as the degree of consideration for stakeholders in flood management practices. Throughout this chapter, the results are also analyzed temporally to determine whether there is a relation between the frequency of

discussions on flooding and large-scale flood events or political changes. The results are then summarized in the final chapter of this study.

This research offers insights about the current state of flood management policy in Canada, and the extent to which the principles of FRM are present in political discourse concerning flooding. Further, it highlights the aspects of FRM that are most prevalent in policy discourse, as well as how they have changed over time. Elements of FRM that are largely absent from flood policy discourse are also identified to determine whether flood management discourse is evolving to incorporate aspects of FRM, as well as the degree to which politicians align flood management practices with principles cited within academic literature. Finally, the study seeks to identify factors that initiate discussions on flooding and whether discussions are reactive to a flood event or if flooding is being discussed through a management- and precautionary-based lens.

2. LITERATURE REVIEW

2.1 PUBLIC POLICY AND FLOODING IN CANADA

2.1.1 FLOODING IN CANADA

Floods have become Canada's most frequent and costly natural catastrophe. Continued instances of drought, extreme rainfall, high temperatures and strong winds are expected as global climates continue to change (Nastev & Todorov, 2013; Sandink, 2009). As the effects of climate change continue to proliferate and urban exposure to flood-prone regions increases, health impacts and property damages linked to floods will continue to grow (Burn & Whitfield, 2016).

Across Canada, there are large variations in geographic, climatic, and socio-economic conditions. As the effects of climate change take effect, different regions across Canada are projected to experience uneven degrees of warming and exposure to extreme weather events. Furthermore, socio-economic discrepancies across the country are likely to result in a varied capacity of regions to adapt to these changes. Regions with limited access to resources and services, and low economic diversity will likely experience higher losses and strains on local infrastructure. Ultimately, this makes it difficult to predict and understand the effects that climate change will have on Canadian infrastructure and human health, and presents challenges in implementing consistent, national climate change adaptation and mitigation approaches (Boyle et al., 2013).

A. SIGNIFICANT FLOOD EVENTS IN CANADA

For the last century, floods have been responsible for more social and economic costs than any other natural disaster in Canada. Of the 287 major flood events from 1900 to 2012, 62% occurred in just four provinces: Ontario, New Brunswick, Quebec, and Manitoba. Further, the frequency of floods increased within this time period, with 80% of these flood events happening

after 1970 (Nastev & Todorov, 2013). Within the last few decades alone, Canada has experienced its costliest natural disasters.

Two of the largest Canadian flooding events in the twentieth century occurred in the late 1990s. In 1996, large-scale flooding occurred in the Saguenay region in Quebec, resulting in severe damages to over 2600 homes and 10 fatalities (Nastev & Todorov, 2013). The Saguenay Flood resulted in $800 million in direct financial losses, and was the first flood in Canada to experience total losses amounting to $1 billion (Nastev & Todorov, 2013; Oliver & Wiebe, 2003). Shortly after the Saguenay Flood, Manitoba experienced the Red River Flood in 1997. This flood event displaced more than 75,000 individuals, and extended more than 256,000 hectares (Oliver & Wiebe, 2003). The Red River Flood resulted in $150 million in direct economic costs, and amounted to $450 million in property and infrastructure damage (Nastev & Todorov, 2013; Oliver & Wiebe, 2003).

Five of the largest ten floods on the Red River in Manitoba have occurred in the last 19 years, with severe floods in this region in 2009, 2011 and 2014 (Blais et al., 2016). Total estimated costs for each flood event amounted to approximately $76.5 million, $700 million, and $1.1 billion, respectively. As a direct result of these events, 3000 residents were evacuated in 2009, 2543 in 2011, and 560 in 2014, totalling more than 6000 people displaced from their homes in a 5 year time-span. Over the course of these floods, vital infrastructure including bridges, roads and highways was damaged, and over 25% arable of farmland was unusable during the 2014 growing season, amounting to $1 billion in lost revenue (Government of Canada, 2018a, 2018b, 2018c).

In 2013, Calgary, Alberta experienced Canada's costliest natural disaster with $6 billion total damages (Environment and Climate Change Canada, 2017; Thistlethwaite, 2017). Federal

disaster assistance payments amounted to over $1 billion, and insurance payouts totalled over $1.7 billion. This event is responsible for the largest evacuation in the history of Alberta, with 29 states of emergency announced and approximately 100,000 residents displaced. The flood had direct impacts on vital services including clean water distribution, access to electricity, main highways; and had an effect on more than 4000 businesses, ultimately causing a reduction in the province's GDP by $550 million (Government of Canada, 2018d).

More recently, severe spring floods caused significant damage in Canada. In 2017, Ottawa and Southeastern Quebec were inundated with heavy floods as a result of increased rainfall and runoff (Ottawa River Regulation Planning Board, 2018). This flood event amounted to an estimated $223 million in insured damages, in addition to costs incurred by uninsured properties and governments, and displaced more than 4000 residents (IBC, 2017; Teufel et al., 2019). Two years later, flooding across Ontario, Quebec and New Brunswick, resulted in an estimated $208 million in insured damages, with Quebec bearing the largest sum of these costs at $127 million (IBC, 2019a).

A. FLOOD RISK IN CANADA

Canadian flood risk is expected to increase, and it is estimated that average annual losses from flooding could rise by as much as 137% by mid-century and 300% by the end of the century as a result of climate change (Thistlethwaite, Minano, et al., 2018). The Parliamentary Budget Officer approximates that flooding will trigger annual federal disaster assistance payouts of $673 million in the near future (PBO, 2016). Flood risk is surpassing levels that society is willing to accept due to the mounting costs and damages associated with flooding, increasing risk posed to Canadian property and infrastructure, and increases in public spending on DFAA (Henstra & Thistlethwaite, 2017a).

By definition, flood risk is “a function of both the likelihood of an event occurring and the consequences of that event occurring” (Lyle & Mills, 2016, p. 344). Hence, it is possible to use risk to categorize and predict a community’s potential exposure to a flood event occurring. Regions that are sparsely populated with no exposure to large bodies of water would be seen as “low-consequence” and “low-likelihood”, and ultimately are at low risk for flooding (Lyle & Mills, 2016, p. 344). Comparatively, a low-lying region located near a floodplain with a dense population and concentrated insured assets would be a “high-consequence” and “high-likelihood” region, putting it at high risk from a flood event (Lyle & Mills, 2016, p. 344). Canada is geographically diverse and as a result, communities have variable exposure to flood risk associated with coastal floods, snowmelt runoff, storm-rainfall, ice jams, natural dams, coastal flooding, urban flooding, groundwater flooding and structural failure (Boyle et al., 2013; Sandink et al., 2010).

Canadian coastal regions are exposed to many triggers for flood events including sea level rise, storm surges, as well as hurricanes (City of Vancouver, 2018; Tucker, 2000). According to 2011 predictions, sea level along Canadian coasts is projected to rise 1 metre by the end of the century, and 2 metres by the year 2200 as a result of rising global temperatures (City of Vancouver, 2018). It is difficult to predict the precise extent, frequency, and magnitude of sea level rise, thereby presenting challenges in long-term management strategies. However, it is certain that flood risk to coastal communities and infrastructure located in low-lying regions is increasing due to sea-level rise (Lyle & Mills, 2016). Additionally, factors such as increased affluence, buyer interest in coastal and waterfront properties, urbanization within high-risk regions, rising population, and land-use shifts further expose these regions to flood risk (Boyle et al., 2013).

Cities throughout Canada have also seen increased instances of urban flood events within the past two decades (Sandink, 2016). Damage associated with urban flooding are the result of high concentrations of infrastructure, people and impermeable surfaces, resulting in increased instances of property damage, sewer backup and infiltration (Sandink, 2009). Household water damage associated with basement flooding and insufficient plumbing systems has become the largest source of property insurance claims in Canada, costing insurance companies $1.7 billion in 2012 alone (Sandink, 2013, 2016). In 2013, Aviva Canada announced that water damages comprised 51% of insurance payouts, and that these claims had increased from $8944 to $20 537 between 2003 to 2013 (Sandink, 2016).

Increased damages and costs associated with flooding have implications for Canadian governments and insurers. To effectively mitigate flood risk, public policy must account for factors such as land use planning, community density, infrastructure reliability as well as the management of and coastal flooding. Additionally, insurers have to be prepared with policies that account for rising losses endured from flood events (Sandink et al., 2014). Increasing flood risk in Canada presents a challenge to its flood management strategies which have evolved considerably over time.

2.1.2 THE EVOLUTION OF FLOOD MANAGEMENT IN CANADA

Flood management efforts in Canada have largely framed society as external to flood events, creating a ‘human against nature’ paradigm. Categorizing flooding under the ‘natural disaster’ umbrella implies that the consequences of flooding are beyond the control of humans and their activities; however, in reality, humans interact with surrounding environments to either mitigate or exacerbate the effects of overland flood events (Gober & Wheater, 2015). Socio-hydrology is the discipline that studies the interaction of societal and hydrological systems

(Sivapalan et al., 2012). Compared to traditional paradigms that flood management measures are external to water cycle processes, socio-hydrology promotes the view that human actions play a large role in water dynamics (Sivapalan et al., 2012).

Put simply, human activities have implications for flood risk. Some examples include urbanization, which results in increased runoff and land-use changes involving agricultural expansion, which affect fluvial processes. In fact, the 2013 floods in Calgary, which are reported as Canada's costliest natural disaster, resulted in part from poorly planned flood plain development (Gober & Wheater, 2015). Ultimately, "flood risk results from complex interactions between extreme events, human changes to the natural environment, human perceptions and responses to risk, and the capacity of human institutions to reduce and manage risk" (Gober & Wheater, 2015, p. 4783). Framing disaster as a policy problem is critical in enacting effective management strategies. Moreover, emphasizing flooding as a 'natural disaster' alleviates decision-makers of the responsibility of ineffective planning and flood management (Bogdan et al., 2020).

Flood management in Canada has historically involved three key stages including; (1) planning, where structural and preventative measures are undertaken to minimize damage prior to a flooding event; (2) flood emergency management, whereby flood risk is consistently monitored and involves the daily maintenance of flood controls and (3) post-flood remediation, which comprises recovering losses after an overland flood event (Akter & Simonovic, 2005). Increasingly, the literature is emphasizing the importance of a risk-based approach towards managing floods, rather than relying on structural defenses that traditionally comprised the majority of flood mitigation efforts in Canada.

A. THE STRUCTURAL CONTROL ERA

Until recently, Canada relied heavily on structural defenses to manage flood risk and minimize damages associated with flood events. The implementation of these defenses was based on "specified return period" of the hazard or a "repeat of a specified historical event", in order to minimize flood risk to a level that is deemed acceptable (Henstra & Thistlethwaite, 2017a, p. 9). These measurements formed the basis of policy implementation, which aimed to stop or prevent flood damages. To this day, estimates of '1-in-100-year-flood' events are used to measure a region's susceptibility to flooding, which indicates that a region has a 1% chance of experiencing a flood of this extent annually (Thistlethwaite et al., 2017). Subsequently, structures such as dams, dykes, sandbags, floodwalls, and levees are constructed that act as physical barriers to flooding (Ran & Nedovic-Budic, 2016).

The first part of the twentieth century saw the beginning of the implementation of large-scale 'water control' projects such as hydroelectric dams and drainage basins. Initially, these structures were not intended to be flood defences, and instead serve as facets for recreation, irrigation and wildlife conservation; however, they ended up decreasing flood peaks and were recognized as effective in managing floods. At that time there was no formal water policy in Canada, and the *Constitution Act* contained no particular mention of flood management (Environment and Climate Change Canada, 2009). The ambiguous constitutional responsibility incentivized neither the federal nor provincial governments to take the lead on flood control efforts and failed to hold any particular level of government accountable for flood management (Shrubsole, 2000; Shrubsole et al., 2003).

In 1953, Canada enacted the *Canada Water Conservation Assistance Act* (CWCAA); its first national legislation that addressed national water management (Environment and Climate

Change Canada, 2009). Prior to this Act, municipalities and local residents undertook the majority of flood management efforts. The CWCAA empowered the federal government to play a larger role in flood prevention measures, and it aimed to alleviate the financial burden of flood management infrastructure on provinces and local governments (Shrubsole et al., 2003). This legislation permitted the federal government to cover 37.5% of the cost of large-scale structural defenses for the "conservation and control of water" (Environment and Climate Change Canada, 2009).

Financial assistance from the federal government as per the CWCAA was intended for structural defences, and as a result, flood mitigation efforts from the 1950s to the mid-1970s were largely focused on this approach. During this time, major flood defenses were constructed primarily in the Metro Toronto and Upper Thames regions in Ontario with the federal government contributing an estimated $15 million (Bruce, 1976). Additionally, more defenses were constructed under "Special Agreement", whereby the government contributed more than the 37.5% limit outlined in the CWCAA (Bruce, 1976, p. 7). These included the Red River Floodway, with a total cost of $63 million and a federal contribution of $37 million; the Shellmouth Reservoir where the federal government paid $5.5 million of the total cost of $11 million; the Assiniboine River Diversion with federal inputs of $9 million of an $18 million total; and dykes throughout the Red River Region for which the federal government contributed $1.9 million of a $2.7 million total (Bruce, 1976).

These structures have played a role in reducing damages from severe flood events. For instance, it is estimated that the Red River Floodway prevented $200 million in damages during the Winnipeg Floods of 1974, and $500 million in damages were prevented in Manitoba's 1997 flood (Bruce, 1976; Rashid, 2011). Cumulatively, it is estimated that the Red River Floodway

has prevented $8 billion in damages (Public Safety Canada, 2008). Some of these structural defenses have been expanded in recent years. One example is the expansion of the Red River Floodway in 2005, where $665 million was invested to increase the capacity of this floodway to withstand a 1-in-700-year flood event (Blais et al., 2016).

Despite the benefits of protecting historical development, a hazard-based approach is largely criticized in the literature. Structural defenses are often designed based on the probability of a disaster, and do not take into consideration the exposure or vulnerability of a region to a flood event. This results in poor allocation of investment in mitigation strategies and uninformed prioritization of risk reduction. Furthermore, the construction and operation of structural defenses are a large financial burden. Flood control structures mislead individuals, as they give the illusion of complete flood protection, and they do little to discourage migration to high-risk regions. Additionally, disaster assistance, which provides financial support after structural defenses fail, provides little incentive for people to adopt personal protective measures and engage in risk-reducing behaviours or seek to rebuild in safer locations (Henstra & Thistlethwaite, 2017a). Finally, post-flood remediation emphasizes returning to a "pre-flood state", which puts the affected communities at risk of future flooding as no further mitigation measures are undertaken (Henstra & Thistlethwaite, 2017a, p. 7; Jakob & Church, 2011; Shrubsole, 2000; Shughart, 2011).

B. THE NON-STRUCTURAL CONTROL ERA

While flood management strategies have traditionally relied on structural measures, a combined method has been identified as most effective in practice. Successful flood management policy includes the use of both structural and non-structural mechanisms. Non-structural measures include agreements, expertise, and regulations. Whereas structural defenses act as

protective barriers, they are associated with environmental and economic drawbacks, as noted above. Non-structural defenses allow for efficient planning and policy to be developed, but are sensitive to the regions in which they are implemented (Ran & Nedovic-Budic, 2016).

In 1970, the *Canada Water Act* (CWA) was implemented and became the primary legislation outlining the role of the federal government in managing floods in Canada, effectively replacing the CWCAA which was viewed as too "restrictive" as assistance covered limited water uses, assistance was inadequate, and planning did not allow for wide-ranging stakeholder engagement. This Act introduced a method that was less dependent on structural defenses to manage flood risk. New approaches outlined in the CWA include incorporating "all water uses and their economic, social and environmental importance"; consulting affected parties and residents; incorporating geographic features, such as waterways, in planning; and non-structural flood management techniques should be incorporated in policy (Environment and Climate Change Canada, 2009).

Non-structural approaches were incorporated into the Flood Damage Reduction Program (FDRP) in 1975. This new program involved a series of renewable 10-year agreement between the federal and provincial governments (Oulahen, 2014; Shrubsole et al., 2003). Federal support and regulation through this program allowed for an approach that prioritized non-structural measures, such as flood hazard mapping, the identification of flood-prone regions and a reduction in development within high risk areas (Oulahen, 2014). Furthermore, the FDRP outlined important principles, such as the need to harmonize mitigation efforts between federal and provincial governments; that flood maps should be developed to identify high-risk regions and be made accessible to the public; provincial investment and developments should be minimized in flood-prone regions; and that disaster assistance will be made unavailable in

regions which are identified as flood-prone (Bruce, 1976). Public awareness was also a key factor outlined in the FDRP (Shrubsole et al., 2003).

Through the FDRP, each province has been left responsible for maintaining their flood hazard maps, which has resulted in national inconsistencies of flood plain investment and development (Oulahen, 2014). Flood maps provide important information regarding land-use planning, assist with the identification of high-risk areas, and inform infrastructure and development (Henstra & Thistlethwaite, 2018). However, provinces and municipalities have demonstrated varying levels of engagement with maintaining flood maps (Oulahen, 2014). In a recent study undertaken on the quality of flood maps, 62% of maps surveyed were 'low quality', based on their inability to meet basic criteria. These criteria included fundamental components of a hazard map, including the legibility of map legends and flood zones, as well as the ability of readers to identify landmarks and information pertaining to their property (Henstra, Minano, et al., 2019). In fact, some municipalities still use flood maps that have not been updated since they were originally produced by the FDRP over four decades ago (Oulahen, 2014). As a result, there is a need for improved hazard maps that are accessible and comprehensible to the public, and that can be used to effectively inform flood management strategies (Henstra, Minano, et al., 2019).

Another key component of flood recovery in Canada has been the Disaster Financial Assistance Arrangements (DFAA), introduced in 1970 by the Government of Canada (Public Safety Canada, 2018). Through the DFAA program, the federal government assists with disaster recovery costs when they exceed the financial means of the provincial governments (Henstra & Thistlethwaite, 2017a; Public Safety Canada, 2018). Often, these payouts are needed where structural controls are overwhelmed and significant damages have occurred (Henstra &

Thistlethwaite, 2017a). DFAA is used to cover expenses such as rebuilding infrastructure and public property to their pre-flood state, compensating individuals, businesses and farms for damages to their properties, and funding evacuation procedures (Public Safety Canada, 2018).

While DFAA has often been regarded as a key component of post-flood recovery, it does little to minimize flood risk as further preventative measures are scarcely implemented when restoring a community to its 'pre-flood state' (Henstra & Thistlethwaite, 2017a). Moreover, DFAA spending has increased significantly in the past decade, rendering it economically unfeasible. For instance, average annual DFAA payments more have more than doubled in the past two decades, with an increase from an average of $118 million per year between 1996 and 2011 to an average of $280 million annually between 2012 and 2015, overreaching its budget of $100 million per year (Henstra & Thistlethwaite, 2017a; Public Safety Canada, 2015). In fact, the federal government pays approximately 90% of disaster relief costs after a severe flood event (Groeneveld, 2006). Government programs are intended for disaster relief, whereas insurers provide the financial means for the restoration of damaged properties after flooding events occur (Sandink et al., 2016). Disaster assistance programs are important tools in recovering from losses caused by flooding events, but they limit perceptions of individual responsibility by decreasing the incentive for individual flood protection measures, encourage development and re-building in high-risk areas, and are no longer financially sustainable (Sandink et al., 2016; Thistlethwaite & Henstra, 2017).

Faced with predicted increases in costs associated with flooding, municipalities have been obligated to increase their contributions to disaster recovery costs, while the federal government has tightened the economic threshold for accessing the DFAA after a disaster (Henstra & Thistlethwaite, 2017a). Additionally, because property owners tend to expect a short-

term return on their investment, they neglect to pay for flood prevention measures, assuming a flood event will not affect their homes within a few years. Moreover, property owners have become reliant on government disaster assistance as a means of restoring their homes after a flood event (Kunreuther, 2001).

Flood insurance has been widely regarded as an effective flood management tool capable of addressing weaknesses in government-run disaster assistance programs. However, there is a lack of uptake of private flood insurance. Flood insurance is not included in residential property insurance, and therefore remains costly for homeowners to purchase particularly for those residing in high-risk areas (Thistlethwaite, 2016). In addition, many Canadian residents are under a false impression that damage due to flooding is covered in their home insurance (Oulahen, 2014). Among 2100 Canadian property owners surveyed in 2004, nearly 70% were unaware that their home insurance policies did not cover damage as a result of overland flooding (Sandink et al., 2010).

This has placed a large burden on governments to recover property damages as a result of flooding through disaster assistance, and more recently through property buyouts. In response to the reluctance of Canadians to purchase coverage for flood events, insurers are pushing for the federal government to undertake "risk-based approaches to flood risk management" to better mitigate the increasing costs associated with damage from overland flood events (Henstra & Thistlethwaite, 2017a, p. 7).

Despite the incorporation of structural and non-structural defenses in managing flood risk, there remains a need to implement an approach to flood management in Canada that allows for effective risk-sharing and allocation of resources. Current flood mitigation and recovery measures are no longer sustainable economically, and hazard-based approaches have proven

ineffective at mitigating flood risk through untargeted investment to flood defenses, poor communication of risk, and through failing to enforce limitations on development in high-risk regions (Thistlethwaite & Henstra, 2017). Additionally, current flood management practices poorly distribute the burden of flood risk and assert heavy reliance on disaster assistance. The literature asserts the need for a risk-based approach to flood management policy in Canada.

2.1.3 FLOOD RISK MANAGEMENT

A. FLOOD RISK MANAGEMENT THEORY

Risk management is an emerging approach towards flood management policy. This approach uses analysis tools to reduce and share the responsibility of the risk posed by a particular flooding event (Henstra & Thistlethwaite, 2017a). By definition, Flood Risk Management (FRM) comprises the "decisions and actions undertaken to analyze, assess and (to try to) reduce flood risks" (Schanze et al., 2006, p. 4). FRM strategies should be all-inclusive, as well as 'continuous', implying that there is a need to regularly evaluate flood risk and mitigation measures (Schanze et al., 2006).

FRM represents a shift away from hazard-based models of managing flood risk (Henstra & Thistlethwaite, 2017a). Instead, FRM uses risk as a basis of informing management strategies which is defined as factor of hazard, exposure, and vulnerability (Kron, 2003).

1. *Hazard*: the identified threat (i.e. flooding) and the likelihood of its occurrence (Kron, 2003; Nelson et al., 2007)
2. *Exposure*: the potential for loss of people, valued assets (resources, infrastructure, social/cultural capital), and environmental assets (services, ecosystems, species) in a specified region as a result of the hazard (IPCC, 2018; Kron, 2003; Nelson et al., 2007)

3. *Vulnerability*: the predisposition of a region to be negatively impacted by the hazard; based on a variety of factors such as risk threshold, ability to adapt, and proneness to hazard (IPCC, 2018; Kron, 2003; Nelson et al., 2007)

In theory, calculating flood risk in a region involves multiplying these three factors (risk = hazard x exposure x vulnerability), and designing policy based on this value (Henstra & Thistlethwaite, 2017a; Kron, 2003). However, managing risk becomes more complicated as floods are not isolated incidences that are inherently predictable. Rather, flood events involve many different variables, and require management efforts from a wide variety of stakeholders, from local residents to government officials and decision-makers (Plate, 2002).

FRM requires the reduction of flood risk in a current system, as well as planning a system to minimize future flood risk (Plate, 2002). Throughout the literature, FRM generally involves three main steps, including:

1. *Risk Analysis,* where potential hazards, and the vulnerability and exposure of communities to the hazard are determined;
2. *Risk Evaluation,* where the level of risk is weighted, and 'acceptable' levels are determined; and
3. *Risk Reduction & Mitigation*, which involves implementing 'risk controls' to decrease risk to a level that is acceptable (Henstra & Thistlethwaite, 2017a; Plate, 2002; Schanze et al., 2006).

As a first step, *risk analysis* is used to identify risk information based on past, present and future flood events. Prevailing methods for risk analysis in academic literature include the use of risk maps to identify the likelihood of flood events and potential impacts to communities, and forecasting and warning systems, which use models to monitor flood events (Schanze et al.,

2006). Other areas of risk can be highlighted through the occurrence of flood events, such as weaknesses in structural defenses (Plate, 2002). Uncertainty must be accounted for in determining risk, as analyses typically only account for factors that are quantifiable. As the climate continues to change rapidly, the high degree of uncertainty presents challenges to estimating flood risk, and predictions of indirect economic, social and ecological consequences are limited (Schanze et al., 2006). Constant updates to information are necessary to account for changes in a system, such as the introduction of new data, academic developments, or changes in landscape due to land use or urbanization (Plate, 2002).

Risk evaluation is identified as the second step in FRM procedure. This step is concerned with the "perception and evaluation" of risk, and ultimately shapes the decisions that are made for managing the system (Plate, 2002; Schanze et al., 2006, p. 6). Risk evaluation uses the experiences of individuals, societal perceptions and the viewpoints of stakeholders to determine acceptable levels of flood risk (Henstra & Thistlethwaite, 2017a; Schanze et al., 2006). It predominantly focuses on the majority view of 'costs' (negative costs and mitigation efforts) and 'benefits' in developing FRM measures. However, it is worth noting that this approach fails to account for intangible losses, such as casualties and mental and physical health issues, and therefore requires consideration in FRM decision-making (Schanze et al., 2006). *Tolerable Risk,* which defines the level of risk that society is willing to accept to protect certain assets, is also a common practice used to evaluate risk in decision making. The 'As Low As Reasonably Practicable' (ALARP) principle, which is a key factor in determining Tolerable Risk, asserts that any remaining risk should be reduced as far as possible (Bowles, 2003).

The third step is *risk reduction and mitigation*, which uses measures to reduce unacceptable levels of risk to a point where they are deemed acceptable (Henstra &

Thistlethwaite, 2017a; Schanze et al., 2006). Risk controls are "specific measures – processes, policies, devices, or practices – implemented to modify risk" (Henstra & Thistlethwaite, 2017a, p. 7). Specifically, these controls involve decreasing involvement with high risk activities, removing and mitigating hazards, sharing losses among stakeholders, and acknowledging beforehand that certain losses will occur from risk (Henstra & Thistlethwaite, 2017a). Risk controls are a key policy consideration in FRM. Schanze et al. (2006) argue that these controls are relevant at 'pre-flood', 'flood event', and 'post-flood' stages to reduce risk.

FRM requires a shift towards a diversification of policies and stakeholders. It prioritizes sharing responsibility among stakeholders rather than imposing the burden of managing flood risk solely on governments and individuals (Henstra & Thistlethwaite, 2017a). *Risk sharing*, by definition, is "the distribution to other parties of some of the burden of loss associated with flood risk, and/or the responsibility and costs for measures to avoid, prevent and mitigate flood risk" (Thistlethwaite & Henstra, 2017, p. 352). Risk sharing is an important component of FRM as it requires that responsibility for mitigation is distributed among all affected parties, ultimately allowing for increased stakeholder engagement and more efficient allocation of resources (Henstra & Thistlethwaite, 2017a). Ineffective risk sharing between levels of government and between key decision makers has caused a lack of prioritized FRM investment, particularly at a local scale.

FRM incorporates several factors that assert it as a public policy problem. First, it identifies that the consequences of flooding are a result of poor decision-making, rather than a natural occurrence (Gober & Wheater, 2015; Henstra & Thistlethwaite, 2017a). FRM also requires a variety of policies for the effective management of flood events. There is a need to adopt multisector measures so that FRM is supported at all stages of a flood event, and to ensure

that there are defined roles for the planning and implementation of FRM measures (Sayers et al., 2013). Additionally, using risk-based approaches in FRM as opposed to traditional hazard-based models require stakeholder involvement and shared responsibility, thereby defining it as public policy (Henstra & Thistlethwaite, 2017a).

FRM requires policy strategies and instruments that go beyond traditional ways of inputting structural and non-structural defenses (Henstra & Thistlethwaite, 2017a). Sayers et al. (2013) identify the foundations of effective FRM policy, which include securing funding and support for FRM measures, cooperation among stakeholders and strategies, communication of risk, suitable legal framework, as well as the enactment of "adaptive management" programs (p. 8). Sustainable FRM policy in Canada will actively incorporate each of these elements.

2.1.4 FLOOD RISK MANAGEMENT IN PRACTICE

Within the past ten years, there has been an uptake of FRM in flood policy around the world. Managing flood risk is becoming a priority in international climate change strategies (Wiering et al., 2017). Both the United Nations and the European Union have identified FRM as an effective framework to mitigate flood risk (European Commission, 2016; Henstra, Thistlethwaite, et al., 2019; United Nations, 2015). Uptake of FRM governance has been viewed in many countries including England, Scotland, the Netherlands, Germany, France, Poland and Sweden, India, and China (Hegger et al., 2016; Henstra, Thistlethwaite, et al., 2019; van Doorn-Hoekveld et al., 2016; Wiering et al., 2017).

FRM concepts have influenced national flood management strategies in countries worldwide. Many countries have seen a shift to "adaptive risk governance", where responsibility is shared among a well-rounded group of stakeholders from public and private sectors (Mees et al., 2014, p. 271). Furthermore, particularly in Europe, nations have been encouraged to diversify

their FRM strategies. The level of FRM diversification varies between countries, and plays an important role in determining a country's capacity to manage flooding (Hegger et al., 2016). The literature emphasises that diversity among flood management strategies and the involvement of multi-level stakeholders is critical in promoting resilience to flooding (Hegger et al., 2016; Henstra, Thistlethwaite, et al., 2019; Wiering et al., 2017).

The 2007 EU Flood Directive is a development that initiated a widespread shift towards FRM uptake in flood management policy. This program provides a framework grounded in FRM principles, which governs member states in managing and reducing adverse the adverse effects of flooding (European Commission, n.d.). Sitting at 27 member states across Europe, this program is notable as it has allowed for nations to adapt principles of FRM within the context of their own country to meet the requirements set out in the Directive, and has improved inter-country collaboration regarding flood management (Adamson, 2018; EU, 2007).

Studies have tracked the progress of FRM implementation in various countries, including England, France, Belgium, the Netherlands and Poland. It was seen that England has a well-established, diverse FRM approach (Hegger et al., 2016; Wiering et al., 2017). Furthermore, England involves multi-level governance, and a variety of both public and private actors in its strategy (Wiering et al., 2017). Comparatively, the Netherlands, Poland, France and Belgium have diversified their FRM approach to some extent, but a large emphasis has been placed on certain elements in their FRM strategy (Hegger et al., 2016). The Netherlands and Poland, specifically, tend to rely on stakeholders from the public sector, have prioritized structural defenses and were reported as having very low diversification in their FRM approaches. France and Belgium have partially diversified strategies, but still rely largely on public entities and prioritize defenses (Wiering et al., 2017). Among these countries studied, England is deemed

more resilient to flooding through its diverse FRM strategy. Comparatively, the Netherlands, Poland, France and Belgium have been working to implement diverse strategies, where defenses are prioritized and additional measures are seen as supportive to flood infrastructure (Hegger et al., 2016).

Additionally, interactions among private and public sectors in managing flooding have been widely studied between nations and are important in understanding each country's approach to risk sharing and implementation of FRM principles. In some countries, such as the Netherlands, flood mitigation is seen as a "collective good", whereby it is largely the responsibility of governments and public actors (Meijerink & Dicke, 2008, p. 505). Comparatively, nations such as the United States and the United Kingdom have employed both the private and public sector in their flood management approach, with the government and the insurance industry as important actors (Meijerink & Dicke, 2008).

It is argued that the use of private entities, such as insurers, in flood management approaches is largely dependent on a country's perception of risk and their values (Hofstede, 1995; Meijerink & Dicke, 2008). These cultural values include solidarity, the extent to which members of society feel responsibility towards one another; independence, describing the extent to which each individual in society is responsible for their own protection; and predictability, that describes the level to which society perceives risk. In cases where there is high solidarity, low independence, and high predictability, governments are prioritized in flood management with low private sector involvement (Hofstede, 1995).

FRM prioritizes a shift towards shifting the responsibility towards a variety of stakeholders, and for recovering losses through private-public partnerships (Henstra & Thistlethwaite, 2017a; Hudson et al., 2020). Flood management policy in Canada is evolving,

however research on Canada's response to FRM implementation is just emerging. There remains the need for research that examines FRM uptake in practice.

2.1.5 FLOOD RISK MANAGEMENT IN CANADA

A. FRM POLICY AND IMPLEMENTATION IN CANADA

Along with many countries around the world, Canada has seen the implementation of FRM principles in disaster policy. As previously mentioned, upper levels of government and individuals have traditionally been sources of financial relief in recovering costs after a flood event through DFAA payments and out-of-pocket repairs to damaged property (Henstra & Thistlethwaite, 2017a). There is an expectation, however, that a wide range of stakeholders, including municipalities, will begin to play a larger role in managing flood risk. Local governments can play a critical role in managing flood risk through the enactment of bylaws to regulate land use and zone new developments to areas that are at low risk to flooding (Stevens & Hanschka, 2014). However, municipalities are largely unwilling to enforce 'restrictive' policies that could limit local economic development, and require federal and provincial intervention to enforce these regulations (Stevens & Hanschka, 2014).

Municipalities, which tend to endure the largest losses to infrastructure and local economies, rely on income from property taxes and consequently have less economic flexibility to address flood damages compared to upper levels of government that are able to generate income from various revenue streams (Thistlethwaite & Henstra, 2017). Furthermore, municipalities have limited financial means to adopt flood prevention measures in high risk regions (Henstra & Thistlethwaite, 2017a). Despite this, studies have shown that flood management efforts are most effective when coordinated at a local scale (PBO, 2016). Risk sharing is an important policy tool to improve resiliency to floods within Canadian

municipalities as it aims to distribute recovery efforts as well as efforts to reduce risk (Thistlethwaite & Henstra, 2017).

Just as recently as 2008, the Government of Canada launched the National Disaster Mitigation Strategy (NDMS) (Oulahen, 2014). This strategy was developed to promote natural disaster mitigation efforts, through risk reduction and prevention, in order to place less of a strain on DFAA (Oulahen, 2014; Public Safety Canada, 2008). Mitigation efforts are referred to in this strategy as measures that "include all structural and non-structural risk treatments appropriate to hazards, and leverage or incorporate new, existing and developing disaster risk reduction programs" (Public Safety Canada, 2008, p. 1). Notably, the NDMS prioritizes risk sharing among all levels of government. It identifies the importance of implementing mitigation measures at a municipal level to reduce risk from natural hazards and funds local mitigation initiatives (Public Safety Canada, 2008; Thistlethwaite, Henstra, et al., 2018).

One of the main principles in the NDMS is the "return on investment" of mitigation strategies (Public Safety Canada, 2008, p. 1). To reduce future damage and repair costs associated with natural disasters, investment is directed towards improving the resilience of infrastructure and properties (Public Safety Canada, 2008). Hence, it is expected that this investment will pay off as instances of natural disasters continue to increase. Furthermore, the NDMS aligns with an amendment which was implemented to the DFAA that allocated 15% of the funds to mitigation measures, thereby improving disaster financial assistance investment (Oulahen, 2014; Public Safety Canada, 2011). This is aimed at equipping communities with the resources to mitigate damages from hazards, rather than recovering damages to a "pre-disaster state" that is vulnerable to future natural disaster events (Oulahen, 2014, p. 607).

In 2014, the National Disaster Mitigation Program (NDMP) was implemented and was cemented in flood policy through funding of $200 million over the years of 2015 to 2020. It has recently been renewed to extend to 2022. This program enacts measures highlighted throughout the NDMS, and aims to reduce the overall costs associated with flooding through funding mitigation measures as well as enhance collaboration among insurers (Public Safety Canada, 2015). Other notable national initiatives that align with FRM implementation include the establishment of a National Taskforce on Flood Insurance and Relocation at the end of 2020, which prioritizes five key elements of residential flood management including (1) flood mapping, (2) flood insurance (3) tactical property buyouts and location transfer, and (4) a review of current flood management policies, including DFAA and NDMP (Meckbach, 2021). Changes in natural disaster policy have had implications for the distribution of FRM in Canada.

Insurance itself has become one of the most widely referenced risk-sharing tools. It is well-documented that market-based instruments play an important role in recovery after flood events (Henstra & Thistlethwaite, 2017a; Oulahen, 2014; Thistlethwaite, 2016; Thistlethwaite, Henstra, et al., 2018). Canadian FRM policy has identified flood insurance is a key tool for recovering losses from flood events and informing policy through the use of flood maps and reporting on insured costs (Henstra & Thistlethwaite, 2017a).

However, Canadian insurers have traditionally resisted the introduction of flood insurance, stating the argument that it would result in ‘adverse selection’; a process by which high-risk homeowners are more likely to request insurance coverage than those that are lower risk (Botzen & Van Den Bergh, 2008). Furthermore, people tend to perceive themselves at low risk to flooding, resulting in a low demand for flood insurance (Oulahen, 2014). The poor uptake of flood insurance policies has left Canadian homeowners ill-equipped to effectively manage the

costs associated with overland flood events (Thistlethwaite, 2016). Additionally, DFAA has traditionally negated incentives for property owners to purchase flood insurance as it has compensated for losses endured from flood events (Henstra & Thistlethwaite, 2017a). Nevertheless, flood insurance and personal protection measures are moving to the forefront of FRM policy as DFAA is becoming increasingly limited (Thistlethwaite, Henstra, et al., 2018).

Despite support for FRM, its implementation has been slow in Canada. There is a need for employing a consistent and sustainable approach towards FRM in Canada, as flooding is no longer economically, politically or socially feasible. Resilience and adaptation are important concepts in informing effective FRM policies in Canada. An effective flood risk management strategy in Canada will incorporate both resilience and adaptation through efforts to reduce the impacts of flooding before an event occurs (Folke, 2006). This can include measures such as warning systems, evacuation plans, spatial planning, building regulations, as well as retrofitting properties to minimize damage due to floods. Embodying resilience in high-risk regions also includes flood risk management processes to aid with post-flood damage, which can incorporate damage compensation measures and insurance (Vis et al., 2003). Adaptation, comparatively, refers to the actions and decision-making process performed to mitigate future socio-ecological change without changing the structural identity, function, or feedbacks of the system (Nelson et al., 2007). Through improved FRM policy implementation that incorporates these principles, a community will be able to better absorb shocks associated with flooding events (Vis et al., 2003).

2.2 POLITICAL DISCOURSE, PUBLIC POLICY & FLOOD RISK MANAGEMENT

2.2.1 DISCOURSE AND PUBLIC POLICY

The communication of flood risk is important in determining how FRM is perceived by the public and, ultimately, how it gets translated in policy outcomes. By definition, discourse refers to accounts that allow "those that subscribe to it to interpret bits of information and put them together into coherent stories or accounts" (Dryzek, 2013, p. 9). In its most basic form, discourse shapes a cohesive knowledge base and set of assumptions within a society that form the basis for research, discussion and debate (Dryzek, 2013). However, it is argued that the role of discourse goes beyond providing a medium through which narratives are communicated and understood. Discourse is also critical in defining and systematizing social practices and structures (Howarth, 2010; Laclau & Mouffe, 2014).

Discourse influences public policy by informing and amplifying dominant social paradigms. Legitimization means the societal acceptance of an ideology or custom (Reyes, 2011). Political power is given to discourse when it legitimizes prevailing ideologies and enforces overarching public opinions (Motion & Leitch, 2009). In this way, discourse reflects what is important to the public.

Further, the frequency at which issues are discussed determines their relevancy in decision-making. Put simply, the more that people are exposed to discourse pertaining to certain topics or events, the more salient these issues are among the general populace (Bornstein, 1989). This is in part due to a phenomenon called routinization, whereby the repeated exposure to information allows for its increased recognition among audiences (Herbst et al., 2014). This familiarity has been seen to increase the "affective response" of voters in a political context,

where people are more likely to prefer ideologies to which they have been repeatedly exposed (Sheff, 2010, p. 160).

Policy actors will often promote their stance on issues using narratives that have been pre-subscribed by the public in order to gain widespread support (Liu et al., 2019). This is often done through *framing* which, in short, refers to the process by which an audience understands information based on how it is displayed (Goffman, 1974). Altering the presentation of an issue or an event can have significant impacts in terms of shaping public views, and can ultimately have implications for policy outcomes (Chong & Druckman, 2007).

Framing in public policy discourse involves the strategic use of language in communications. According to Silva et al. (2016), discourse analysis literature provides two main principles that govern policy narratives: (1) that language represents dominant public beliefs and is inherently influenced by the social systems in which it exists, and (2) that discourse is "a form of social practice" that relates narratives with overarching social conditions (p. 225). In this way, it is assumed that public policy discourse is composed to enforce and appeal to societal expectations (Fairclough, 2001; Silva et al., 2016).

However, that is not to say that discourse frames are fundamentally consistent with a single social paradigm. Each frame is built on its own set of assumptions and values. *Reframing* occurs when there is a paradigm shift in an individual or group's views (Jerneck & Olsson, 2011). Reframing assumes that people have already subconsciously subscribed to narratives and that a highly influential force is required to change these entrenched notions (Jarratt & Mahaffie, 2009). It is up to decision-makers to appeal to these existing ideologies and attract public attention to new perspectives.

Subjects of public policy debate are largely "multi-faceted", in that they can be framed in many different ways (Cairney, 2019, p. 156). The use of keywords and political labels in discourse has been found to affect public perception. This has been emphasized in studies looking at the ways in which the use of keywords has influenced public opinion on various topics; such as smoking and human health (i.e. *public health vs. health inequalities*) (Cairney, 2019), immigration (i.e. *illegal immigrant* vs. *undocumented worker*) (Lakoff & Ferguson, 2006), and environmental issues (i.e. *climate change* vs. *global warming*) (Schuldt et al., 2011). In each case, these policy issues are identified under keywords that are associated with a specific point of view, or frame, of the topic. Jerneck and Olsson (2011) summarize that this is a result of:

> "dynamic interactions between language (words, concepts) and cognition (thinking) meaning that words evoke frames; language evokes moral and conceptual frames; the negation of a frame evokes the frame; and the evoking of a frame reinforces it" (p. 258).

In other words, the connotation associated with words that are used in discourse has the ability to adhere to individual ideologies. In a public policy context, keywords and labels can be used to evoke support from and shape perceptions of the general populace.

Often, social and justice movements are a driving force of shifts in public opinion. *Collective Action Frames* are frames that emerge and contest existing, dominant frames (Benford & Snow, 2000). Collective action frames are viewed as a series of shared ideologies and are widely assumed to stem from a leader's ability to gain support for their position in challenging prevailing (and often justice-based) paradigms (Tarrow, 1992). In this sense, it is assumed that a leader's discourse must appeal to a group, whether it is in terms of identity, ability to act, or a feeling of injustice, to build momentum to enact change (Kubal, 1998; Tarrow, 1992). When

there is widespread public support for an issue, it is more likely that it will be influential in informing public policy.

A. MEDIA DISCOURSE AND PUBLIC POLICY

A large portion of the general public relies on media outlets, such as print and broadcast news, to provide current and reliable information on events and issues. Inevitably, the media influences public opinion and plays a role in defining the issues that are of political importance. Through the use of framing, media sources are able to present political matters in ways which influence how they are widely understood and recognized among the public. Often in media discourse studies, this is referred to as *agenda setting*, whereby mass media selectively covers issues and events to resonate with audiences in ways that prompt political action (Barnes et al., 2008; McCombs & Guo, 2014).

Thistlethwaite et al. (2019) summarize that media framing influences policy in two distinct ways: (1) through identifying and concentrating the attention of policymakers to particular issues, and (2) by framing events to make them 'newsworthy', thereby persuading the public to see these issues in a certain context. Increased media coverage has been shown to advance the priority of certain issues among policymakers, as well as urge decision-makers to add items to discourse agendas (M. Jones et al., 2014; Thistlethwaite et al., 2019).

News media acts as a source through which key stakeholders, such as public interest groups, decision-makers, and subject matter experts can connect with the public (Escobar & Demeritt, 2014). Effectively, news media can influence the scope of response through crediting the policy problem to a definition that is supported by knowledge and expertise, giving more political relevance to the issue (Thistlethwaite et al., 2019). However, news coverage has not been seen to report risks that subject matter experts have identified as the most important; news

sources often over- or under- report scientific assessments, thereby miscommunicating risk to public audiences. Ultimately, this causes a push for ineffective policy targets (Boholm, 2009).

The perception of risk is another way in which the media influences public policy. The urgency and immanency by which news sources frame a flood event will determine the priority of addressing this issue in the political sphere (Barnes et al., 2008). Perceived risk is higher for an issue that is linked to long-term effects, is associated with climate change, and that affects local infrastructure and public safety, and therefore is more likely to enact policy change (Thistlethwaite et al., 2019). Despite this, the sensationalism associated with news reporting is short term.

B. POLITICAL DISCOURSE AND PUBLIC POLICY

As political discourse spans multiple fields of study, namely political studies and linguistics, there has been much debate in settling on a single definition (Kampf, 2015). Further, this definition is reliant on the scope at which the term 'political' is used. More broadly, political discourse can be used to define any dialogue among the general public or organizations, such as governments and mass media outlets, regarding policy and decision-making (Kampf, 2015; Kirvalidze & Samnidze, 2016). However, when referring to institutional political discourse, the definition is often specific to politicians and members of parliament (Kirvalidze & Samnidze, 2016). The term politicians in this case pertains to individuals who are elected and compensated for their role in municipal, provincial and federal decision-making processes (Kirvalidze & Samnidze, 2016; van Dijk, 1997). Therefore, through an institutional policy theory lens, and for the purposes of this research, the definition according to Kirvalidze & Samnidze (2016) will be used, whereby political discourse consists of written and spoken dialogues "which take place in such institutional situations where the speaker expresses his/her opinion as a politician" (p. 164).

Discourse research has examined the influences of discourse and public policy on each other. Motion and Leitch (2009) associate discourse with organizational identity, as it is the channel through which power is distributed within a system and therefore has an effect on political actions within the system. Further, public discourse has a *legitimization* effect, whereby sanctioning a public policy confirms a belief system or knowledge base, through vehicles such as normalization, authorization, rationalization, moralization and narrativization (Motion & Leitch, 2009; Vaara et al., 2006). The reputation of a political institution also has a large influence on public perception and the trust that is placed upon it (Stromback & Kiousis, 2011).

In particular, the Canadian system which is to be examined in this study is a *democratic system*. Gastil (1992) identifies that, theoretically, a democratic system should comprise four characteristics; that public decisions must be made purposefully and must have reason to be supported, that each member within the system must have equal opportunity to engage in the decision-making process, that all involved stakeholders and trade-offs of a decision must be considered, and that there should be a mutual respect among representatives and their autonomy in voicing their political stances. Hager and Hilbig (2020) remark that public opinion acts as a "double-edged sword", whereby decision-makers must respond to issues that are important to the public, however, must be careful not to use public opinion as a way to avoid productive discourse and heavily debated subjects (p.936).

Criticisms have been made that elected officials ultimately address audiences in a manner that furthers their platform. Obeng (1997) argues that politicians in this sphere will often avoid directly addressing issues which are heavily debated among the general public. Rather, they will use verbal tactics, such as metaphors, providing evasive or vague answers to questions, or innuendos to avoid controversy, and ultimately to further their platform. The strategic use of

language has long been used in political discourse to influence public opinions and push political agendas into mainstream public interest (Stewart et al., 2012). The way in which these messages resonate with individuals depends on the public's translation of language into reasoning.

Political ideology and affiliation are also key drivers of priorities that are discussed at a parliamentary level. By definition, *political ideology* encompasses the political beliefs of an individual and determines the extent to which they lean towards conservative or liberal, and *political affiliation* indicates the political party with which an individual typically associates themselves (Cruz, 2017). More left-leaning political ideologies tend towards more progressive views on environmental-based issues, often rendering individuals who adopt this ideology more accepting of sustainable policies than more right-leaning individuals who favour economic progression with limited regulatory burden (Harring & Sohlberg, 2017). Right-leaning perspectives have a tendency to oppose beliefs regarding climate change management and associated environmental risk (Clements, 2012; Davidson & Haan, 2012).

This has been seen repeatedly throughout the literature through studies on climate change, and various aspects of environmental policy (Clements, 2012; Davidson & Haan, 2012; Fielding et al., 2012; Jagers et al., 2018; McCright et al., 2016). Generally, these views have been seen as a tool for predicting for attitudes towards environmental policy discussions, however, have been cautioned that other factors such as individual values, perceptions of equity, cultural background as well as education level also play a role in shaping views towards politics (Bauer et al., 2017; Jagers et al., 2018).

Additionally, there is a broader issue of widespread misunderstanding of political and scientific dialogue among general public audiences. Sturgis and Allum (2004) remark that a society which is literate in research-based reasoning is, "one that can effectively participate in

public debates about science and hold government to account over the speed and direction of public policy" (p. 55). While it is unreasonable to assume that each member of society will have a deep understanding of a wide variety of technical subjects, effective communication and transparency within the decision-making process is critical in ensuring that individuals are aware of and understand the basis of political decisions. Further, Crozier (2007) argues that the ability of governments and political actors to enact effective communication through "open informational loops" determines the extent to which information will be deemed legitimate (p. 13). In effect, if subjects of political discourse are inaccessible or widely misunderstood, they will enact little public interest or support. Further, this can lead to indecisiveness and conflicting opinions on these subjects (Delshad et al., 2010). This is an important consideration in public policy regarding natural hazards management.

2.2.2 DISCOURSE AND NATURAL HAZARDS MANAGEMENT IN CANADA

A. PUBLIC DISCOURSE AND FRM IN CANADA

To understand how FRM is being implemented, existing research has explored the discussion of FRM in public discourse. To promote effective FRM policy implementation, it is important that stakeholders including governments, insurers and homeowners are aware of flood risk. Public discourse plays a large role in shaping perceived risk; those who have higher perceived risk are more likely to undertake personal prevention measures and to purchase flood insurance (Siegrist & Gutscher, 2006).

Researchers have emphasized the importance of the media in influencing political outcomes and in shaping public opinions (Crow & Lawlor, 2016). News media has received attention in Canada and remains an important force in gaining public awareness about flood events and in determining the urgency for political action (Smith et al., 2017). However,

widespread Canadian media outlets often report on events that are likely to influence public policy, however, they are likely to omit the policy gaps that contribute to flood events (Thistlethwaite et al., 2019).

News reports of key flooding events have a tendency to focus on an event and the immediate impacts, as opposed to the underlying causes, vulnerabilities or effective management strategies (Escobar & Demeritt, 2014). Studies have found that flood coverage in the news is primarily focused on noteworthy events, with little mention of climate change, policy failures that have resulted in severe overland floods, or context regarding the long-term effects of these events (Escobar & Demeritt, 2014; Rashid, 2011; Thistlethwaite et al., 2019). Policymakers have shown to pay more consideration to issues that are grounded in experience and knowledge from relevant stakeholders, thereby demonstrating the importance of reporting credible information in flood discourse (Thistlethwaite et al., 2019).

A lack of awareness is one of the main obstacles facing widespread implementation of FRM. Surveyed homeowners have demonstrated a strong sense of responsibility when it comes to protecting their properties against flooding. However, only around 30% of residents had undertaken substantial property-level flood protection, 23% demonstrated a willingness to pay for flood insurance, and an astonishing 6% were aware of their overall flood risk (Henstra & Thistlethwaite, 2019). This signifies an overall absence of understanding of flood risk among the public and could ultimately signify a failure of communication of these risks by mass media and policymakers.

Experience has been determined as a key contributing factor to flood risk perception among individuals (Siegrist & Gutscher, 2006). Some experts have argued that it is in fact the single most influential force in driving the uptake of mitigation tools such as flood insurance or

property-level flood protection measures (Thistlethwaite, Henstra, et al., 2018). Studies have shown that individuals who have been exposed to flood events demonstrate increased perceived risk and more prevention behaviours than those who have not been exposed to flooding (Mills et al., 2016; Siegrist & Gutscher, 2006). Individuals rely on media sources when there is a lack of personal experience with a phenomenon, such as flooding, further emphasizing news media as a key force in driving public discourse pertaining to FRM (Kasperson et al., 1988).

B. POLITICAL DISCOURSE AND FRM

While some research has discussed the influence of media and public discourse on FRM in Canada, the role of political discourse remains largely unexplored. As FRM is an evolving approach in flood management, its principles have experienced slow implementation in Canadian public policy. However, with an emerging flood insurance market and the ability to draw upon federal, provincial and territorial resources, Canada has the opportunity to spearhead a national flood management system which incorporates principles of FRM (Henstra & Thistlethwaite, 2017b).

Generally, FRM decision-making comprises of six primary steps as summarized by Maskrey et al. (2016), including;

> "a) problem definition; b) objective setting; c) benchmark development and setting; d) intervention option scoping and definition; e) intervention option appraisal and; f) intervention option recommendation/selection" (p. 276).

Studies that have taken place internationally have demonstrated the importance of early stakeholder participation in the decision-making process to warrant accountability in FRM implementation (Kuhlicke et al., 2016). Research has also identified the need for tools such as flood risk maps, flood insurance and flood risk reporting to improve the uptake of FRM measures and implement responsibility among the public (Henstra & Thistlethwaite, 2019).

Despite its widespread acceptance among flood management literature, political discourse pertaining to FRM in Canada has yet to be investigated. As flood risk in Canada is undeniably increasing, the literature points towards a need for a risk-based approach to managing floods that aim to mitigate flood risk, rather than relying on traditional hazards-based approaches that prioritize flood prediction and prevention. This includes employing a wide-ranging variety of tools and stakeholders to diversify flood risk in Canada. The employment of effective FRM principles in flood management policy begins with proactive discourse among key decision-makers in Canada. As such, this research aims to determine the extent to which FRM is being discussed among public policy, and prevalence of core FRM principles within this discourse.

3. METHODS:

3.1 DATA COLLECTION

The focus of this research is political discourse regarding FRM in Canada, and whether flooding is being prioritized as a policy problem. Specifically, this research pertains to the discussion of FRM among policymakers. For the scope of this study, discourse was derived from the publicly accessible Canadian Hansard Index of Debates, through the Parliament of Canada's House of Commons Database. The Hansard Index is a "verbatim account of what is said in Parliament" (McGill Library, n.d.). These accounts contain official dialogue among the 338 Members of Provincial Parliament, defined as "the elected assembly of the Parliament of Canada. Its members are elected by Canadians to represent defined electoral districts of constituencies, also known as ridings" (House of Commons, n.d.).

A keyword search of the database for the term "flood", and its variants, such as "flooding" or "floods", yielded 204 unique documents between the years of 2006 to 2020. The sample spans 15 years and includes dialogue from the 39th Parliament, 1st session through to the 43rd Parliament, 2nd session. Each unique document represents one parliamentary session date. Each of these documents was downloaded as a .PDF file and is labelled by date and Hansard Number in preparation for temporal analysis.

A sample of 25 files were manually searched for the key word "flood". This was done as a quality check to ensure that the word "flood" was used in the context of a natural hazard. The 204 Hansard documents are then uploaded onto the NVivo Qualitative Data Analysis Software.

A Text Search Query was then performed on the Hansard documents for the words "flood", "floodgate", and "floodway", and is set to include stemmed words, such as "flooded",

"floods" and "flooding". The results yielded 197 unique Hansard files, and 1502 references. Duplicates among the three Text Search Queries were removed.

3.2 CONTENT ANALYSIS

Throughout this study, a content analysis was used to explore connections between political discourse on floods and FRM framing. Content analysis is a method which has been used widely to examine discourse surrounding natural disaster policy and management (Houston et al., 2012; Shi, 2020; Tang et al., 2013; Thistlethwaite & Henstra, 2017). It explores the predominant frames and themes within a set of written dialogues by determining the connotation of keywords based on a set of predetermined indicators (Downe-Wamboldt, 1992; Saraisky, 2016). Specific to this research, content analysis gives insight into flood risk frames within Canada's federal government through determining the presence or absence of variables that indicate effective FRM dialogue.

For this research, manual coding was used, as opposed to automated or computer-assisted coding strategies. This was done for several reasons, including reliability, familiarity, and objectivity (de Graaf & van der Vossen, 2013; Thistlethwaite et al., 2019). As dialogue within the Hansard varies largely between speakers and parliamentary sessions, manual coding allows for an in-depth analysis of each reference to ensure consistency within the coding process. Additionally, it accommodates the complexity of the codebook, which contains multiple nested sub nodes as well as nodes with open code. It also helps to evaluate the inclusion of a reference in the sample. Several references have been manually excluded as the discourse does not meet the specified research criteria.

3.3 CODEBOOK DEVELOPMENT AND APPLICATION

A codebook was designed to determine how flood risk is being framed within the Hansard, and whether parliamentary discussions among members of Canada's Federal Government are conducive to effective risk governance. According to the literature review, there are several elements that identify effective FRM discourse, including the identification a broad range of stakeholders; accountability for flood risk among all levels of government and sectoral actors; the assertation that flooding is a policy problem; and the implementation of a diverse set of tangible commitments and tools to reduce overall flood risk (Henstra & Thistlethwaite, 2017a; Sayers et al., 2013; Thistlethwaite & Henstra, 2017). To capture these fields in the codebook, a framework was established that identifies six distinct categories, including: (1) Flood Identification, (2) Party Speaking on Flooding, (3) Problem Framing, (4) Climate Change Framing (5) Flood Risk Management Focus, and (6) Stakeholder Identification. Once the overarching categories were developed, a codebook to disseminate these themes was constructed in NVivo using parent- and sub-nodes.

3.3.1 DISCOURSE SELECTION

To capture discourse on flooding and framing around FRM in policy discourse, discussions that center around flooding and that reference flood as a natural disaster in Canada were coded. There are several cases where the references did not meet this criterion, and as a result have been excluded from the sample.

The first instance where this criterion was not met is dialogue where floods are identified as human-induced. This includes circumstances where water levels have been intentionally increased, regions have been purposely flooded, structures such as dams have been built that caused increased water levels, and shipping-related accidents that have caused in-land flood

waters[1,2]. The second instance where these requirements were not been met is when the word "flood" is not used in relation to a natural hazard event, and instead has been used as a figure of speech[3,4]. These references were not coded. Additionally, this research has a specific focus on flood policy in Canada. References which discuss international flood events were removed from the selection[5].

Discussions which are not specific to flooding were also removed from this analysis as they do not provide substantial insight on FRM or flood framing and would in turn bias the final coding results. There are several cases where these references have been removed. The first is

[1] Sample quote: "Mr. Speaker, intentional flooding in the spring of 2011 forced Manitoba first nations from their homes. A year and a half, and millions of dollars later, more than 2,000 people are still in Winnipeg hotels" (Bennett, 2012, p. 11915)

[2] Sample quote: "Plan 2014, for the benefit of Canadians who have not heard of it, is the policy of the federal government to create 26,000 hectares, or 64,000 acres, of wetland by flooding homeowners in the Lake Ontario-St. Lawrence water basin, which includes the Ottawa River watershed. What happens when homeowners who are being adversely affected by catastrophic flooding dare to question the Liberal policy to flood their homes?" (Gallant, 2020, p. 1788)

[3] Sample quote: "Spam is not just a Canadian problem, as I indicated earlier. Given the borderless nature of the Internet, it means that spam can originate from anywhere and be delivered anywhere. It will not help a lot if we just do the controls here because then we will be flooded by people sending spam to Canadians, gumming up Canadian businesses" (Bagnell, 2010, p. 4437)

[4] Sample quote: "In addition, we are taking real action to strengthen our borders. These borders are strengthened to stem the flood of illegally smuggled firearms from the United States. Our efforts to crack down on this illegal activity have taken many forms, including the deployment of integrated border enforcement teams at strategic points along the border, as well as making key improvements to border infrastructure, which improves the way that travellers are screened" (Yelich, 2011, p. 2784)

[5] Sample quote: "Mr. Speaker, Fiji has just experienced massive floods that have caused millions of dollars in damage, displaced thousands of families, and killed several people. All across Canada, Fijian families are concerned that the government has not reacted with any urgency. Canada has pledged no form of support to deal with this Fiji situation" (Dhaliwal, 2009, p. 160)

with regards to discussions on climate change[6]. References that mention flooding as an example of climate change but are not related to FRM, or that do not discuss flooding beyond using it as example have been removed from the selection. Other examples include where flooding has been briefly mentioned but is not the focus of discussion[7]. Also excluded were statements of expressed sentiment, whereby the speaker gives brief condolences to communities that have endured flooding prior to initiating a debate.

Finally, references of "flood" in the *Routine Proceedings* section of the Hansard documents are not conducive to analysis of parliamentary discussions on flooding and FRM. This section contains statements from Members of Parliament to bring attention to a variety of issues. However, this section is "generally without debate", and the issues are discussed at a later date (Bosc & Gagnon, 2017b). Since it only contains open-ended questions and does not involve any discussion among politicians, its references were also omitted from the selection. Based on these criteria, the coded discourse involves a total a sample size of 236 unique references of "flood" throughout 149 Hansard documents.

[6] Sample quote: "The reality is the world is getting hotter. The warmest 13 years of average global temperatures have all occurred in the 15 years since 1997. Increased global average temperatures are expected to increase droughts and floods, and other extreme weather patterns. Recent record-breaking temperatures for June 2012 are what we would expect from climate change. In fact, records for the contiguous United States that have been kept since 1895 show that July 2012 was the hottest month ever" (Duncan, 2013, p. 15886)

[7] Sample quote: "Up to 273 RCMP personnel were involved in an operation that resulted in officers kicking in doors at more than 1,900 homes in High River, Alberta, between June 21 and July 7, 2013. Thirty Alberta communities were flooded in June 2013 and some were evacuated, but it was only in High River, Alberta, that police kicked in doors, searched homes, and seized firearms" (Zimmer, 2014, p. 5945)

3.3.2 CODE DESCRIPTIONS

Flood Identification determines whether specific floods are being discussed. This also identifies which regions of Canada are being prioritized among flood discourse within the Hansard. Further analysis of this category also gives a better understanding of whether the discussion is event-based, whereby it was prompted in response to a major flood in a specific location. Evidence of events-based discourse that is predominantly initiated by the occurrence of flood events demonstrates a lack of discussion surrounding key elements of FRM, such as preparedness and mitigation.

Table 1: Nodes and code description for the Flood Identification category, whereby 1 indicates the presence of the respective variable, and 0 indicates its absence.

Parent Node	**Sub Nodes**	**Code Description**
Province or Territory	ON, AB, MB, SK, BC, QC, NS, NB, PEI, NL, NU, NWT, YK, 0	The mention of a province or territory was coded at the corresponding sub node. A reference could be coded at more than one sub node if the discussion referenced multiple provinces or territories. If no province or territory was discussed, then the reference was coded at 0.
City	1 [Open Code]	Captured (1) if a specific city was identified in the reference. Open code was used, however if a sub node already existed for the respective city, then it was captured under the existing sub node.
	0	
Reference to a Specific Flood	1	Captured (1) if a specific flood event is identified in the reference.
	0	

Party Speaking on Flooding determines who is prompting the discussion on flooding. This includes whether the speaker is a member of opposition or cabinet, and the Canadian political party in which the speaker belongs. Overall, this gives insight into whether political parties tend towards specific flood frames, which parties speak the most on flood risk, and whether the discourse has evolved through changes of government within the House of Commons. The literature identifies political ideology as a good indicator for evaluating the

framing of environmental issues, such as flooding, as it is expected that left-wing parties are more likely to support environmental- and climate-related policy efforts compared to their right-wing counterparts (Jagers et al., 2018).

Table 2: Nodes and code description for the Party Speaking on Flooding category, whereby 1 indicates the presence of the respective variable, and 0 indicates its absence.

Parent Node	**Sub Nodes**	**Code Description**
Political Party	Conservative Party of Canada [CPC]	The political party to which the speaker belongs. In the case where there is a discussion among speakers from multiple political parties, the party of the speaker that initiated the discussion on flooding is coded.
	Liberal Party of Canada [LIB]	
	New Democratic Party [NDP]	
	Green Party [GRP]	
	Bloc Québécois [BLQ]	
	Independent [IND]	
Member of Opposition	1	Captured (1) if the speaker is a member of the Official Opposition party.
	0	
Member of Cabinet	1	Captured (1) if the speaker is a Member of Cabinet. This includes the Prime Minster, Ministers, as well as their respective Parliamentary Secretaries.
	0	

Problem Framing examines variables relating to the context in which flood risk is perceived in Canadian political discourse. This highlighted elements that distinguish discourse as proactive to FRM implementation, such as whether flood risk is presented as increasing, urgent, manageable, or preventable, natural or anthropogenic, and whether an explicit policy problem or failure is identified. Additionally, the consequences of flood risk framing have been captured, including social, political/partisan, and economic, as well as the temporal aspects of the discussion. Further analysis of these variables determines whether these elements are actively being discussed, as well as how dialogue around these variables evolved over time.

Urgency within policy discourse establishes flood management as a priority and allows for improved implementation of risk-minimizing measures, particularly within high-risk flood regions. Additionally, positioning flood risk as increasing demonstrates that there is a recognition

among decision-makers that instances of flood are rising, that climate change and poor policy decisions contribute to flood risk, that the consequences of flooding are surpassing an acceptable threshold, and that there is a need to implement sustainable flood management practices. Further, framing flooding as manageable and preventable, as well as human-induced and as a product of poor policy, ascertains that overall flood risk can be minimized through effective governance and mitigation. The recognition of each of these factors within parliamentary discourse allows for discussions to take place which are conducive to FRM.

It is also important to identify the temporal aspects in which flooding is framed throughout policy discourse. Addressing the long-term and short-term consequences of flooding are important in effective FRM discourse, however a tendency to focus predominantly on the short-term effects can demonstrate a lack of importance placed on mitigating the long-term effects of flooding. In addition, framing flooding as both a present and a future risk aligns with FRM, but a dominant focus on short-term framing can show a lack of awareness of flood risk as increasing. Conversely, a dominant focus on long-term framing can demonstrate a lack of understanding of flood risk as urgent. Therefore, each of these temporal frames should be prevalent in discussion to indicate FRM principles within the discourse.

Table 3: Nodes and code description for the Problem Framing category, whereby 1 indicates the presence of the respective variable, and 0 indicates its absence.

Parent Node	Sub Nodes		Code Description
Flood Risk as Increasing	1		Captured (1) if flood risk is framed as likely to recur and surge in severity or frequency.
	0		
Flood Risk as Manageable or Preventable	1		Captured (1) if flood risk is framed as a predictable occurrence whereby risk can be reduced by implementing effective FRM measures (i.e., preparedness, mitigation/prevention, response, recovery).
	0		
Flood Risk as Urgent	1		Captured (1) if it is stated that prompt action from governing entities is required to minimize flood risk.
	0		
Flood Risk as Natural or Anthropogenic	Natural [N]	Act of God	Captured at N if the cause of flooding is a natural occurrence and separate from human influence. Sub nodes of N include, (a) Act of God, whereby floods were framed as an unpredictable and uncontrollable phenomenon, and (b) Geophysical, whereby floods stem from naturally occurring phenomena such as spring snow melt, heavy rainfall, etc. A reference is captured at A if flooding is linked to a human-induced policy problem, such as climate change, failed infrastructure, etc. It is captured at 0 if there is no cause of flooding stated.
		Geophysical	
	Anthropogenic [A]		
	0		
Policy Problem or Failure Stated	1		Captured (1) if there is an explicit criticism of policy or it is stated that there is a lack of action on behalf of the government that propagates flood risk.
	0		
Framing of Consequences	Short Term [S]		Captured at S if the consequences of flooding are framed as immediate and solvable. Captured at L if the consequences of flooding are framed as multi-faceted and complex with effects that will be seen for an extended period.
	Long Term [L]		
Temporal Scale of Discussion	Present [P]		Captured at P if the discussion is in present tense and is centered around current flood risk. Captured at F if the discussion is in future tense and is centered around future flood risk.
	Future [F]		
Consequences of Flood	Political-Partisan	1	Captured (1) if flooding results in a critique of governance structures; examples include the enactment or modification to a government policy or program, criticisms of current political systems, etc.
		0	
	Economic	1	

		0	Captured (1) if consequences of flooding are framed as monetary; examples include damage to public and personal property, loss of business, etc.
	Social	1	Captured (1) if consequences of flooding are framed as impacting social wellbeing; examples include health and/or mental health effects, loss of homes or cultural spaces, etc.
		0	

Climate Change Framing determines linkages between flood risk and climate change throughout the discourse. This will determine whether floods tend to be framed as isolated events, or whether they are discussed in connection to the broader policy problem of climate change. The classification of temporal framing (i.e., present vs. future) highlights whether politicians present climate change as relevant to current FRM implementation and requires immediate action, or a future issue that will require action. Further analysis of these variables also determined how this frame changes between 2006 and 2020.

Table 4: Nodes and code description for the Climate Change Framing category, whereby 1 indicates the presence of the respective variable, and 0 indicates its absence.

Parent Node	**Sub Nodes**		**Code Description**
Climate Change Stated as a Contributing Factor	1	Present [P]	Captured (1) if climate change is stated as a cause or accelerator of flood risk. Sub nodes include (a) P, whereby climate change is stated as currently propagating flood risk, and (b) F, whereby climate change will impact flood risk in the future.
		Future [F]	
	0		

Flood Risk Management Focus identifies the specific elements of FRM that are being considered among Canadian politicians. This includes the four key constituents of FRM, including (1) Preparedness, (2) Mitigation/Prevention, (3) Response, and (4) Recovery. Effective FRM discourse highlights each of these four elements. Additionally, this category capture whether explicit action is being undertaken to reduce flood risk. This highlights the most whether

aspects of FRM are being discussed, the prominent aspects of FRM that are being discussed, as well as the degree to which measures were being undertaken to reduce overall risk of flooding across Canada. Further analysis of these variables gives insight as to which political parties tend to favour certain aspects of FRM in discussion, as well as how discourse around FRM implementation has changed over the 15-year period studied.

Table 5: Nodes and code description for the Flood Risk Management Focus category, whereby 1 indicates the presence of the respective variable, and 0 indicates its absence.

Parent Node	**Sub Nodes**	**Code Description**
Focus in Terms of FRM	Preparedness [PREP]	Captured at PREP if the discussion involves the readiness of emergency measures prior to a flood occurring. This includes tools such as warning systems, evacuation plans, community education campaigns, as well as composing emergency response plans.
	Mitigation [MIT]	Captured at MIT if the discussion revolves around action that is undertaken before a flood occurs to minimize overall risk. This includes mitigative and preventative measures such as structural defenses, infrastructure reinforcement, and funding adaptation programs.
	Response [RES]	Captured at RES if the discussion pertains to emergency measures undertaken during a flood event to reduce the amount of damage suffered. This includes the involvement of emergency response teams, sandbagging, emergency evacuation, etc.
	Recovery [REC]	Captured at REC if the reference discusses measures undertaken to minimize losses after a flood event and compensate for damages that are incurred. This includes measures such as post-flood financing programs, rebuilding, and flood insurance.
	0	Coded at 0 if there is no reference to the four identified elements of FRM. If there was more than one element of FRM stated in a reference, then it was coded at each of the relevant sub nodes.
Explicit Action to Reduce Flood Risk	1	Captured (1) if tangible commitments are expressed to reduce overall flood risk. This includes mitigation and preparedness programs, stakeholder consultation, strengthening infrastructure, etc.
	0	

(**Sources**: Driessen et al., 2016; Pettersson et al., 2016)

The final category, *Stakeholder Identification*, captures the actors that are identified in parliamentary discourse on flooding. This includes any mentioned stakeholders, whether this stakeholder is portrayed in a negative (critical) or positive (constructive) context, as well as the role that the stakeholder plays in the discussion. This also includes the levels of government (municipal, provincial, or federal) that are involved in sharing flood risk. Specific government entities, such as ministries or government organizations, as well as government programs and policies that are identified within the discussion are coded. Indigenous communities and their linkage to flooding are also coded to examine discussions surrounding vulnerable populations, as well as whether this linkage has a positive (beneficial) or negative (deleterious) connotation.

This category determines the diversity of stakeholders involved in managing flood risk, which levels of Canadian government are often cited as responsible for flooding, as well as the governing entities which are perceived as having the most accountability for flood risk. Evidence of a diverse stakeholder engagement aligns with the principles of FRM, as it facilitates risk sharing, and allows for improved coordination among involved parties before, during and after a flood event occurs. Further, it allows for increased accountability among governing actors by specifying roles in flood management for stakeholders.

Table 6: Nodes and code description for the Stakeholder Identification category, whereby 1 indicates the presence of the respective variable, and 0 indicates its absence.

Parent Node	**Sub Nodes**			**Code Description**
Stakeholder Identified in Discussion	1	Stakeholder Listed [Open Code] [P, N]		Captured (1) if a specific stakeholder is identified in the discussion. The first sub node captures the identified stakeholder. Open code is used, however if a node already exists for the respective stakeholder, then it is captured under the existing node. For each stakeholder, a second sub node of P is used for discussions where the
		Stakeholder Role or Function	1 [Open Code]	

			0	stakeholder was being framed with a positive connotation. For discussions where the stakeholder is framed negatively or criticized, it is coded under the second sub node of N. The stakeholder role or function is identified as a sub node. It is captured (1) using open code, however if a node already exists for the respective stakeholder role or function, then it is captured under the existing node. See **Table 6b** for Stakeholder Role or Function Descriptions.
	0			
Level of Government to Share Flood Risk	1	Federal [FED]		Captured (1) at the respective level of government if it is identified in the discussion as responsible for an aspect of reducing flood risk. If there was more than one level of government identified in a reference, then it was coded at each of the relevant sub nodes.
		Municipal [MUN]		
		Provincial [PRO]		
	0			
Specific Government Policies or Programs Identified	1	Government Program or Policy [Open Code] [P, N]		Captured (1) if a government program or policy is identified. Open code is used, however if a node already exists for the respective program or policy, then it is captured under the existing node. For each program or policy, a second sub node of P is used for discussions where the program was being framed with a positive connotation. For discussions where the program is framed negatively or criticized, it is coded under the second sub node of N.
	0			
Ministry or Government Organization Identified	1	Open Code		Captured (1) if a Ministry or government organization is identified in the discussion. Open code is used, however if a node already exists for the respective Ministry or government organization, then it is captured under the existing node.
	0			
Indigenous Communities	1	Positive [P]		Captured (1) if the discussion mentions Indigenous communities in connection with flooding.

Linked with Flooding		Negative [N]	The discussion is coded at a sub node of P if Indigenous communities are positively linked with flooding. This includes Indigenous involvement in risk reduction measures, emergency management plans, community consultation, etc. The discussion is coded at a sub node of N if Indigenous communities are negatively impacted by flooding. This includes instances of repeated relocation, losses endured by Indigenous communities due to flooding, etc.
	0		

Stakeholder roles were classified based on the descriptions in Table 7, in order to categorize the most commonly cited functions assigned to the stakeholders. Defining each role allowed for improved categorization of the function of involved parties, which enabled further analysis on the diversification of stakeholder roles in policy discourse and the extent to which the elements of FRM (i.e., preparedness, mitigation, response, recovery) were highlighted through these roles.

Table 7: Coding description for Stakeholder Role/Function sub node.

Stakeholder Role	**Description**
Climate Action	Put in place mitigation and adaptation strategies to address climate change.
Community Outreach	Initiatives to involve local communities in decision-making and inform individuals on flood risk and flood preparation; examples include education campaigns, community engagement sessions, etc.
Develop a National Flood Plan	Involved in the development of a consistent National Flood Plan for Canada.
Ecological Infrastructure Restoration	Protect and restore natural habitats with the objective of using them as structural defenses to flooding; examples include wetlands, tree planting, etc.
Emergency Preparedness	Undertake measures to improve readiness prior to a flood event.
Emergency Response	Front-line involvement in coordinating rescue and response efforts during a flood event.
Evacuation	Involvement in evacuation as an emergency response measure during a flood event.
Financing Post Flood	Provide funds for recovery as well as to compensate for losses incurred from a flood event.
Flood Defense Infrastructure	Involvement in the implementation or maintenance of flood defense structures such as dikes, levees, floodways, dams, etc.

Flood Insurance	Involvement in the discussion on implementing a flood insurance system in Canada.
Flood Mapping	Implement and/or improve flood risk mapping systems.
Flood Plain and Watershed Management	Involvement in managing regions containing natural water basins that are at high risk of flooding.
Funding for Emergency Response Volunteer Organizations	Provide funding for emergency response organizations, such as the Red Cross.
Funding Risk Reduction Programs	Provide funding to programs targeted at reducing flood risk; examples include funding the construction of structural defenses, infrastructure reinforcement, programs such as the Disaster Mitigation and Adaptation Fund, etc.
Indigenous Relations	Work with Indigenous communities to reduce flood risk as well as improve flood preparation and response.
Infrastructure Reinforcement	Improve the resilience of existing infrastructure so that it can withstand a flood event. This includes reinforcing public infrastructures such as bridges, roadways, sewer systems, etc.
Land Use and Zoning	Enact regulations prevent or limit development in high-risk flood zones.
Policy Reformation	Examine and enact alterations to existing government programs or policies to better accommodate flood management.
Property Buyouts	Involved in the process of purchasing properties in high-risk flood zones to minimize exposure to floods.
Rebuilding	Finance and/or coordinate the restoration of damaged property and infrastructure after a flood event.
Relocation	Involved in the process of relocating individuals or communities out of high-risk flood zones.
Research and Development	Conduct research pertaining to flood risk and mitigation or translate external research into policy.
Satellite Weather Forecasting and Warning	Implement flood forecasting and warning systems to better predict and manage flood risk.
Telecommunications Implementation	Implement communications infrastructure, such as cell phone towers for emergency response purposes.
Water Level Management	Monitor and/or take action to reduce water levels to prevent and prepare for flooding.

3.4 DATA EXPORT

Once all references were coded, the Codebook was directly exported to an excel document (Appendix A). This was used as a summary document and informs the descriptive results. For an export containing more detailed results, and to prepare the data for the problem framing results and further statistical analysis, the Report functionality in NVivo is used to

retrieve node-specific results. The report was then exported to Microsoft Excel where it has been cleansed and formatted for further analysis.

3.5 DATA ANALYSIS

3.5.1 INITIAL RESULTS

Using the summary codebook (Appendix A), preliminary graphs and the percentages of each sub node were produced. This allows for a direct comparison of corresponding sub nodes within each category. It was also used to draw initial conclusions on the geographical and temporal aspects of flood in policy discourse, flood policy problems and actions, the framing of flood risk, the relation between Indigenous communities and flooding, as well as climate change and flood risk.

Comparison graphs were produced using node-specific results. The compilation of this data sorts the codes that are specific to each reference. This allows for the analysis of trends by date as well as political party. These results have provided the basis for further statistical analysis.

3.5.2 STATISTICAL ANALYSIS

A statistical analysis was then performed to determine whether there were any significant relationships between political party, ideology, and flood risk framing. The variables chosen for this analysis included those that determined how flood risk was framed in accordance with FRM. These include, (1) flood risk as increasing, (2) flood risk as manageable or preventable, (3) flood risk as urgent, (4) flood risk as natural or anthropogenic, (5) climate change stated as a contributing factor to flood risk, (6) policy problem or failure stated, (7) long- or short-term framing of consequences, (8) temporal scale of discussion, and (9) explicit action stated to

reduce flood risk. The node-specific results were used to convert for these variables into binary (1, 0) results, which were then sorted by Hansard file and political party of the member of parliament speaking.

Statistical tests were then conducted, including chi-square to determine the significance of the relationships between flood framing variables and political party, as well as a Cramer's V test. Throughout the sample, the discourse was dominated by three main political parties including the Liberal Party of Canada, the Conservative Party of Canada, and the New Democratic Party. The sample size for the Green Party, the Bloc Québécois, and Independent Parties were too small derive reliable results, and consequently references from these parties were removed to focus on the prevailing flood risk frames. Once exported, these results were used to applied to themes found in the discourse

4. RESULTS & DISCUSSION:

This section outlines the primary findings of this research, which examines the predominant frames by which flooding is discussed among politicians within the Canadian political sphere. This includes the examination of narratives pertaining to the geographic and temporal frames in flood discourse, flood policy problems and actions, the framing of flood risk, indigenous communities and flood risk, climate change and flood framing, political parties and ideology and flood risk frames, as well as government stakeholders and flood risk.

4.1 GEOGRAPHIC AND TEMPORAL CHARACTERISTICS OF FLOODING IN POLITICAL DISCOURSE

4.1.1 LOCATION AND REPRESENTATION

Geographic and temporal aspects identified within flood policy discourse provide insight into the prioritization and the factors which prompt discussion on flooding. Based on the frequency by which each province is identified within the literature (Figure 1), it is evident that Quebec and Ontario are most referenced in flood discussion with each cited 70 and 57 times, respectively. New Brunswick, Manitoba, British Columbia, and Alberta are cited less frequently, however are still prevalent among discussions, with 27, 27, 23 and 17 references, respectively.

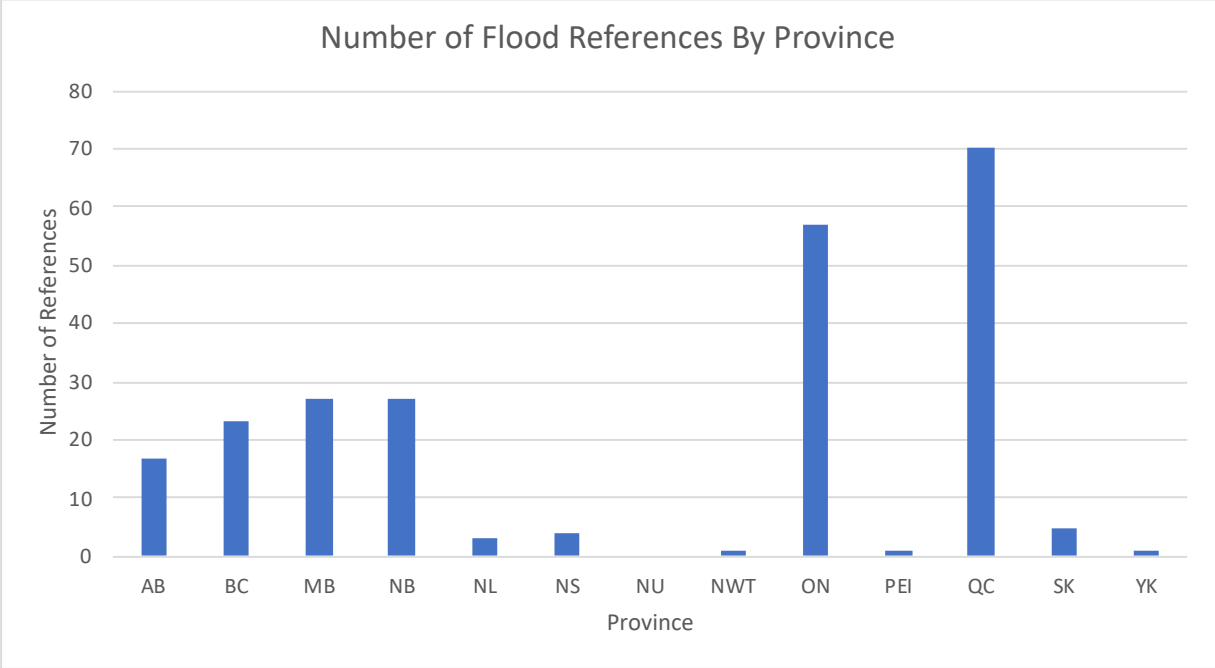

Figure 1: The number of flood references by province in the discourse sample studied from the Canadian Hansard Index.

Representation within the House of Commons varies among provinces, and is dependent on population of each province, as well as policies including the "Grandfather Clause", which states that no province could have less seats than was allocated in 1986 through the *Representation Act*, a "Senatorial Clause", which dictates that a province cannot possess fewer seats in the House of Commons than in the Senate, and the "Representation Rule", which adjusts for over- or under- representation within the House (Bosc & Gagnon, 2017a). Currently, there are 388 seats in the House of Commons, with the greatest number of seats held by Ontario (121), and Quebec (78), followed by British Columbia (42), Alberta (34), Saskatchewan (14), and Manitoba (14), Nova Scotia (11), and New Brunswick (10) (Elections Canada, 2020).

Upon comparison of the number of references by province and provincial seat representation within the House of Commons, it is evident that Ontario and Quebec hold the highest count in both. There is also a relation among the provinces with intermediary

representation and flood mentions, including Alberta, British Columbia, Manitoba, and New Brunswick. These results suggest that provincial seat representation within the House is a contributing factor to the provinces most frequently cited in flood discourse within the Hansard.

There are other potential influences to consider when examining flood mention by province within the Hansard, such as flood cost and frequency. The Parliamentary Budget Office reports that between 2005 and 2014, the most DFAA payouts have gone to Manitoba, Saskatchewan and Alberta, comprising 82% of DFAA expenditures on natural disasters (Figure 2). Flooding comprises the majority of these costs (PBO, 2016). Upon examination of the large-scale flood events (with costs greater than or equal to $50 000 000) in Canada between 2006 and 2020, these have occurred the most in Ontario, Quebec, Alberta, Saskatchewan, Manitoba, and New Brunswick, respectively (Figure 3).

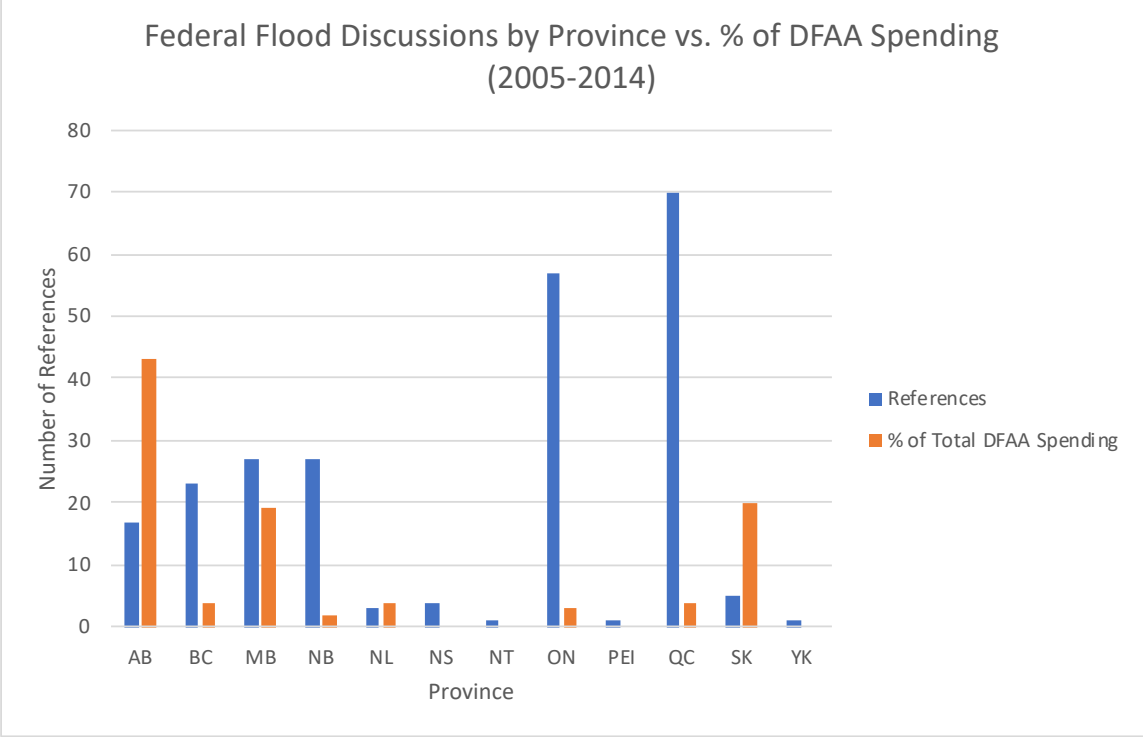

Figure 2: The number of flood references by province in the discourse sample studied from the Canadian Hansard Index compared with the amount of DFAA spending by province between the years of 2005 to 2014. (**Source**: PBO, 2016)

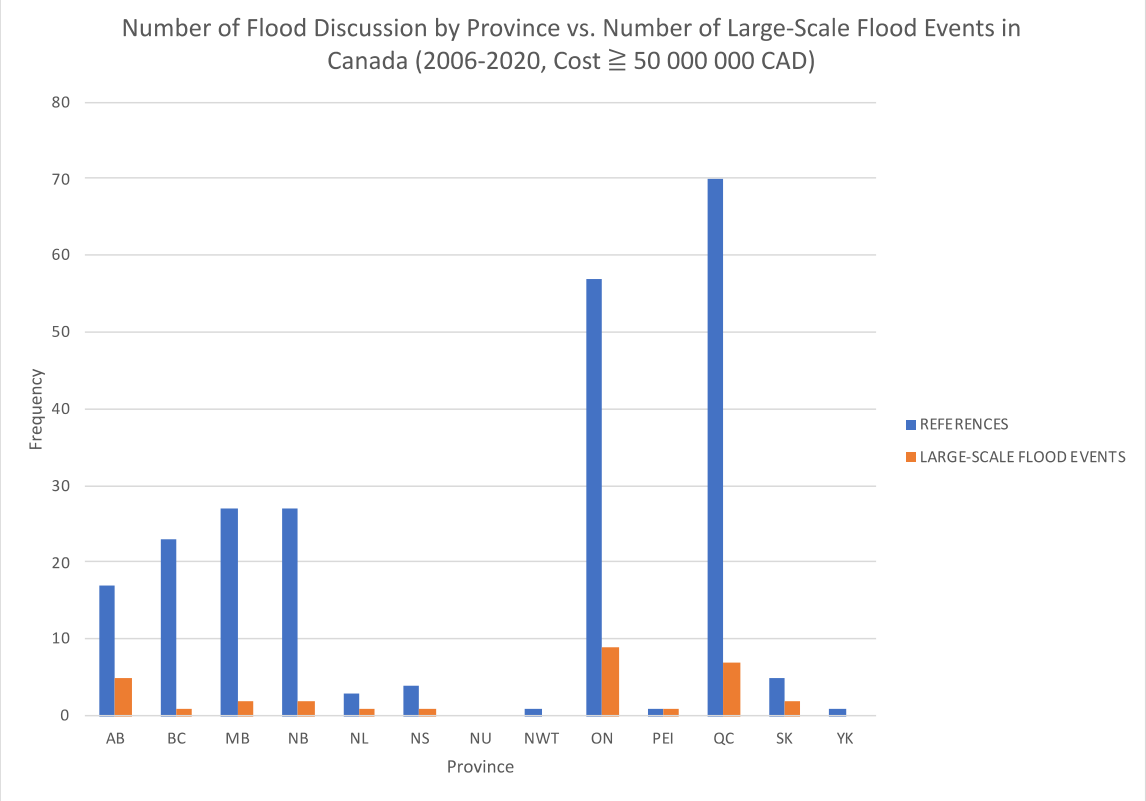

Figure 3: The number of flood references by province in the discourse sample studied from the Canadian Hansard Index compared with the number of large-scale flood events in Canada, where the cost was equal to or greater than $50 000 000 CAD.

(**Sources**: Contant, 2018; Cousins, 2021; Golnaraghi et al., 2020; Government of Canada, 2018; IBC, 2018, 2019a, 2019b, 2021; Malik, 2021)

As evidenced by Figures 2 and 3, there is a relation between the frequency and severity of flood events and the number of flood references by province in the Hansard. Alberta, Manitoba, and Saskatchewan are highlighted as receiving the largest proportion of DFAA payouts, however, do not yield the largest number of references within the sample. With Ontario and Quebec experiencing the highest frequency of large-scale flood events, it is expected that these provinces will be prioritized in discussion. This is the case, however this is not true for Alberta and Saskatchewan, where moderately frequent flood events are still occurring.

While the frequency and severity of flood events does seem to capture attention among flood discourse, it seems that population and representation within parliament remains a key

force that influences the degree to which each province is highlighted among discussion. This demonstrates that politics, rather than flood risk, is the impetus of flood discourse. This is not consistent with effective FRM strategies, which uses risk-based metrics, such as exposure and vulnerability, to implement effective flood policy.

The interplay between hazards and politics is further examined through the identification of specific flood events in discourse. It was determined that 64.8% of references in the sample cite a specific flood event. This is indicative of events-based discourse, whereby discussion is prompted by or is in relation to a past or present flood event. By contrast, hazards-based discourse focuses on flood risk and is not prompted because of a flood event, but rather in the interest of reducing overall risk. A hazards-based discussion represents an important shift to FRM and incorporates management efforts pre-flood, including preparedness, prevention, and mitigation.

4.1.2 TEMPORAL ASPECTS OF FLOOD IDENTIFICATION

An examination of the temporal aspects of political flood discourse was undertaken using two metrics: (1) the framing of flood consequences, which determines whether the consequences are framed as short term or long term, as well as (2) the scale at which flood risk is described, either as a present or future threat. The initial results indicate that the consequences of flood risk are more often framed as short term (52.5%) rather than long term (47.5%); however, this difference is too small to draw substantial conclusions regarding flood policy framing. Contrastingly, upon comparison of the temporal scale of discussion, there is a sizeable difference between the framing of flood risk as future or present, with 81.8% of the sample references framing flooding as a current issue, compared to 18.2% discussing flooding as a future concern.

A statistical analysis determined that there was no significant link between political party and the temporal framing of flood risk.

These results emphasize a focus on the present, short-term effects of flooding, rather than the future costs. Often, future-scale discussions can be more significant as flood risk is recognized prior to an occurrence, and highlights a hazards-based response to flooding, rather than an events-based response. A focus on the long-term effects of flooding provides more robust discussion around resilience and adaptation, and takes into consideration the lasting effects on health care services, mental health, critical infrastructure, displacement, workplaces, rebuilding, etc.

Despite this, a temporal analysis of consequence framing reveals that there is an increase in the long-term framing of the consequences of flooding starting in 2016 (Figure 4).

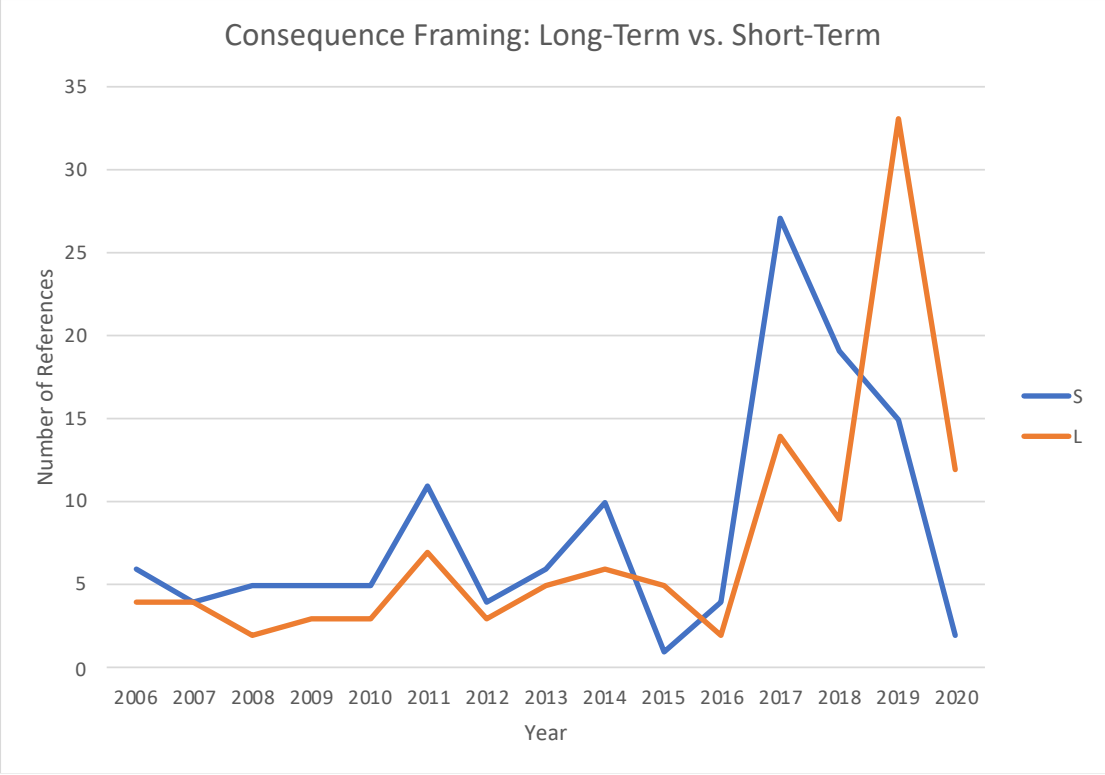

Figure 4: The number of flood references within the discourse sample from the Canadian Hansard Index that frame flooding as short-term (S) or long-term (L) by year throughout the study period of 2006 and 2020.

This could be attributed to a variety of factors including major political implementations, such as the Paris Agreement which was put into action in November of 2016, and a shift in majority government from the Conservative Party of Canada to the Liberal Party at the end of 2015 (UNFCCC, n.d.). Further, a statistical analysis performed indicates a significant relationship between political party and the framing of consequences ($p= 0.01$, Cramer's $V= 0.201$). The Chi-Square residuals indicate that Conservatives tend away from framing the costs of flooding as long-term. Despite recent developments in consequence framing, the results still demonstrate the need to account for socio-economic vulnerability, particularly among populations that are likely to be affected by the long-term risk.

4.2 POLITICAL PARTY, IDEOLOGY AND FLOOD RISK

An initial examination of the results reveals that flood discourse is largely dominated by the three main parties, with LIB accounting for 41.5% of the references, CPC accounting for 22.9%, and NDP accounting for 27.5%. This shows that the LIB Party initiates the majority of discussions on flooding, despite being a member of the official opposition for the majority of the study period (2006-2015). Additionally, the results reveal that only 8.5% of flood discourse is initiated by a Member of Cabinet, and only 16.1% are initiated by a Member of Opposition.

In Canadian parliament, the Members of Cabinet are comprised of the Ministers that head their respective Ministries, which focus on the strategic priorities of the elected administration (Government of Canada, n.d.). This indicates that discussions on floods are largely instigated by Members of Parliament (91.5%), who represent their respective constituencies across Canada. This suggests that flood discussions are rarely initiated at a national level. Rather, localized concerns are the main driver of flood risk discussions. This suggests that discussion is largely

events-based and is in response to occurrences at a local level, including a flooding event that has taken place, anticipation of a flood event, or local actions that are targeted at reducing flood risk. Further, Members of Parliament that make up the official opposition are not widely initiating flood discourse. Consequently, flood management decisions and associated policy problems are not being challenged by members of the official opposition.

Generally speaking, Canada has five principal political parties. These include the Liberal Party of Canada, the Conservative Party of Canada, the New Democratic Party, the Bloc Québécois, and the Green Party of Canada. These are the parties that typically comprise the main sources of parliamentary discussion within the Hansard. Occasionally, an Independent Party (IND) has spoken on flooding. This study, however, only captured Table 8 describes the overarching ideologies of these parties.

Table 8: General ideologies of the three principal Canadian political parties examined within this study, where CPC is the Conservative Party of Canada, LIB is the Liberal Party of Canada and NDP is the New Democratic Party of Canada.

Political Party	**Left- or Right-Leaning**	**General Priorities**
CPC	Right	Supports traditional values; generally, prioritizes low taxes, less regulatory burden, environmental platforms typically focus on technological development and energy efficiency (traditionally strong opponent of a tax on carbon, instead propose carbon capture and storage to reduce emissions and meet targets)
LIB	Centre-Left	Supports progressive values; generally, prioritizes social and health programs, supports a free market with limited regulatory burden, identifies climate change as a strategic priority (strong proponent of a carbon tax)
NDP	Left	Supports highly progressive vales; generally, a stricter approach to economic and environmental regulation, proponent of a wealth tax and a heavy emitters tax

(**Sources**: Anderson & Stephenson, 2011; McCarthy & Walsh, 2019; McCullough, n.d.)

The ensuing results are consistent with the traditional left/right dichotomy which is present in academic literature. Previous studies have shown that climate change and associated

policy problems, such as climate change, are largely demonstrative of political ideology whereby left-leaning ideologies are more likely to support disaster risk reduction and climate action as opposed to those who identify with more right-positioned political groups (Fielding et al., 2012; McCright et al., 2016).

4.3 FLOOD POLICY PROBLEMS AND ACTIONS

4.3.1 FLOODING AS A POLICY PROBLEM

The initial results demonstrate that discourse recognizes a policy problem in 40.3% of flood references within the sample, with no detectable policy problem in the remaining 59.7%. These results are consistent with other research that has been done on discourse and flood policy framing. In an analogous study which examines how the media frames flooding a policy problem, Thistlethwaite et al. (2019) found policy problems in only 26% of the articles examined. While the political discourse studied identifies a higher degree of policy problems compared to media discourse, this result should be expected given government is responsible for designing and implementing public policy.

There is, however, evidence within the parliamentary discourse that positively reinforces flooding as a policy problem (Table 9).

Table 9: The most frequently cited policy problems within the discourse sample from the Canadian Hansard Index.

Policy Problem	**Sample Text**
Poor Infrastructure Management	"…the current Conservative government's neglect of our city and its critical infrastructure needs, such as improved sewer systems, some of which are over 100 years old" (Sullivan, 2013, p. 403)
Repeated Flooding in High-Risk Regions	"Owing to predictable flooding of their community, Kashechewan residents were evacuated this spring for the fourth consecutive year and for the sixth year over the last 10 years" (Y. Jones, 2015, p. 13880)
Ineffective Coordination	"under the present cost-shared agreement with the province, should a municipality want to put back a larger culvert, for example, the agreement

among Levels of Government	will only cover to have that culvert replaced to its pre-disaster condition. The municipality will be responsible for the cost of the upgrade. This needs to change. Rural communities, in particular, cannot afford this cost and cannot afford to replace failed infrastructure with more of the same" (Foote, 2010, p. 4415)
Climate Change	"This is the fourth year in a row we have had what was deemed to be a 100 year flood. Climate change has moved from being a future threat to a present danger. Extreme weather events such as floods are increasing in frequency and severity. The Insurance Bureau of Canada recently mapped the flood risk for people across the country and found that 19% of Canadian households are at some level of risk" (Johns, 2017, p. 15603)
Lack of Mitigation Measures	"does he feel we need to ensure that we have preventative measures in place so we are not just dealing with mitigations and trying to address things after the fact, after the damage is done, like groundwater contamination, property damage and ongoing infrastructure damage, because of not having that foresightedness?" (Bezan, 2006, p. 3141)

Some key policy issues have been identified among Canadian politicians, however, there remains the belief that flooding is a "natural" disaster, rather than a lack of effective policy. Contributing factors are examined in depth in the following section, *Framing Flood Risk*, and include an analysis of whether flood risk is increasing, manageable/preventable, urgent, as well as natural or anthropogenic in origin.

Over the study period, there is growing identification that flooding is a policy problem as of 2016 (Figure 5). This, again, coincides with the major political shifts observed in 2016, such as a change in majority government and the implementation of the Paris Agreement. There is a statistically significant relation between political party and the identification of a policy problem or failure ($p= 0.03$, Cramer's $V= 0.171$). Compared to its counterparts, the Conservative Party is less likely to identify a policy problem in association with flooding. Further, throughout recent elections, the Liberal Party of Canada has cited climate change action as a policy directive (Worland, 2015). As climate change is a policy problem, linking flooding with climate change could have also spurred discussions that identify flooding as a policy problem.

Politically, this may have initiated debates criticizing the previous government's policies, as well as brought attention to the overarching issue of climate change and its contribution to severe weather. In that same year, Canada also experienced a series of flood events, with the most severe floods occurring in Alberta and British Columbia amounting to $462 million and $65 million, respectively (Government of Canada, 2018a). These large-scale flood events could have further prompted discussion on flooding and its associated policy problems, further emphasizing flood discourse as events based.

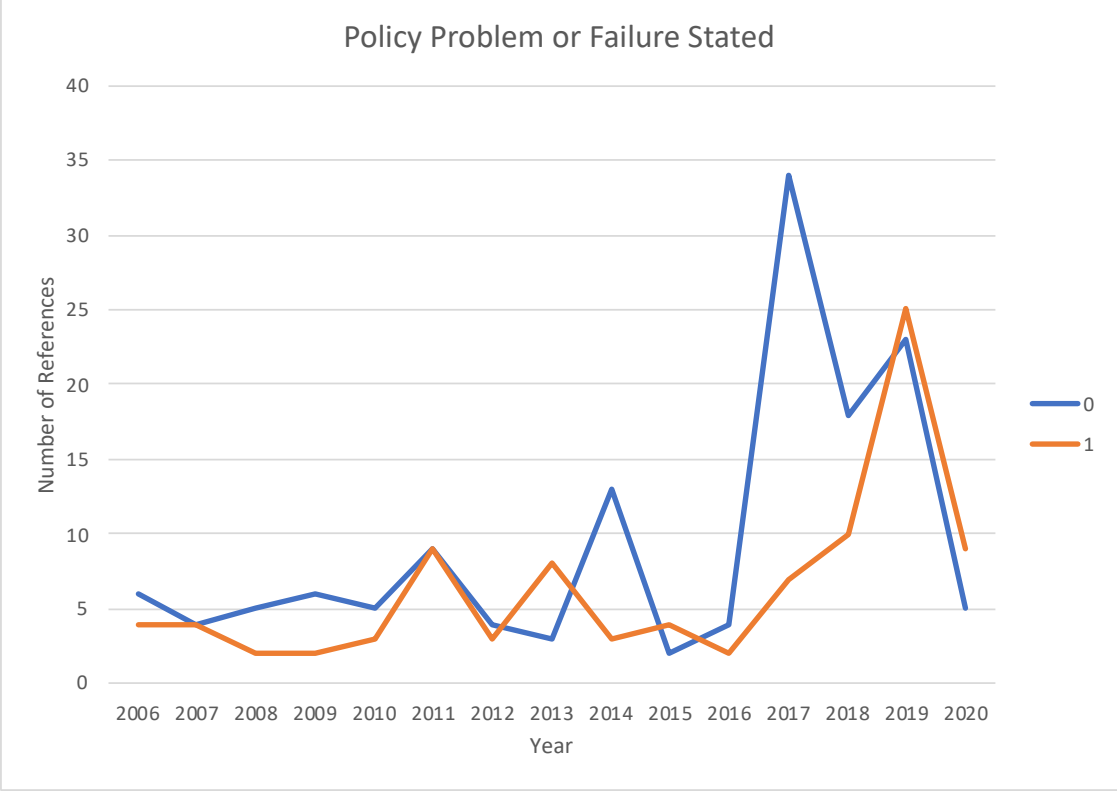

Figure 5: The number of flood references within the discourse sample from the Canadian Hansard Index that state a policy problem or failure in connection with flooding throughout the sample period of 2006 to 2020. 1 indicates the presence of a policy problem and 0 indicates no policy problem or failure stated.

The literature emphasizes flooding is a policy problem. To effectively implement FRM policies, there must be widespread recognition among key decision-makers in Canada that floods are a result of poor policy decisions, rather than natural events.

4.3.2 ACTION TO REDUCE FLOOD RISK

In combination with establishing flooding as a policy problem, explicit risk-reducing actions are required to effectively manage flood risk. The results show that explicit action to reduce overall flood risk is stated in just 36.0% of references within the sample, with the remaining 64.0% indicating no concrete action. This indicates that of the flood discourse studied within Canadian parliament, the majority lacks tangible risk reduction measures. Again, this is fairly consistent with the findings in the media discourse study by Thistlethwaite et al. (2019), which found that only 3.0% of the articles studied contained information on decreasing flood risk. A statistical analysis revealed that there is no significant correlation between Canadian political parties and discourse surrounding action to reduce flood risk.

While the results from this political discourse study are substantially better than what is seen in the media study in terms of discussion surrounding risk mitigation, it still demonstrates a need for exhaustive management discussions that are consistent with FRM principles and prioritize measures to reduce flood risk. There is, however, evidence within the sample that identifies specific action to decrease flood risk, and positively reinforces that there is some discussion surrounding the implementation of mitigative strategies. Table 10 summarizes the primary measures that are discussed throughout the sample.

Table 10: The most frequently cited actions to reduce flood risk within the discourse sample from the Canadian Hansard Index.

Risk Reduction Measure	**Sample Text**
Structural Defenses	"The provincial-territorial base fund is supporting upgrades to Chilliwack's east dike that will increase flood protection to more than 40,000 people residing in the flood plain. These upgrades will help increase protection for critical infrastructure such as rail lines, the Trans-Canada Highway, oil and gas infrastructure, utilities, hospital and care facilities and a wastewater treatment plant" (Miller, 2013, p. 14300)

Funding Flood Mitigation Programs	"The national disaster mitigation program, or NDMP, has provided funding for 363 flood mitigation projects across Canada… The national disaster mitigation program has helped to address rising flood risks and costs, and has built the foundation for informed mitigation investments to reduce or even negate the effects of flood events and climate change" (Boissonnault, 2019, p. 29230)
Community Relocation	"Since 2016, we have been working in partnership with Kashechewan on its request to relocate the community to higher ground. The community has chosen the place where they think it would be best to relocate. Work is under way to build a new road, transfer the land and design the new community" (Trudeau, 2019, p. 27183)
Programs to Identify High-Risk Regions	"We funded satellite weather forecasting for early warning and flood mapping to enable overland home flood insurance" (Crockatt, 2015, p. 14597)

Despite these actions, most of the sample size excludes policy problem identification and concrete action to reduce flood risk. This further emphasises a lack of hazard-based discussion as most of the discussion does not account for measures to reduce flood risk prior to a flood event occurring. These results are not seen to change substantially over the study period (Appendix C).

4.4 FRAMING FLOOD RISK

To determine how flood risk is framed and the extent to which these frames align with the principles of FRM, the following factors were examined based their presence or absence within each reference, (1) flood risk as urgent, (2) flood risk as increasing, (3) flood risk as manageable or preventable, (4) flood risk as natural or anthropogenic, and (5) consequences of flood framing.

4.4.1 FLOOD RISK FRAMES

Evidence of FRM in political discourse should include findings that flood risk is urgent, increasing, and manageable. In practice, however, these factors are not highly prevalent within the parliamentary discourse sample. Throughout the study period, just 19.9% of the references

frame flood risk as urgent, 33.9% cite flood risk as increasing, and 32.2% frame flooding as manageable or preventable. This is indictive of the low saliency of flood risk among politicians. Political salience of risk is important as it promotes hazards-based policy decisions and prioritizes proactive pre-flood management.

Moreover, these results demonstrate a disconnect between research and politics. Climate change and its role as a catalyst for severe and frequent floods is well-documented in the academic literature. Despite this, the majority of discourse in the study did not cite flood risk as increasing or urgent. From 2006 to 2020, the number of references that frame flood risk as urgent does not change significantly (Appendix D). However, around 2016, there does appear to be a growing recognition among politicians that flood risk is increasing (Figure 6).

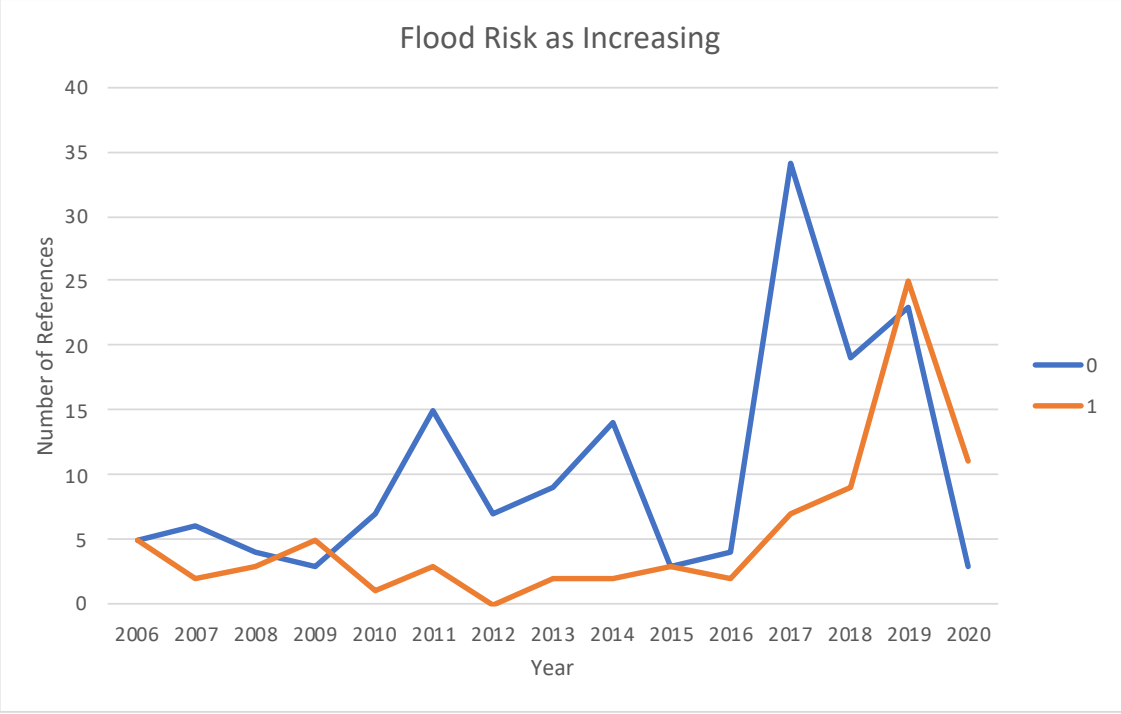

Figure 6: The number of flood references within the discourse sample from the Canadian Hansard Index that cite flood risk as increasing (1) or not increasing (0) throughout the sample period of 2006 to 2020.

Additionally, there is no substantial changes in the framing of flood risk as manageable and preventable over the study period (Appendix E). These results further highlight a disconnect

between theoretical FRM policy and FRM in practice. The literature asserts that flood risk is a policy problem which can be minimized through effective management practices. However, based on the sample, the results suggest that politicians often frame flooding as an uncontrollable and unpredictable phenomenon. This could be motivated by political factors, such an unwillingness to take the blame for underlying policy problems, political party ideology, or other policy interests. Overall, this further emphasizes that discussions on flooding are largely events-based, as discussions surrounding mitigation and prevention measures imply that flood risk is manageable rather than an uncontrollable force of nature. The statistical analysis performed did not produce any significant relationships between political party and framing flood risk as increasing, manageable or urgent.

In total, 41.5% of the references within the sample frame flooding as anthropogenic, 35.6% frame flooding as natural, and 22.9% state neither as an origin of flood risk. Of the references frame flood risk as natural, 58.7% identify flooding as an "Act of God", and 41.7% frame flooding as geophysical in origin (encompassing seasonal snow melt, high tide, instances of heavy rainfall, etc.). While the discourse commonly embraces an anthropogenic frame, a substantial proportion of the references as describe flooding as natural in origin. This indicates that there is still a high prevalence of discussions that frame flood risk as inevitable and unstoppable. Some sample quotes which that demonstrate this frame include,

- "Natural disasters are unfortunately not predictable or controllable. However, the assistance provided by emergency personnel enables disaster victims to get the care and services they need" (D'Amours, 2008, p. 5990)
- "some people in eastern Canada are currently going through tough times because of Mother Nature's wrath, which has caused abnormal flooding in residential areas. Those affected are facing situations beyond their control that are putting their properties and belongings at risk" (Godin, 2017, p. 10884)

This discourse is unproductive, and is even injurious, to sustainable flood policy as it promotes a reliance on post-disaster assistance rather than mitigative measures, absolves politicians of the responsibility to manage flood risk, and shifts the blame away from poor policy decisions.

However, there is a growing recognition of flooding as human-induced, particularly towards the end of the study period. This shows that there is an acknowledgement that human-induced policy problems, such as poor infrastructure development, ineffective land use zoning, as well as climate change, are driving instances of severe and frequent floods. This starts to increase in prevalence in 2016 and does not start to become a dominant perspective until 2018 (Figure 7).

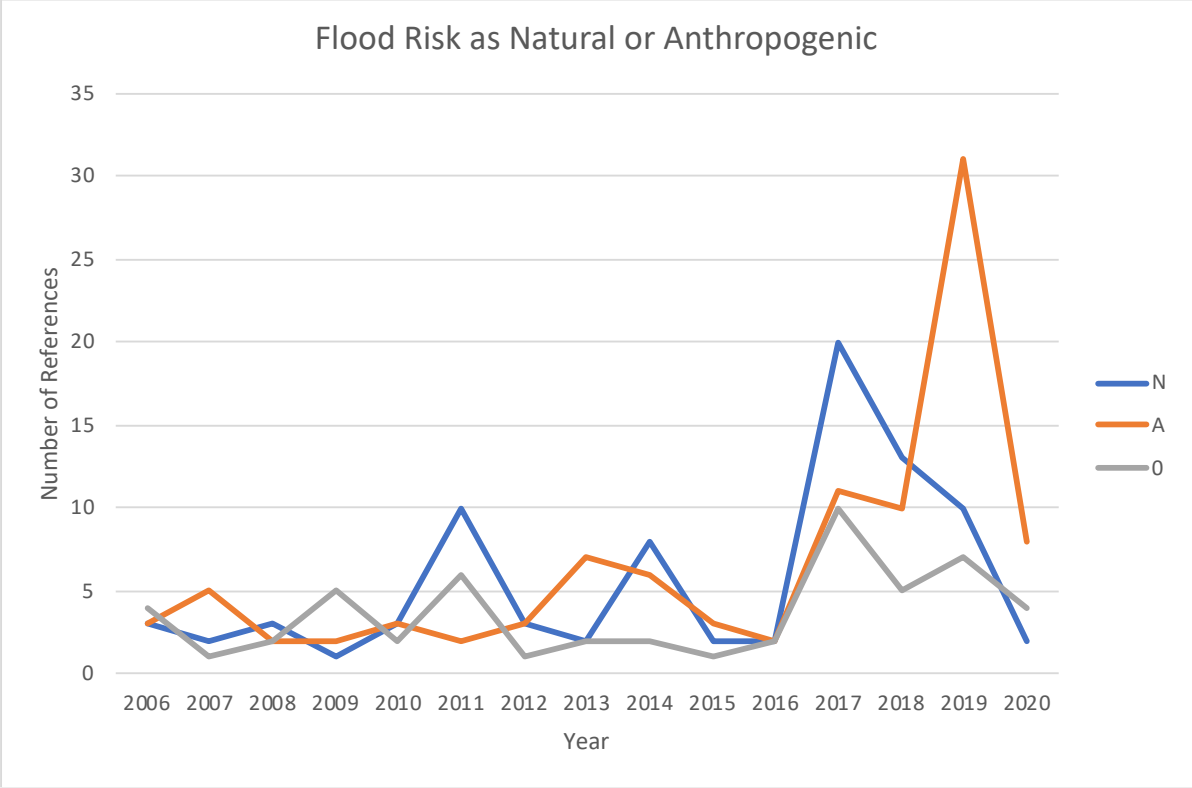

Figure 7: The number of flood references within the discourse sample from the Canadian Hansard Index that frame flooding as natural (N), anthropogenic (A), or neither (0) throughout the sample period of 2006 to 2020.

This timeline is consistent with other instances of discussion that are productive to FRM, such as the recognition of a policy problem or failure, and the identification of flood risk as increasing. The year 2016 coincides with several political events, such as a change in government from the more fundamentalist-positioned Conservative Party of Canada to the more progressive Liberal Party of Canada, who have placed climate action at the forefront of their election campaigns. The statistical analysis performed on the data determined that there is a significant relationship between political party and the framing of flood risk as natural or anthropogenic ($p= 0.0001$, Cramer's $V= 0.248$), with Chi-Square residuals showing that members of the NDP Party strongly tend towards framing flood risk as anthropogenic and away from framing flood risk as natural, whereas the Conservatives did not frame flood risk as anthropogenically-induced. Therefore, the ideology of flood risk as human-induced could have grown as the more "left-aligned" Liberals became a majority government. This timing also coincides with the implementation of the Paris Agreement, which could have further spurred recognition of climate change as a contributor to flood events.

Additionally, the Canadian Disaster Database reported 7 flood events in 2016 with events in the Maritimes, Alberta and British Columbia amounting to over $558 million, which could have further prompted discussions around mitigations and improving resilience to flooding (Government of Canada, 2018a). Despite these progressions, the results suggest that FRM remains conceptual rather than referenced as a tangible policy directive.

The results also show that the Canadian political parties vary in their focus of FRM. Overall, mitigation is discussed the most with 38.5% of the references focusing mitigative or preventative measures, followed by 32.6% focusing on response, 28.8% focusing on recovery, and 11.4% on preparedness. While all phases of FRM are represented in discourse, mitigation

and response comprise the majority. This is likely due to a heavy dependence on funding structural defenses, funding prevention/mitigation programs, as well as coordinating emergency response efforts during a flood event.

Specific to each party, the results show that the Conservative Party places a large emphasis on recovery and mitigation. Liberals, comparatively, focus on response and mitigation, which the NDP prioritize mitigation, response, and recovery (Figure 8).

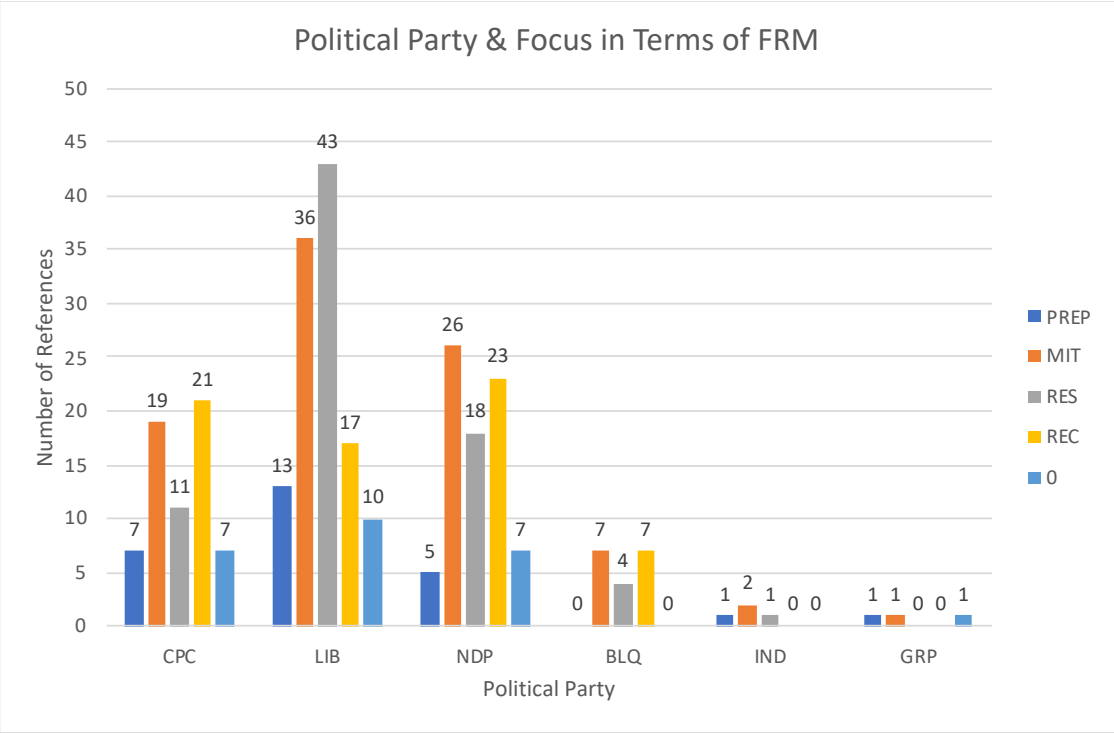

Figure 8: The five political parties within the Canadian Hansard Index that contributed to flood discourse within the sample and the associated aspect of FRM (preparedness (PREP), mitigation (MIT), response (RES), recovery (REC), none (0)) that is highlighted in each reference studied.

In this case, it is important to point out that mitigation also includes preventative measures such as structural defenses, which are important aspects of flood management but are often too heavily relied upon and rely on traditional methods of 'controlling' floods (Henstra & Thistlethwaite, 2017a).

Overall, the data shows that all of the aspects of FRM are being represented within discourse. However, there is a lack of emphasis on preparedness, which gives affected regions the ability to anticipate and develop a plan for response and recovery efforts to minimize the overall cost of flooding.

4.4.2 FRAMING THE CONSEQUENCES OF FLOODS

In addition to framing the causes and characteristics of flood risk, it is important that the consequences of flood risk also align with the principles of FRM. Fundamentally, effective FRM requires a whole-of-society approach and frames flood risk as a societal issue, rather than just a hazard. Therefore, it takes incorporates a multi-faceted view of costs that are endured after a flood event. One of the main criticisms of the current flood management system in Canada is that a large emphasis is placed on recovering costs post-flood through programs, such as DFAA (Sandink et al., 2016; Thistlethwaite & Henstra, 2017). This is becoming financially unsustainable with mounting instances of severe flood events. Larg2021-09-02 6:19:00 PMely, this reflects how governments prioritize the financial and economic consequences of flooding.

The results, however, indicate that there are discussions occurring on a parliamentary level that consider the multi-faceted consequences of flooding. Based on a binary examination of each consequence of flood risk, it was found that 49.6% of the results state economic consequences of flooding (ex. lost business, financial compensation for losses, property loss, etc.), 47.0% of the results describe social costs of flooding (ex. effects on health and mental health, loss of home, etc.), and 47.0% state political/partisan consequences (ex. enactment or alterations to existing policies, criticism of government policies, etc.). Overall, these dimensions that encompass the consequences of flooding are similarly represented throughout the sample (Figure 9).

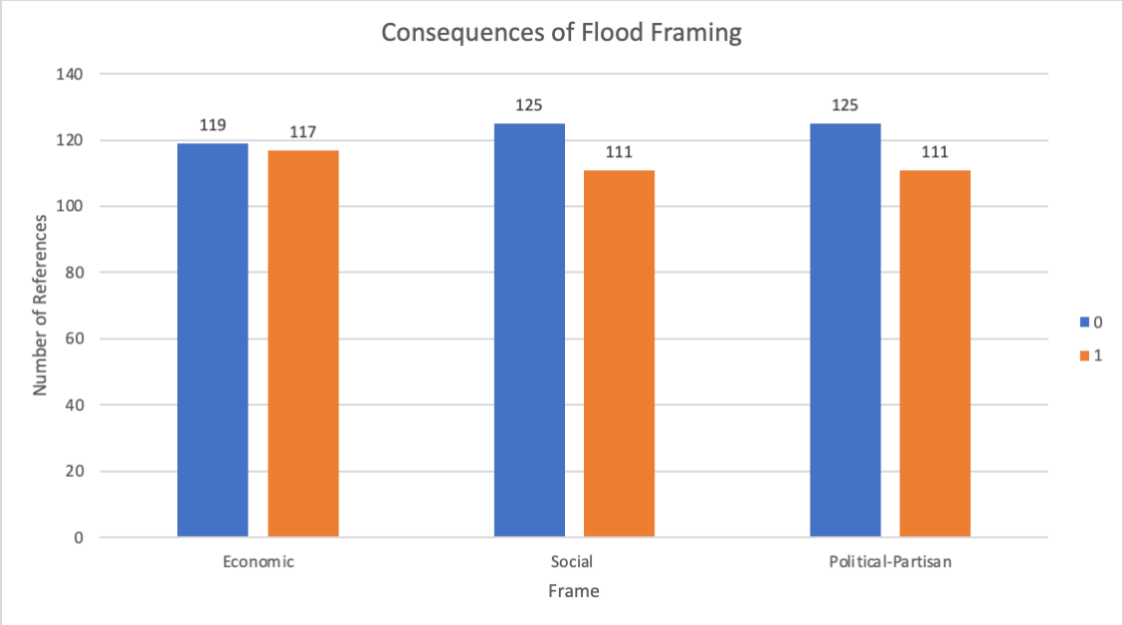

Figure 9: The number of references within the sample that frame (1) or do not frame (0) the consequences of flooding as social, economic or political-partisan.

While it is encouraging to see that there is an array of consequences prevalent in flood discourse, there remains the need to incorporate more discussion surrounding the consequences of flooding. Approximately half of the references within the study do not refer to any economic, societal, or political/partisan effects. It is important that the consequences of flooding are at the basis of flood management discussions as it indicates a recognition of the broader impacts of flooding, such as equity and the long-term impacts of a flood event on communities. This suggests that in these instances, discourse focuses on the hazard, without referencing the greater societal implications that occurs after a flood event.

4.5 INDIGENOUS COMMUNITIES AND FLOOD RISK

In Canada, Indigenous communities are disproportionately exposed to flood risk. The literature indicates that this is due to a lack of access to risk assessment resources pertaining to infrastructure resilience, emergency response services, and defense mechanisms, as well as

susceptibility to annual flooding. In fact, 22% of Indigenous lands are prone to 1-in-100 year flood events, rendering them the most frequently flooded land (Thistlethwaite et al., 2020). This is exacerbated by repeated evacuation, relocation, and destruction of property which contributes to a variety of economic and social costs (Thistlethwaite et al., 2020).

Despite being a population that endures the most flood events within Canada, only 17.8% of the references cite Indigenous communities in flood discussions. Of these references, 73.8% are framed with a negative connotation, indicating that these communities are adversely affected by flooding. Indigenous communities are a good proxy for determining vulnerability in flood discussions as they are marginalized through colonialism and racism and have traditionally had little representation in policy processes, rendering these communities with a lack of adaptive capacity in the face of flooding (Haalboom & Natcher, 2012). Overall, the results signify that vulnerability does not play a large role in motivating discussions around flood risk.

However, the consideration of vulnerability is essential in enacting effective FRM policy. Risk literature cites vulnerability as key in managing hazards as small disturbances can have catastrophic impacts with a lack of action to mitigate these changes (Folke, 2006). Despite this being prevalent within risk management research, this is not being seen in practice, particularly with regards to Indigenous communities. This further indicates that vulnerability, in conjunction with other principles of FRM, remain conceptual rather than an explicit framework being used to enact sustainable flood management policies, and justifies more work on prioritizing vulnerable communities in flood discourse.

FRM also requires a broad range of stakeholders to inform well-rounded policies. The results show that Indigenous communities are positively represented in only 26.2% of Indigenous references within the sample. To be positively represented in this case implies active

involvement of Indigenous stakeholders in management decisions, community consultation, as well as the implementation of measures that align with the stages of FRM (i.e., preparedness, mitigation/prevention, response, recovery). Since Indigenous communities experience the highest instances of flooding in Canada, there is a need for more inclusion of these communities as key stakeholders in flood management discussions.

4.6 CLIMATE CHANGE AND FLOOD FRAMING

Climate change is one of the main drivers of increasing and severe instances of flooding in Canada. This recognition among politicians is critical in understanding the underlying causes of flood risk, the long-term costs of flooding, as well as the recognition that this is a phenomenon that is going to increase in frequency and severity. Therefore, it requires effective implementation of risk-reducing measures to mitigate flood events. Further, it emphasizes the understanding of the interconnectivity of flood risk and climate change, and the need for climate action in conjunction with flood-specific mitigation measures to effectively reduce flood risk.

The results found that climate change is not widely cited as a contributing factor to flood risk throughout the study period. Overall, only 27.5% of the references within the sample cite climate change as a driver of flood risk. Of these references, 7.7% identify climate change as currently contributing to flooding, whereas 92.3% identify it as a future driver of flood risk. The results of this study are comparable with those found in the media frames study by Thistlethwaite et al. (2019), which determined that flood was linked to climate change in only 6% of the media sources studied.

This signifies that flood risk has not been widely discussed in conjunction with climate change. Further, it gives evidence that climate change is being framed as a future threat, rather

than a current policy problem. This takes away from the urgency of the issue and implementing associated management strategies. Additionally, linking flood risk with climate change gives the issue political salience as it extends beyond isolated events. Rather, it gives a narrative of a repetitive and increasing event that affects a wide variety of stakeholders and thus requires attention from policy-makers (Crow et al., 2017; Escobar & Demeritt, 2014; Thistlethwaite et al., 2019).

There is a shift in climate change framing and flood risk towards the end of the study period. As is seen with other policy issues throughout this study, 2016 marks an increase in the number of references that cite climate change as a contributing factor to flood risk (Figure 10). This aligns with large shifts in international climate policy, such as the Paris Agreement. Further, this timing marks the change in majority government, from the Conservative Party of Canada to the Liberal Party of Canada, who have prioritized climate action throughout their 2015 campaign (Worland, 2015). The data demonstrates a statistically significant relation between political party and climate change framing ($p= 0.028$, Cramer's $V= 0.181$), whereby the Conservative Party is less likely to associate climate change as a contributing factor to flood risk, compared to its Liberal and NDP counterparts.

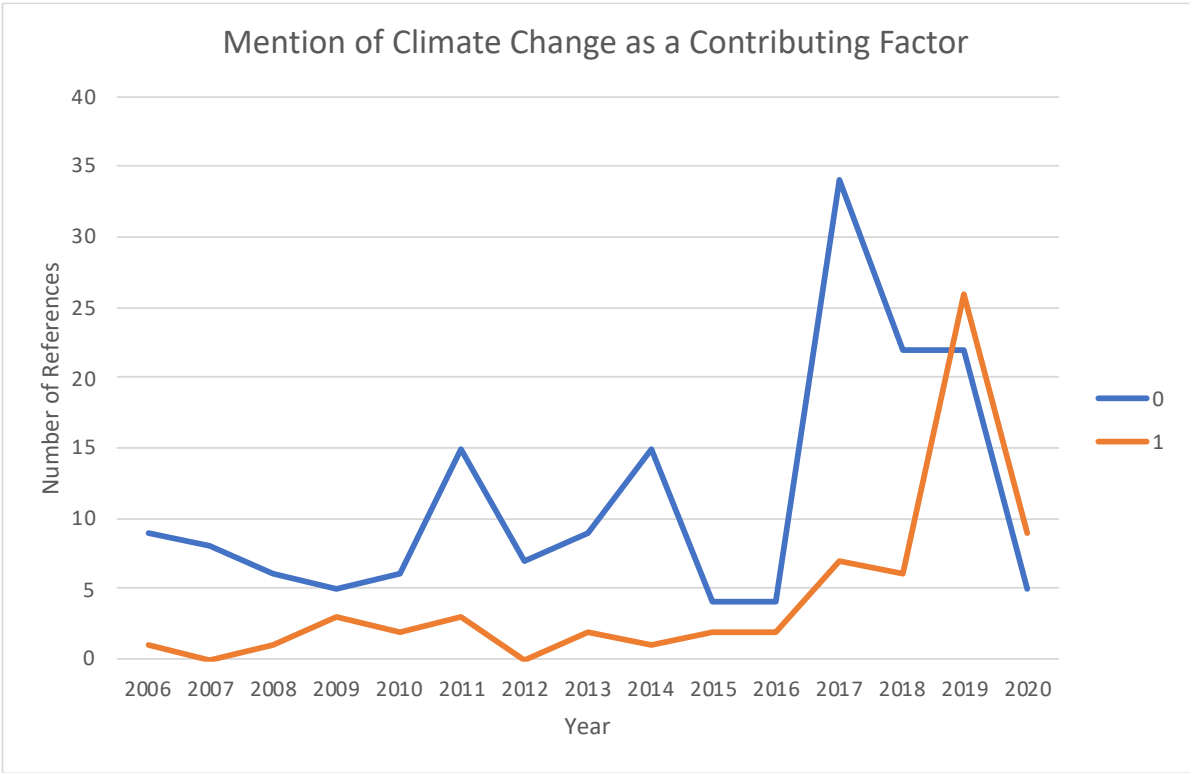

Figure 10: The number of flood references within the discourse sample from the Canadian Hansard Index that frame climate change as a contributing factor to flooding (1) or not a contributing factor to flooding (0) throughout the sample period of 2006 to 2020.

Therefore, the switch in government could have contributed to an increase in climate change discussion towards the four years of the sample period. Overall, while there has been an increase in flood framing and its connection to climate change, the results indicate that this is only a recent development. There is a need for a multi-sector approach to flood management, and a widespread recognition among elected officials that instances of frequent and severe flood events are linked to climate change.

4.7 GOVERNMENT, STAKEHOLDERS AND FLOOD RISK

Another key principle of FRM is that it incorporates a wide variety of stakeholders through risk sharing. In this way, it prioritizes a whole-of-society approach. This allows for

sustainable flood management through sharing recovery and mitigation actions, as well as minimizing the burden on high-risk and vulnerable communities. While government entities play a key role in flood management efforts, there has been criticisms that there is too much reliance on government disaster financial assistance programs and structural defenses, and not enough focus on rebuilding to improve resilience, non-structural defenses and incorporating private entities (such as insurers) in flood management strategies (Henstra & Thistlethwaite, 2017a). Further, it has been stated that there is too much reliance on the higher levels of government in Canada, with municipalities and insurers being under-utilized in cost- and risk-sharing programs (Thistlethwaite & Henstra, 2017).

4.7.1 GOVERNMENT ACTORS

The levels of government in Canada (federal, provincial, and municipal) that are mentioned as having identified involvement in flood management and risk-reducing efforts were examined. Within the sample, 70.3% of the references identify the federal government as partaking in flood management, 47.5% indicate the provincial government, and only 21.6% highlight the municipal government as a risk-sharing actor. While the large proportion of federal government identification could be in part due to the nature of the study focusing on parliamentary discourse within the House of Commons, it is important to note that the provincial government is stated more often in cost-sharing programs and recovery efforts, as opposed to the municipal government. This is significant as it reinforces municipalities as an under-utilized actor in national flood management and risk sharing strategies, particularly at a local level to enforce measures such as zoning and land use regulations, community-level management, building codes.

Additionally, the involvement of government-specific programs, policies and organizations was examined. It was found that 44.9% of the references within the study state specific government ministry or organization involvement in flood management efforts. This is indictive that a substantial proportion of flood risk is linked to a government organization and demonstrates accountability and responsibility. Of the entities mentioned, the most commonly cited ones include the Canadian Forces (15.7%), Public Safety Canada (15.7%), and local first responders (14.0%). Further, 25.0% of references within the sample identify a specific government program or policy within the discussion. The most mentioned programs include, Disaster Financial Assistance Arrangements (DFAA) (9.3%), National Disaster Mitigation Program (NDMP) (3.8%), and the Disaster Adaptation Mitigation Fund (DMAF) (3.4%). For the most part, these programs were positively discussed, rather than criticized.

These results indicate that response- and recovery-focused agencies represent the largest proportion of government actors that are cited within the sample. This reinforces that discussion about flood risk are events-based. Emergency response agencies comprise the most frequently mentioned organizations. These organizations respond during or after a flood event. Additionally, DFAA is the most cited government program, highlighting that there is a heavy reliance on government-funded financing post flood. Despite its financial caveats, it is possible that politicians still rely on this program to gain public support as there remains a widespread expectation that the government will cover costs post-flood. This does little to incentivize personal uptake of insurance and property-level protection measures. The uptake of these risk-reducing measures are highly dependent on a society's perception of risk and values regarding individual responsibility (Henstra & Thistlethwaite, 2017a; Hofstede, 1995; Meijerink & Dicke,

2008). Overall, these results indicate that there remains a need to shift towards diversifying risk-reducing programs and incorporating all levels of government in risk-sharing measures.

4.7.2 STAKEHOLDERS AND FLOOD RISK

Throughout the sample, a variety of stakeholders and associated roles are identified (Figure 11).

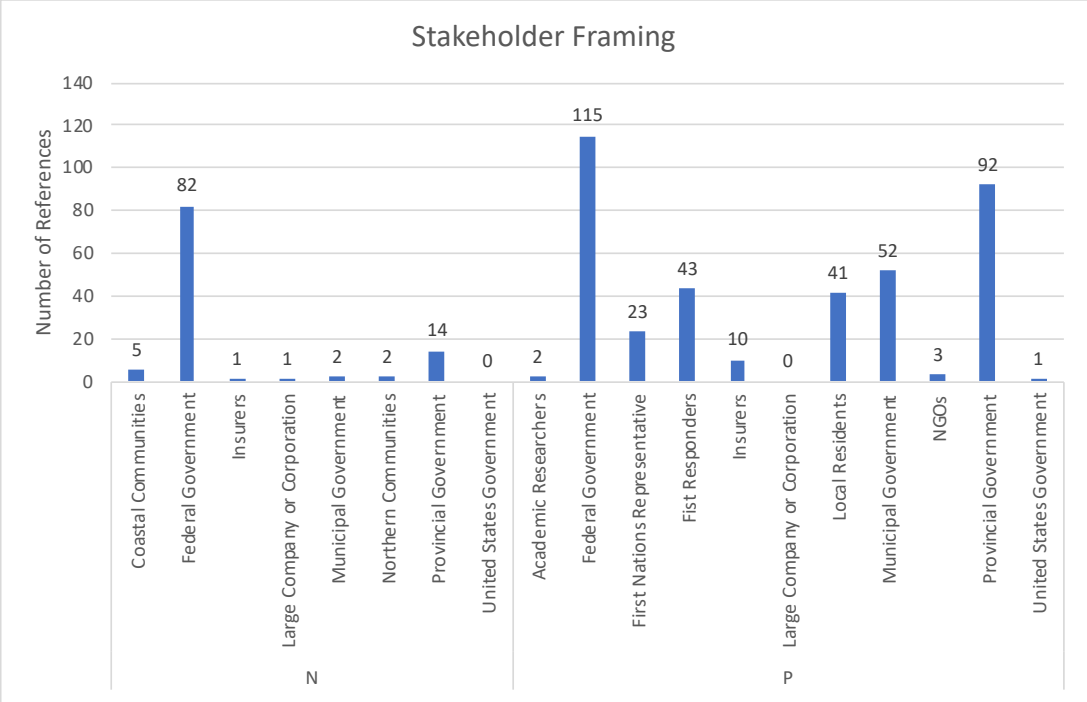

Figure 11: The stakeholders that are stated within the discourse sample in connection with flooding, cited as having either a negative (N) or positive (P) role in flood management.

While this demonstrates that flood risk is diversified among various actors, there remains a disproportionate emphasis on several stakeholders. These include the federal, provincial, and municipal governments, which comprise the vast majority of stakeholders mentioned, as well as first responders and local residents.

Additionally, upon examination of the functions of these stakeholders, it was found that the most prevalent roles cited throughout the sample include emergency response (35.6%), financing post-flood (25.8%), funding risk-reduction programs (22.9%), climate action (15.7%),

flood defense infrastructure (12.7%), infrastructure reinforcement (11.4%), and evacuation (10.2%) (Figure 12).

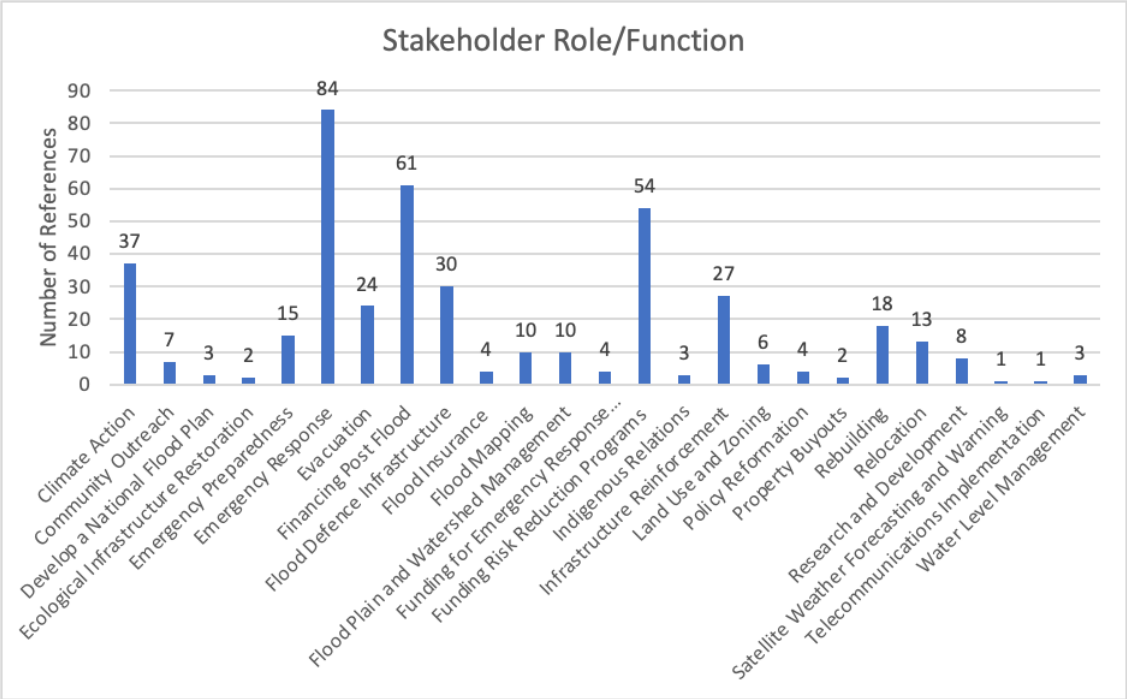

Figure 12: The number of references containing each stakeholder role or function within the discourse sample.

Again, response and recovery efforts, including emergency response, recovering costs, and evacuation make up the majority of stakeholder roles. However, stakeholder roles that are conducive to flood mitigation are also prevalent within the discussion, including funding risk management programs, as well as re-enforcing infrastructure to withstand floods. This is consistent with the FRM principles that are most mentioned within the sample, including mitigation, response and recovery as stated previously.

Overall, these results indicate that discourse needs to be more wide-reaching to encompass actions that are proactive to all aspects of FRM (such as more emphasis on preparedness), as well as the need for discussion that prioritizes sharing responsibility among all stakeholders. There is a heavy emphasis placed on government stakeholders, rather than

stakeholders which can help guide effective mitigation strategies and cost-share recovery efforts, such as Indigenous representatives, insurers, and NGOs.

4.8 SUMMARY

Overall, the results present several main findings. Overwhelmingly, the year 2016 marks an ideological shift in many of the FRM variables studied, including the identification of climate change as a driver of flood risk, the recognition that flood risk is anthropogenic, that flood risk is increasing, framing the consequences of flooding as long term, as well as the statement of a policy problem or failure associated with flooding. This demonstrates a tendency towards frames that align with FRM beginning in 2016. As previously stated, this timeline coincides with large-scale political changes, including a change in power to the left-leaning Liberal Party of Canada, as well as the enaction of the Paris Agreement. The relation between these events and the change in ideology implies that large-scale political changes are key drivers of FRM frame shifts.

Further, the results suggest that politics, rather than flood risk, are at the basis of the discourse studied. The findings show that discussions are largely initiated by the onset of a flood event, and that the priority by which regions are discussed is based on representation within the House of Commons, rather than risk-based metrics such as the frequency and severity of flood events. The findings also demonstrate that flood discourse is largely events-based, which shows a tendency of politicians to react to flooding rather than initiate discussions based on flood risk and climate change mitigation. Additionally, the results are consistent with left-right politics theory, which identifies left-leaning parties as more receptive to environmental issues, and more likely to implement policies centered around issues such as climate change and natural hazards.

The results indicate is a need for more focus on several aspects of FRM. The first is vulnerability as indicated through a lack of discourse and flood risk for Indigenous communities, despite being at a significantly increased risk of flooding. Further, there is a lack of discourse surrounding explicit action to reduce flood risk, which signifies that more definite policy directives are needed to improve flood management strategies. Finally, the results demonstrate the need for a diversification of policies and stakeholders in Canadian flood management strategies. The discourse reveals a heavy reliance on government-funded recovery programs, and on government stakeholders. Effective FRM policy requires a variety of stakeholders and programs to distribute flood risk. Further, the literature identifies tools, such as flood insurance, that are critical in sustainable flood policy. Despite this, these tools are scarcely mentioned in the discourse sample.

5. CONCLUSION

It is becoming evident that current flood management strategies are no longer sustainable in Canada. Floods are more frequent and severe in light of climate change and are associated with mounting economic and social costs. Traditional, hazard-based strategies have become outdated, along with the frame that flooding is a non-predictable phenomenon which can be largely controlled through structural defenses. The literature has shown that these methods fail to account for key elements of risk, including exposure and vulnerability, as well as resilience and adaptation. Further, they are reliant on metrics such as specified return intervals, which does not account for the rapid changes that are occurring as global temperatures increase (Henstra & Thistlethwaite, 2017a).

Additionally, there has been a disproportionate emphasis put on federal cost recovery programs, namely DFAA, which has been criticized for its long term viability, and limits stakeholders and programs involved in flood management (Sandink et al., 2016; Thistlethwaite & Henstra, 2017). Other valuable stakeholders, such as insurers, local governments, and local communities, have traditionally been overlooked in flood mitigation and recovery procedures. As result, tools that are identified as key to a well-rounded flood strategy such as flood insurance, land use and zoning, property-level protection measures, and flood mapping have been under-utilized (Oulahen, 2014; Thistlethwaite & Henstra, 2017).

The literature identifies FRM as an effective and viable strategy for flood management policy. FRM provides several factors that highlight it as a sustainable policy framework. First, it uses risk-based metrics to account for risk disparities and populations more susceptible to flood risk (Henstra & Thistlethwaite, 2017a; Nelson et al., 2007). Second, it prioritizes risk-sharing among a variety of stakeholders to better manage the interdisciplinary nature of flooding and

distribute the efforts required before, during and after a flood occurs (Thistlethwaite & Henstra, 2017). Third, it asserts that flooding is inherently a public policy problem that requires tangible action at all management stages to minimize risk (Gober & Wheater, 2015; Henstra & Thistlethwaite, 2017a). Fourth, it is adaptive and employs a broad range of tools to better prepare for and improve resilience against floods (Thistlethwaite, Henstra, et al., 2018). Overall, FRM aims to manage flood risk so that it is reduced to a level which is economically and socially acceptable (Bowles, 2003; Henstra & Thistlethwaite, 2017a; Schanze et al., 2006).

Despite its prevalence in flood policy research, FRM implementation in Canada has been slow. This research examined flood discourse at within the Canadian House of Commons to determine the predominant frames that exist within political discourse, as well as the extent to which they are consistent with FRM. This research set out to determine (1) how Canadian political discourse frames flooding as a policy problem, and (2) the role of FRM in Canadian policy discourse.

This research began by undertaking a literature review examined the current state of flooding and flood policy in Canada. This highlighted the criticisms of traditional flood management practices. FRM theory was then summarized, allowing for an examination of the main elements of FRM, as well as its role in implementing effective flood policy in Canada. Discourse theory and the influence of media, left-right politics and public opinion in enacting public policy was examined to deduce the ways in which salience is placed on political issues.

The literature review informed the development of a codebook, in order to evaluate the prevalence of FRM in political discourse in practice. This codebook was applied to flood discourse samples extracted from the Hansard Index of the Canadian House of Commons. The codebook identifies six main categories to evaluate FRM, including (1) Flood Identification, (2)

Party Speaking on Flooding, (3) Problem Framing, (4) Climate Change Framing (5) Flood Risk Management Focus, and (6) Stakeholder Identification.

Overall, the results indicate that policy discourse does well to highlight several components of FRM, including mitigation, response, and recovery. There is also a recognition towards the end of the study period that flood risk is a result of human-induced policy problems, climate change, and that flood risk is increasing. There are several main themes that are apparent within the results.

First, the results suggest that flood discourse is largely event-based, rather than risk based. This indicates that discussions surrounding flooding are initiated by the occurrence of a flood event. The data shows that there are some connections between the severity of flood events by province and the frequency of province mentions within the discussions. In other words, provinces that experience more costly floods showed up more frequently within the discourse. Events-based dialogue is evident throughout, which suggests that discussions are spurred by flood events. This is apparent as the majority of discussions do not identify flooding as a result of poor policy, and a tendency to focus on the immediate consequences of flooding, rather than the long-term effects. Further, the prevalence of programs such as the DFAA throughout the discourse suggests that flood policies are largely focused on efforts post-flood.

Second, the results imply that major political events are drivers of a change in discourse. Factors including the temporal framing of flood consequences, the identification of a policy problem or failure, the state of flood risk as increasing, the origin of flood risk as anthropogenic, and the identification of climate change as a contributing factor to flood risk all show a shift towards FRM-based frames in the year 2016. In that time period, several large political changes occurred. This includes a shift to a more left-wing ideology within government that has

campaigned for climate action, as well as the implementation of the Paris Agreement (an international climate policy). These changes could have prompted discussion on underlying policy problems that are exacerbating flood risk, resulting in unsustainable costs to governments as well as taxpayers.

Third, the results show that political representation and ideology influences flood discourse. The data confirms that provinces that are most frequently referenced within discussions have the most political representation within the House of Commons. The results are also consistent with political ideology literature, which states a tendency of right-leaning conservatives to resist progressive environmental policies and negate climate change as a policy problem. Statistical analysis showed significant correlations between dialogue from conservative representatives and a tendency away from anthropogenic-induced flood risk, not stating that climate change is a contributing factor to flood risk, a lack of statement that flooding is a result of a policy problem, and a tendency to frame the effects of flooding as short term. Contrastingly, the farther left-leaning NDPs showed a tendency to frame flood risk as anthropogenic. This suggests that party ideology is indicative of a tendency to support frames that are conducive to FRM and has implications for the enactment of policies that are conducive to FRM based on which party has a majority government. In particular, ideology aligns with one of FRM's founding principles that flood risk is not inevitable and can be managed using public policy.

Finally, the results show that despite the recent shifts in discourse that is proactive to FRM, there remains several policy considerations that need to be met to effectively implement sustainable flood management policy. Stakeholder diversification is a key principle of FRM and allows for effective risk- and cost-sharing. The discourse sample studied frequently cites only a small number of stakeholders in flood discussions and tends to implicate upper levels of

government in flood management. The roles of these stakeholders are largely focused on recovery and recovery, rather than mitigation and preparedness. Additionally, the results show a need for more consideration for vulnerable populations throughout the discourse. This is evident by the representation of indigenous communities, whose lands are the most frequently flooded, have little representation within the discourse. There is a need for more political discourse frames which are consistent with FRM literature. These include the recognition that climate change is a current contributor to flood risk, rather than a future contributor. Further, there remains low recognition of flood risk as urgent and as manageable, as well as explicit action stated to reduce flood risk.

This study provides a robust framework for evaluating flood risk frames and the extent to which FRM is prevalent in policy discourse, however the design of the study presents several limitations. The first is the use of a single coder. This presents challenges with reliability and subjectivity in the application and interpretation of the codebook. The drawbacks of using a single coder were addressed through clearly defining the criteria for each node prior to applying the codebook to the sample. Secondly, the codebook presents issues for generality. The codebook was designed specifically to evaluate FRM in Canada on a national scale. For this study to be replicated, the codebook would need to be modified to allow for broader research applications.

This research contributes to an improved understanding of FRM in practice. Specifically, it highlights the elements of FRM that are prevalent within political discourse and those that remain priorities to implement a sustainable flood management framework in Canada. This study can be expanded upon to evaluate the prevalence of other natural hazards management theories in Canadian political discourse, such as frameworks to manage forest fires, ice storms,

hurricanes, etc. This codebook can also be applied to examine FRM implementation in other levels of Canadian government, through a provincial discourse analysis. This would allow for a greater understanding of the distribution of flood management efforts throughout Canada. It can also be expanded to an international study to determine flood management policy frameworks in other countries. Expansion of this study could allow for an improved understanding of effective flood policy implementation in light of changing climatic conditions and rising global temperatures causing increased instances of severe and frequent disaster events.

REFERENCES

Adamson, M. (2018). Flood risk management in Europe: The EU 'Floods' directive and a case study of Ireland. *International Journal of River Basin Management*, *16*(3), 261–272. https://doi.org/10.1080/15715124.2018.1437744

Akter, T., & Simonovic, S. P. (2005). Aggregation of fuzzy views of a large number of stakeholders for multi-objective flood management decision-making. *Journal of Environmental Management*, *77*(2), 133–143. https://doi.org/10.1016/j.jenvman.2005.02.015

Anderson, C. D., & Stephenson, L. B. (2011). Environmentalism and Party Support in Canada: Recent Trends outside Quebec. *Canadian Journal of Political Science / Revue Canadienne de Science Politique*, *44*(2), 341–366.

Armenakis, C., & Nirupama, N. (2014). Flood Risk Mapping for the City of Toronto. *Procedia Economics and Finance*, *18*, 320–326. https://doi.org/10.1016/S2212-5671(14)00946-0

Bagnell, L. (2010, Sept. 27). "Fighting Internet and Wireless Spam Act." Canada. Parliament. House of Commons. *Edited Hansard 145*(71). 40th Parliament, 3rd session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/40-3/house/sitting-71/hansard

Barnes, M. D., Hanson, C. L., Novilla, L. M. B., Meacham, A. T., McIntyre, E., & Erickson, B. C. (2008). Analysis of Media Agenda Setting During and After Hurricane Katrina: Implications for Emergency Preparedness, Disaster Response, and Disaster Policy. *American Journal of Public Health*, *98*(4), 604–610. https://doi.org/10.2105/AJPH.2007.112235

Bauer, P. C., Barberá, P., Ackermann, K., & Venetz, A. (2017). Is the Left-Right Scale a Valid Measure of Ideology? *Political Behavior*, *39*(3), 553–583. https://doi.org/10.1007/s11109-016-9368-2

Benford, R. D., & Snow, D. A. (2000). Framing Processes and Social Movements: An Overview and Assessment. *Annual Review of Sociology*, *26*(1), 611–639. https://doi.org/10.1146/annurev.soc.26.1.611

Bennett, C. (2012, Nov. 5). "Aboriginal Affairs." Canada. Parliament. House of Commons. *Edited Hansard 146*(176). 41st Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-1/house/sitting-176/hansard

Bezan, J. (2006, Sept. 22). "Emergency Management Act." Canada. Parliament. House of Commons. *Edited Hansard 141*(51). 39th Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/39-1/house/sitting-51/hansard

Blais, E.-L., Clark, S., Dow, K., Rannie, B., Stadnyk, T., & Wazney, L. (2016). Background to flood control measures in the Red and Assiniboine River Basins. *Canadian Water Resources Journal / Revue Canadienne Des Ressources Hydriques*, *41*(1–2), 31–44. https://doi.org/10.1080/07011784.2015.1036123

Bogdan, E., Henstra, D., & Thistlethwaite, J. (2020, May 25). *Fort McMurray's flood disaster was foreseeable and preventable* [Text]. Smart Water Magazine; Smart Water Magazine. https://smartwatermagazine.com/blogs/eva-a-evalyna-bogdan/fort-mcmurrays-flood-disaster-was-foreseeable-and-preventable

Boholm, M. (2009). Risk and Causality in Newspaper Reporting. *Risk Analysis*, *29*(11), 1566–1577. https://doi.org/10.1111/j.1539-6924.2009.01296.x

Boissonault, R. (2019, June 17). "The Environment." Canada. Parliament. House of Commons. *Edited Hansard 148*(435). 42nd Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/42-1/house/sitting-435/hansard

Bornstein, R. F. (1989). Exposure and affect: Overview and meta-analysis of research, 1968–1987. *Psychological Bulletin*, *106*(2), 265. https://doi.org/10.1037/0033-2909.106.2.265

Bosc, M., & Gagnon, A. (2017a). Composition of the House—The House of Commons and Its Members. In *House of Commons Procedure and Practice* (3rd ed.). https://www.ourcommons.ca/about/procedureandpractice3rdedition/ch_04_1-e.html

Bosc, M., & Gagnon, A. (2017b). Routine Proceedings. In *House of Commons Procedure and Practice* (3rd ed.). https://www.ourcommons.ca/About/ProcedureAndPractice3rdEdition/ch_10_2-e.html

Botzen, W. J. W., & Van Den Bergh, J. C. J. M. (2008). Insurance Against Climate Change and Flooding in the Netherlands: Present, Future, and Comparison with Other Countries: Insurance Against Climate Change and Flooding in the Netherlands. *Risk Analysis*, *28*(2), 413–426. https://doi.org/10.1111/j.1539-6924.2008.01035.x

Bowles, D. S. (2003). *ALARP EVALUATION: USING COST EFFECTIVENESS AND DISPROPORTIONALITY TO JUSTIFY RISK REDUCTION*. 18.

Boyle, J., Cunningham, M., & Dekens, J. (2013). *Climate Change Adaptation and Canadian Infrastructure: A review of the literature* (p. 40). International Institute for Sustainable Development. https://www.iisd.org/pdf/2013/adaptation_can_infrastructure.pdf

Bruce, J. P. (1976). THE NATIONAL FLOOD DAMAGE REDUCTION PROGRAM. *Canadian Water Resources Journal*, *1*(1), 5–14. https://doi.org/10.4296/cwrj0101005

Burn, D. H., & Whitfield, P. H. (2016). Changes in floods and flood regimes in Canada. *Canadian Water Resources Journal*, *41*(1–2), 139–150. https://doi.org/10.1080/07011784.2015.1026844

Cairney, P. (2019). *Understanding Public Policy: Theories and Issues*. Red Globe Press.

Calamai, L., & Minano, A. (2017). Emerging trends and future pathways: A commentary on the present state and future of residental flood insurance in Canada. *Canadian Water Resources Journal*, *42*(4), 307–314.

Chong, D., & Druckman, J. N. (2007). Framing Theory. *Annual Review of Political Science*, *10*(1), 103–126. https://doi.org/10.1146/annurev.polisci.10.072805.103054

City of Vancouver. (2018). *Coastal Adaptation Plan*. https://vancouver.ca/files/cov/coastal-adaptation-plan-final-report.pdf

Clements, B. (2012). Exploring public opinion on the issue of climate change in Britain. *British Politics*, *7*(2), 183–202. https://doi.org/10.1057/bp.2012.1

Contant, J. (2018, September 9). Ontario already near $1 billion in insured damage in 2018. *Canadian Underwriter*. https://www.canadianunderwriter.ca/catastrophes/ontario-already-near-1-billion-insured-damage-2018-1004136772/

Cousins, B. (2021). *Severe weather events cost Canadian insurers $2.4 billion in 2020*. CTV News. https://www.ctvnews.ca/business/severe-weather-events-cost-canadian-insurers-2-4-billion-in-2020-1.5270815

Crockatt, J. (2015, June 4). “Infrastructure.” Canada. Parliament. House of Commons. *Edited Hansard 147*(224). 41st Parliament, 2nd session. Retrieved from the Parliament of

Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-2/house/sitting-224/hansard

Crow, D. A., Berggren, J., Lawhon, L. A., Koebele, E. A., Kroepsch, A., & Huda, J. (2017). Local media coverage of wildfire disasters: An analysis of problems and solutions in policy narratives. *Environment and Planning C: Politics and Space*, *35*(5), 849–871. https://doi.org/10.1177/0263774X16667302

Crow, D. A., & Lawlor, A. (2016). Media in the Policy Process: Using Framing and Narratives to Understand Policy Influences: Media in the Policy Process. *Review of Policy Research*, *33*(5), 472–491. https://doi.org/10.1111/ropr.12187

Crozier, M. (2007). Recursive Governance: Contemporary Political Communication and Public Policy. *Political Communication*, *24*(1), 1–18. https://doi.org/10.1080/10584600601128382

Cruz, S. M. (2017). The relationships of political ideology and party affiliation with environmental concern: A meta-analysis. *Journal of Environmental Psychology*, *53*, 81–91. https://doi.org/10.1016/j.jenvp.2017.06.010

D'Amours, J. (2008, May 26). "Flooding in New Brunswick" Canada. Parliament. House of Commons. *Edited Hansard 142*(98). 39th Parliament, 2nd session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/39-2/house/sitting-98/hansard

Davidson, D. J., & Haan, M. (2012). Gender, political ideology, and climate change beliefs in an extractive industry community. *Population and Environment*, *34*(2), 217–234. https://doi.org/10.1007/s11111-011-0156-y

de Graaf, R., & van der Vossen, R. (2013). Bits versus brains in content analysis. Comparing the advantages and disadvantages of manual and automated methods for content analysis. *Communications*, *38*(4). https://doi.org/10.1515/commun-2013-0025

Delshad, A. B., Raymond, L., Sawicki, V., & Wegener, D. T. (2010). Public attitudes toward political and technological options for biofuels. *Energy Policy*, *38*(7), 3414–3425. https://doi.org/10.1016/j.enpol.2010.02.015

Dhaliwal, S. (2009, Jan. 30). "Fiji". Canada. Parliament. House of Commons. *Edited Hansard 144*(5). 40th Parliament, 2nd session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/40-2/house/sitting-5/hansard

Downe-Wamboldt, B. (1992). Content analysis: Method, applications, and issues. *Health Care for Women International*, *13*(3), 313–321. https://doi.org/10.1080/07399339209516006

Driessen, P. P. J., Hegger, D. L. T., Bakker, M. H. N., van Rijswick, H. F. M. W., & Kundzewicz, Z. W. (2016). Toward more resilient flood risk governance. *Ecology and Society*, *21*(4). https://www.jstor.org/stable/26269990

Dryzek, J. S. (2013). *The Politics of the Earth: Environmental Discourses*. OUP Oxford.

Duncan, K. (2013, Apr. 25). "Business of Supply: Opposition Motion- Climate Change." Canada. Parliament. House of Commons. *Edited Hansard 146*(240). 41st Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-1/house/sitting-240/hansard

Elections Canada. (2020, May). *House of Commons Seat Allocation by Province*. https://www.elections.ca/content.aspx?section=res&dir=cir/red/allo&document=index&lang=e

Environment and Climate Change Canada. (2009, March 31). *Reducing flood damage* [Research]. Aem. https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/reducing-flood-damage.html

Environment and Climate Change Canada. (2017). *Canada's top ten weather stories of 2013: 1. Alberta's Flood of Floods*. https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=5BA5EAFC-1&offset=2&toc=hide

Escobar, M. P., & Demeritt, D. (2014). Flooding and the framing of risk in British broadsheets, 1985–2010. *Public Understanding of Science*, *23*(4), 454–471. https://doi.org/10.1177/0963662512457613

EU. (2007). Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. *Official Journal of European Communities, L288/27*. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32007L0060

European Commission. (n.d.). *The EU Floods Directive*. Retrieved March 5, 2021, from https://ec.europa.eu/environment/water/flood_risk/

European Commission. (2016). *Flood risk management—Water—Environment—European Commission*. https://ec.europa.eu/environment/water/flood_risk/

Fairclough, N. (2001). Critical discourse analysis as a method in social scientific research. In *Methods of Critical Discourse Analysis* (pp. 121–138). Sage. http://www.research.lancs.ac.uk/portal/en/publications/critical-discourse-analysis-as-a-method-in-social-scientific-research(8c6658a6-009b-4a10-8c52-d2160d600fba)/export.html

Fielding, K. S., Head, B. W., Laffan, W., Western, M., & Hoegh-Guldberg, O. (2012). Australian politicians' beliefs about climate change: Political partisanship and political ideology. *Environmental Politics*, *21*(5), 712–733. https://doi.org/10.1080/09644016.2012.698887

Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, *16*(3), 253–267. https://doi.org/10.1016/j.gloenvcha.2006.04.002

Foote, J. (2010, Sept. 27). "Newfoundland and Labrador." Canada. Parliament. House of Commons. *Edited Hansard 145*(71). 40th Parliament, 3rd session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/40-3/house/sitting-71/hansard

Gallant, C. (2020, Mar. 9). "Business of Supply: Opposition Motion- Documents on Economic Downturns." Canada. Parliament. House of Commons. *Edited Hansard 149*(27). 43rd Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/43-1/house/sitting-27/hansard

Gastil, J. (1992). Undemocratic Discourse: A Review of Theory and Research on Political Discourse. *Discourse & Society*, *3*(4), 469–500. https://doi.org/10.1177/0957926592003004003

Gober, P., & Wheater, H. S. (2015). Debates-Perspectives on socio-hydrology: Modeling flood risk as a public policy problem: Socio-Hydrology Modeling for Public Policy Problems. *Water Resources Research*, *51*(6), 4782–4788. https://doi.org/10.1002/2015WR016945

Godin, J. (2017, May 8). "Flooding". Canada. Parliament. House of Commons. *Edited Hansard 148*(172). 42nd Parliament, 1st session. Retrieved from the Parliament of Canada

website: https://www.ourcommons.ca/DocumentViewer/en/42-1/house/sitting-172/hansard

Goffman, E. (1974). *Frame analysis: An essay on the organization of experience*. Harper & Row.

Golnaraghi, M., Thistlethwaite, J., Henstra, D., & Stewart, C. (2020). *Flood Risk Management in Canada: Building flood resilience in a changing climate*. The Geneva Association.

Government of Canada. (n.d.). *Cabinet*. Prime Minister of Canada. Retrieved July 20, 2021, from https://pm.gc.ca/en/cabinet

Government of Canada, P. S. C. (2018a, December 21). *Canadian Disaster Database*. https://cdd.publicsafety.gc.ca/dtpg-eng.aspx?cultureCode=en-Ca&provinces=3&eventTypes=%27FL%27&eventStartDate=%2720080101%27%2c%2720151231%27&normalizedCostYear=1&dynamic=false&eventId=588

Government of Canada, P. S. C. (2018b, December 21). *Canadian Disaster Database*. https://cdd.publicsafety.gc.ca/dtpg-eng.aspx?cultureCode=en-Ca&provinces=3&eventTypes=%27FL%27&eventStartDate=%2720080101%27%2c%2720151231%27&normalizedCostYear=1&dynamic=false&eventId=1005

Government of Canada, P. S. C. (2018c, December 21). *Canadian Disaster Database*. https://cdd.publicsafety.gc.ca/dtpg-eng.aspx?cultureCode=en-Ca&provinces=3&eventTypes=%27FL%27&eventStartDate=%2720080101%27%2c%2720151231%27&normalizedCostYear=1&dynamic=false&eventId=1080

Government of Canada, P. S. C. (2018d, December 21). *Canadian Disaster Database*. https://cdd.publicsafety.gc.ca/dtpg-eng.aspx?cultureCode=en-

Ca&provinces=1&eventTypes=%27FL%27&eventStartDate=%2720130101%27%2c%2720131231%27&normalizedCostYear=1&dynamic=false&eventId=1056

Groeneveld, G. (2006). *Provincial Flood Mitigation Report: Consultation and Recommendations*. MLA Highwood. http://www.aema.alberta.ca/images/News/Provincial_Flood_Mitigation_Report.pdf

Haalboom, B., & Natcher, D. C. (2012). The Power and Peril of "Vulnerability": Approaching Community Labels with Caution in Climate Change Research. *Arctic*, *65*(3), 319–327.

Hager, A., & Hilbig, H. (2020). Does Public Opinion Affect Political Speech? *American Journal of Political Science*, *64*(4), 921–937. https://doi.org/10.1111/ajps.12516

Harring, N., & Sohlberg, J. (2017). The varying effects of left–right ideology on support for the environment: Evidence from a Swedish survey experiment. *Environmental Politics*, *26*(2), 278–300. https://doi.org/10.1080/09644016.2016.1244965

Hegger, D., Driessen, P., & Bakker, M. (2016). *A view on more resilient flood risk governance: Key conclusions of the STAR-FLOOD project*. STAR-FLOOD Consortium.

Henstra, D., Minano, A., & Thistlethwaite, J. (2019). Communicating disaster risk? An evaluation of the availability and quality of flood maps. *Natural Hazards and Earth System Sciences*, *19*(1), 313–323. https://doi.org/10.5194/nhess-19-313-2019

Henstra, D., & Thistlethwaite, J. (2017a). *Climate Change, Floods, and Municipal Risk Sharing in Canada* (No. 30; IMFG Papers on Municipal Finance and Governance, p. 48). Institute on Municipal Finance and Governance. http://munkschool.utoronto.ca/imfg/uploads/373/1917_imfg_no_30_online_final.pdf

Henstra, D., & Thistlethwaite, J. (2017b). *Flood Risk Management: What Is the Role Ahead for the Government of Canada?* (No. 103; p. 12). Centre for International Governance Innovation.

Henstra, D., & Thistlethwaite, J. (2018). *Flood Risk Mapping in Canada: Moving Forward on a National Priority* (p. 12).

Henstra, D., & Thistlethwaite, J. (2019, May 27). Engaging Canadians in Flood Risk Management. *HazNet*. http://haznet.ca/engaging-canadians-flood-risk-management/

Henstra, D., Thistlethwaite, J., Brown, C., & Scott, D. (2019). Flood risk management and shared responsibility: Exploring Canadian public attitudes and expectations. *Journal of Flood Risk Management*, *12*(1), e12346. https://doi.org/10.1111/jfr3.12346

Herbst, T., Schmid, H.-J., & Faulhaber, S. (2014). *Constructions Collocations Patterns*. Walter de Gruyter GmbH & Co KG.

Hofstede, G. (1995). Insurance as a Product of National Values. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *20*(4), 423–429. https://doi.org/10.1057/gpp.1995.36

House of Commons. (n.d.). *The Canadian Parliamentary System*. Retrieved March 9, 2021, from https://www.ourcommons.ca/About/OurProcedure/ParliamentaryFramework/c_g_parliamentaryframework-e.htm

Houston, J. B., Pfefferbaum, B., & Rosenholtz, C. E. (2012). Disaster News: Framing and Frame Changing in Coverage of Major U.S. Natural Disasters, 2000–2010. *Journalism & Mass Communication Quarterly*, *89*(4), 606–623. https://doi.org/10.1177/1077699012456022

Howarth, D. (2010). Power, discourse, and policy: Articulating a hegemony approach to critical policy studies. *Critical Policy Studies*, *3*(3–4), 309–335. https://doi.org/10.1080/19460171003619725

Hudson, P., De Ruig, L. T., de Ruiter, M. C., Kuik, O. J., Botzen, W. J. W., Le Den, X., Persson, M., Benoist, A., & Nielsen, C. N. (2020). An assessment of best practices of extreme weather insurance and directions for a more resilient society. *Environmental Hazards*, *19*(3), 301–321. https://doi.org/10.1080/17477891.2019.1608148

IBC. (2017). *Spring flooding in Ontario and Quebec caused more than $223 million in insured damage*. http://www.ibc.ca/on/resources/media-centre/media-releases/spring-flooding-in-ontario-and-quebec-caused-more-than-223-million-in-insured-damage

IBC. (2018). *January winter storms, floods caused more than $54 million in insured damage across Eastern Canada*. http://www.ibc.ca/on/resources/media-centre/media-releases/january-winter-storms-floods-caused-more-than-54-million-in-insured-damage-across-eastern-canada

IBC. (2019a). *Eastern Canada Spring Flooding Caused Close to $208 million in Insured Damage*. http://www.ibc.ca/on/resources/media-centre/media-releases/eastern-canada-spring-flooding-caused-close-to-208-million-in-insured-damage

IBC. (2019b). *Severe Weather Causes $1.9 Billion in Insured Damage in 2018*. http://www.ibc.ca/on/resources/media-centre/media-releases/severe-weather-causes-190-million-in-insured-damage-in-2018

IBC. (2021). *Severe Weather Caused $2.4 Billion in Insured Damage in 2020*. http://www.ibc.ca/on/resources/media-centre/media-releases/severe-weather-caused-$2-4-billion-in-insured-damage-in-2020

IPCC. (2018). *Annex I: Glossary [Matthews, J.B.R. (ed.)]. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of*

strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. https://www.ipcc.ch/sr15/chapter/glossary/

Jagers, S. C., Harring, N., & Matti, S. (2018). Environmental management from left to right – on ideology, policy-specific beliefs and pro-environmental policy support. *Journal of Environmental Planning and Management*, *61*(1), 86–104. https://doi.org/10.1080/09640568.2017.1289902

Jakob, M., & Church, M. (2011). The Trouble with Floods. *Canadian Water Resources Journal*, *36*(4), 287–292. https://doi.org/10.4296/cwrj3604928

Jarratt, J., & Mahaffie, J. (2009). Reframing the Future. *Journal of Future Studies*, *13*(4), 5–12.

Jerneck, A., & Olsson, L. (2011). Breaking out of sustainability impasses: How to apply frame analysis, reframing and transition theory to global health challenges. *Environmental Innovation and Societal Transitions*, *1*(2), 255–271. https://doi.org/10.1016/j.eist.2011.10.005

Johns, G. (2017, Nov. 27). "Ethics." Canada. Parliament. House of Commons. *Edited Hansard 148*(239). 42nd Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/42-1/house/sitting-239/hansard

Jones, M., Shanahan, E., & McBeth, M. (2014). *The Science of Stories: Applications of the Narrative Policy Framework in Public Policy Analysis*. Springer.

Jones, Y. (2015, May 13). "Business of Supply: Indian Affairs and Northern Development- Main Estimates, 2015-2016." Canada. Parliament. House of Commons. *Edited Hansard 147*(213). 41st Parliament, 2nd session. Retrieved from the Parliament of Canada

website: https://www.ourcommons.ca/DocumentViewer/en/41-2/house/sitting-213/hansard

Kampf, Z. (2015). Political Discourse Analysis. In *The International Encyclopedia of Language and Social Interaction* (pp. 1–17). American Cancer Society. https://doi.org/10.1002/9781118611463.wbielsi096

Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., Kasperson, J. X., & Ratick, S. (1988). The Social Amplification of Risk: A Conceptual Framework. *Risk Analysis*, *8*(2), 177–187. https://doi.org/10.1111/j.1539-6924.1988.tb01168.x

Kirvalidze, N., & Samnidze, N. (2016). POLITICAL DISCOURSE AS A SUBJECT OF INTERDISCIPLINARY STUDIES. *Journal of Teaching and Education*, *5*(1), 161–170.

Koslov, L. (2019). Avoiding Climate Change: "Agnostic Adaptation" and the Politics of Public Silence. *Annals of the American Association of Geographers*, *109*(2), 568–580. https://doi.org/10.1080/24694452.2018.1549472

Kron, W. (2003). Keynote lecture: Flood risk = hazard x exposure x vulnerability. *Journal of Lake Sciences*, *15*(Z1), 190–204. https://doi.org/10.18307/2003.sup23

Kubal, T. J. (1998). The Presentation of Political Self: *The Sociological Quarterly*, *39*(4), 539–554. https://doi.org/10.1111/j.1533-8525.1998.tb00517.x

Kuhlicke, C., Callsen, I., & Begg, C. (2016). Reputational risks and participation in flood risk management and the public debate about the 2013 flood in Germany. *Environmental Science & Policy*, *55*, 318–325. https://doi.org/10.1016/j.envsci.2015.06.011

Kunreuther, H. (2001). Incentives for mitigation investment and more effective risk management: The need for public–private partnerships. *Journal of Hazardous Materials*, *86*(1–3), 171–185. https://doi.org/10.1016/S0304-3894(01)00253-9

Laclau, E., & Mouffe, C. (2014). *Hegemony and Socialist Strategy: Towards a Radical Democratic Politics*. Verso Books.

Lakoff, G., & Ferguson, S. (2006). *The Framing of Immigration*. UC Berkeley.

Liu, T., Li, Y., & Tian, T. (2019). Reinterpreting the Connotation of "Sustainability" and the Expansion of Social Policy in China. *Sustainability, 11*(6), 1814. https://doi.org/10.3390/su11061814

Lyle, T. S., & Mills, T. (2016). Assessing coastal flood risk in a changing climate for the City of Vancouver. *Canadian Water Resources Journal / Revue Canadienne Des Ressources Hydriques*, *41*(1–2), 343–352. https://doi.org/10.1080/07011784.2015.1126695

Malik, A. (2021). How home insurance rates in Canada are trending. *Canadian Underwriter*. https://www.canadianunderwriter.ca/insurance/how-home-insurance-rates-in-canada-are-trending-1004208877/

Maskrey, S. A., Mount, N. J., Thorne, C. R., & Dryden, I. (2016). Participatory modelling for stakeholder involvement in the development of flood risk management intervention options. *Environmental Modelling & Software*, *82*, 275–294. https://doi.org/10.1016/j.envsoft.2016.04.027

McCarthy, S., & Walsh, M. (2019, September 8). Federal election 2019: Where the four main parties stand on climate policy. *The Globe and Mail*. https://www.theglobeandmail.com/politics/article-federal-election-2019-where-the-four-main-parties-stand-on-climate/

McCombs, M. E., & Guo, L. (2014). Agenda-Setting Influence of the Media in the Public Sphere. In R. S. Fortner & P. M. Fackler (Eds.), *The Handbook of Media and Mass*

Communication Theory (pp. 249–268). John Wiley & Sons, Inc. https://doi.org/10.1002/9781118591178.ch14

McCright, A. M., Dunlap, R. E., & Marquart-Pyatt, S. T. (2016). Political ideology and views about climate change in the European Union. *Environmental Politics*, *25*(2), 338–358. https://doi.org/10.1080/09644016.2015.1090371

McCullough, J. J. (n.d.). Canadian Political Parties. *The Canada Guide*. Retrieved July 20, 2021, from https://thecanadaguide.com/government/political-parties/

McGill Library. (n.d.). *Canadian Parliamentary Debates (Hansard)*. McGill Library. Retrieved March 9, 2021, from https://www.mcgill.ca/library/find/govinfo/canada/canada-debates

Meckbach, G. (2021, June 16). Progress report: Canada-wide flood mapping is well underway. *Canadian Underwriter*. https://www.canadianunderwriter.ca/insurance/progress-report-canada-wide-flood-mapping-is-well-underway-1004209164/

Mees, H. L. P., Driessen, P. P. J., & Runhaar, H. A. C. (2014). Legitimate adaptive flood risk governance beyond the dikes: The cases of Hamburg, Helsinki and Rotterdam. *Regional Environmental Change*, *14*(2), 671–682. https://doi.org/10.1007/s10113-013-0527-2

Meijerink, S., & Dicke, W. (2008). Shifts in the Public–Private Divide in Flood Management. *International Journal of Water Resources Development*, *24*(4), 499–512. https://doi.org/10.1080/07900620801921363

Miller, L. (2013, Feb. 26). "Business of Supply: Opposition Motion- Federal Infrastructure Plan." Canada. Parliament. House of Commons. *Edited Hansard 146*(214). 41st Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-1/house/sitting-214/hansard

Mills, M., Mutafoglu, K., Adams, V. M., Archibald, C., Bell, J., & Leon, J. X. (2016). Perceived and projected flood risk and adaptation in coastal Southeast Queensland, Australia. *Climatic Change*, *136*(3–4), 523–537. https://doi.org/10.1007/s10584-016-1644-y

Motion, J., & Leitch, S. (2009). The Transformational Potential of Public Policy Discourse. *Organization Studies*, *30*(10), 1045–1061. https://doi.org/10.1177/0170840609337940

Nastev, M., & Todorov, N. (2013). Hazus: A standardized methodology for flood risk assessment in Canada. *Canadian Water Resources Journal*, *38*(3), 223–231. https://doi.org/10.1080/07011784.2013.801599

Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to Environmental Change: Contributions of a Resilience Framework. *Annual Review of Environment and Resources*, *32*(1), 395–419. https://doi.org/10.1146/annurev.energy.32.051807.090348

Obeng, S. G. (1997). Language and Politics: Indirectness in Political Discourse. *Discourse & Society*, *8*(1), 49–83. https://doi.org/10.1177/0957926597008001004

Oliver, D., & Wiebe, J. (2003). *Climate change we are at risk: Final report*. Ottawa : Standing Senate Committee on Agriculture and Foresty. https://sencanada.ca/content/sen/Committee/372/agri/rep/repfinnov03-e.pdf

Ottawa River Regulation Planning Board. (2018). *Summary of the 2017 Spring Flood*. https://www.ottawariver.ca/docs/2017_Spring_Flood_Summary.pdf

Oulahen, G. (2014). Flood Insurance in Canada: Implications for Flood Management and Residential Vulnerability to Flood Hazards. *Environmental Management*, *55*(3), 603–615. https://doi.org/10.1007/s00267-014-0416-6

PBO. (2016). *Estimate of the Average Annual Cost for Disaster Financial Assistance Arrangements due to Weather Events* (p. 49). Office of the Parliamentary Budget Officer.

Pettersson, E., Alexander, M., Beyers, M., Pardoe, J.-C., Priest, S., Suykens, C., & van Rijswick, H. F. M. W. (2016). *Design principles for resilient, efficient and legitimate flood risk governance; Lessons from cross-country comparisons*. http://www.starflood.eu/documents/2016/04/design-principles.pdf/

Plate, E. J. (2002). Flood risk and flood management. *Journal of Hydrology*, *267*(1–2), 2–11. https://doi.org/10.1016/S0022-1694(02)00135-X

Public Safety Canada. (2008). *Canada's National Disaster Mitigation Strategy*. Government of Canada.

Public Safety Canada. (2011). *2011-2012 Evaluation of the Disaster Financial Assistance Arrangements Program*. Government of Canada.

Public Safety Canada. (2015, January 16). *The Government of Canada Announces Disaster Mitigation Investments and Modernizes Disaster Financial Assistance Arrangements* [News releases]. Gcnws. https://www.canada.ca/en/news/archive/2015/01/government-canada-announces-disaster-mitigation-investments-modernizes-disaster-financial-assistance-arrangements.html

Public Safety Canada. (2018, December 21). *Disaster Financial Assistance Arrangements (DFAA)*. https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/rcvr-dsstrs/dsstr-fnncl-ssstnc-rrngmnts/index-en.aspx

Ran, J., & Nedovic-Budic, Z. (2016). Integrating spatial planning and flood risk management: A new conceptual framework for the spatially integrated policy infrastructure. *Computers, Environment and Urban Systems*, *57*, 68–79. https://doi.org/10.1016/j.compenvurbsys.2016.01.008

Rashid, H. (2011). Interpreting flood disasters and flood hazard perceptions from newspaper discourse: Tale of two floods in the Red River valley, Manitoba, Canada. *Applied Geography*, *31*(1), 35–45. https://doi.org/10.1016/j.apgeog.2010.03.010

Reyes, A. (2011). Strategies of legitimization in political discourse: From words to actions. *Discourse & Society*, *22*(6), 781–807. https://doi.org/10.1177/0957926511419927

Sandink, D. (2009). *Urban Flooding, Homeowner Hazard Perceptions, and Climate Change*. 5.

Sandink, D. (2013). *Urban flooding in Canada: Lot-side risk reduction through voluntary retrofit programs, code interpretation and by-laws*. Institute for Catastrophic Loss Reduction. http://www.deslibris.ca/ID/238839

Sandink, D. (2016). Urban flooding and ground-related homes in Canada: An overview. *Journal of Flood Risk Management*, *9*(3), 208–223. https://doi.org/10.1111/jfr3.12168

Sandink, D., D'Souza, C., & Ledra, H. (2014). *Improving Industry Loss Data: Refining Personal and Commercial Kind of Loss Codes for Water Damage, Flood, Fire, Wind and Hail*.

Sandink, D., Kovacs, P., Oulahen, G., & McGillivary, G. (2010). *Making Flood Insurable for Canadian Homeowners: A Discussion Paper* (p. 75). Institute for Catastrophic Loss Reduction & Swiss Reinsurance Company Ltd.

Sandink, D., Kovacs, P., Oulahen, G., & Shrubsole, D. (2016). Public relief and insurance for residential flood losses in Canada: Current status and commentary. *Canadian Water Resources Journal*, *41*(1–2).

Saraisky, N. G. (2016). Analyzing Public Discourse: Using Media Content Analysis to Understand the Policy Process. *Current Issues in Comparative Education*, *18*(1), 26–41.

Sayers, P., Yuanyuan, L., Galloway, G., Penning-Rowsell, E., Fuxin, S., Kang, W., Yiwei, C., & Le Quesne, T. (2013). *Flood Risk Management: A Strategic Approach*. UNESCO. https://think-asia.org/bitstream/handle/11540/81/flood-risk-management.pdf?sequence=1

Schanze, J., Zeman, E., & Marsalek, J. (Eds.). (2006). *Flood risk management: Hazards, vulnerability and mitigation measures*. Springer.

Schuldt, J. P., Konrath, S. H., & Schwarz, N. (2011). "Global warming" or "climate change"?: Whether the planet is warming depends on question wording. *Public Opinion Quarterly*, *75*(1), 115–124. https://doi.org/10.1093/poq/nfq073

Sheff, J. N. (2010). The Myth of the Level Playing Field: Knowledge, Affect, and Repetition in Public Debate. *Missouri Law Review*, *75*(1), 143–180.

Shi, D. (2020). How Do Businesses Help during Natural Disasters? A Content Analysis of Corporate Disaster Aid on Twitter. *International Journal of Strategic Communication*, *14*(5), 348–367. https://doi.org/10.1080/1553118X.2020.1835920

Shrubsole, D. (2000). *Flood Management in Canada at the Crossroads* (No. 5; ICLR Research Paper Series). Institute for Catastrophic Loss Reduction. https://www.iclr.org/wp-content/uploads/PDFS/flood-management-in-canada-at-thecrossroads.pdf

Shrubsole, D., Brooks, G., Halliday, R., Haque, E., Kumar, A., Lacroix, J., Rasid, H., Rousselle, J., & Simonovic, S. P. (2003). *An Assessment of Flood Risk Management in Canada*. Institute for Catastrophic Loss Reduction.

Shughart, W. F. (2011). Disaster Relief as Bad Public Policy. *The Independent Review*, *15*(4), 519–539.

Siegrist, M., & Gutscher, H. (2006). Flooding Risks: A Comparison of Lay People's Perceptions and Expert's Assessments in Switzerland. *Risk Analysis*, *26*(4), 971–979. https://doi.org/10.1111/j.1539-6924.2006.00792.x

Silva, A., Stocker, L., Mercieca, P., & Rosano, M. (2016). The role of policy labels, keywords and framing in transitioning waste policy. *Journal of Cleaner Production*, *115*, 224–237. https://doi.org/10.1016/j.jclepro.2015.12.069

Sivapalan, M., Savenije, H. H. G., & Blöschl, G. (2012). Socio-hydrology: A new science of people and water: INVITED COMMENTARY. *Hydrological Processes*, *26*(8), 1270–1276. https://doi.org/10.1002/hyp.8426

Smith, A., Porter, J. J., & Upham, P. (2017). "We cannot let this happen again": Reversing UK flood policy in response to the Somerset Levels floods, 2014. *Journal of Environmental Planning and Management*, *60*(2), 351–369. https://doi.org/10.1080/09640568.2016.1157458

Stevens, M. R., & Hanschka, S. (2014). Multilevel Governance of Flood Hazards: Municipal Flood Bylaws in British Columbia, Canada. *Natural Hazards Review*, *15*(1), 74–87. https://doi.org/10.1061/(ASCE)NH.1527-6996.0000116

Stewart, C. J., Smith, C. A., & Jr, R. E. D. (2012). *Persuasion and Social Movements: Sixth Edition*. Waveland Press.

Stromback, J., & Kiousis, S. (2011). *Political Public Relations: Principles and Applications*. Taylor & Francis.

Sturgis, P., & Allum, N. (2004). Science in Society: Re-Evaluating the Deficit Model of Public Attitudes. *Public Understanding of Science*, *13*(1), 55–74. https://doi.org/10.1177/0963662504042690

Sullivan, M. (2013, Oct. 25). “Infrastructure.” Canada. Parliament. House of Commons. *Edited Hansard 147*(8). 41st Parliament, 2nd session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-2/house/sitting-8/hansard

Tang, Z., Dai, Z., Fu, X., & Li, X. (2013). Content analysis for the U.S. coastal states’ climate action plans in managing the risks of extreme climate events and disasters. *Ocean & Coastal Management, 80,* 46–54. https://doi.org/10.1016/j.ocecoaman.2013.04.004

Tarrow, S. (1992). Mentalities, political cultures, and collective action frames. In *Frontiers in social movement theory* (pp. 174-202.). Yale University Press.

Teufel, B., Sushama, L., Huziy, O., Diro, G. T., Jeong, D. I., Winger, K., Garnaud, C., de Elia, R., Zwiers, F. W., Matthews, H. D., & Nguyen, V.-T.-V. (2019). Investigation of the mechanisms leading to the 2017 Montreal flood. *Climate Dynamics*, *52*(7), 4193–4206. https://doi.org/10.1007/s00382-018-4375-0

Thistlethwaite, J. (2016). The Emergence of Flood Insurance in Canada: Navigating Institutional Uncertainty. *Risk Analysis*, *37*(4), 744–755. https://doi.org/10.1111/risa.12659

Thistlethwaite, J. (2017). The Emergence of Flood Insurance in Canada: Navigating Institutional Uncertainty. *Risk Analysis*, *37*(4), 744–755. https://doi.org/10.1111/risa.12659

Thistlethwaite, J., & Henstra, D. (2017). Municipal flood risk sharing in Canada: A policy instrument analysis. *Canadian Water Resources Journal / Revue Canadienne Des Ressources Hydriques*, *42*(4), 349–363. https://doi.org/10.1080/07011784.2017.1364144

Thistlethwaite, J., Henstra, D., Brown, C., & Scott, D. (2018). How Flood Experience and Risk Perception Influences Protective Actions and Behaviours among Canadian Homeowners. *Environmental Management*, *61*(2), 197–208. https://doi.org/10.1007/s00267-017-0969-2

Thistlethwaite, J., Henstra, D., Minano, A., & Dordi, T. (2019). Policy framing in the press: Analyzing media coverage of two flood disasters. *Regional Environmental Change*, *19*(8), 2597–2607. https://doi.org/10.1007/s10113-019-01576-7

Thistlethwaite, J., Henstra, D., Peddle, S., & Scott, D. (2017). *Canadian Voices On Changing Flood Risk: Findings from a National Survey*. Interdisciplinary Centre on Climate Change and Partners for Action (P4A). https://uwaterloo.ca/climate-centre/news/canadian-voices-changing-flood-risk-findings-national-survey

Thistlethwaite, J., Minano, A., Blake, J. A., Henstra, D., & Scott, D. (2018). Application of re/insurance models to estimate increases in flood risk due to climate change. *Geoenvironmental Disasters*, *5*(1), 8. https://doi.org/10.1186/s40677-018-0101-9

Thistlethwaite, J., Minano, A., Henstra, D., & Scott, D. (2020). *Indigenous Reserve Lands in Canada Face High Flood Risk*. *159*, 12.

Trudeau, J. (2019, Apr. 30). "Indigenous Affairs." Canada. Parliament. House of Commons. *Edited Hansard 148*(406). 42nd Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/42-1/house/sitting-406/hansard

Tucker, C. (2000). Floods in Canada: An Emergency Preparedness Canada (EPC) perspective. *Environments; Waterloo*, *28*(1). http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/207671573?accountid= 14906

UNFCCC. (n.d.). *The Paris Agreement*. Retrieved July 3, 2021, from https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

United Nations. (2015). *Sendai Framework for Disaster Risk Reduction 2015—2030* (p. 37).

Vaara, E., Tienari, J., & Laurila, J. (2006). Pulp and Paper Fiction: On the Discursive Legitimation of Global Industrial Restructuring. *Organization Studies*, *27*(6), 789–813. https://doi.org/10.1177/0170840606061071

van Dijk, T. A. (1997). What is Political Discourse Analysis? *Belgian Journal of Linguistics*, *11*, 11–52. https://doi.org/10.1075/bjl.11.03dij

van Doorn-Hoekveld, W., Goytia, S., Suykens, C., Homewood, S., Thuillier, T., Manson, C., Chmielewski, P., Matczak, P., & van Rijswick, H. (2016). Distributional effects of flood risk management—A cross-country comparison of preflood compensation. *Ecology and Society*, *21*(4). https://doi.org/10.5751/ES-08648-210426

Vis, M., Klijn, F., De Bruijn, K. M., & Van Buuren, M. (2003). Resilience strategies for flood risk management in the Netherlands. *International Journal of River Basin Management*, *1*(1), 33–40. https://doi.org/10.1080/15715124.2003.9635190

Wiering, M., Kaufmann, M., Mees, H., Schellenberger, T., Ganzevoort, W., Hegger, D. L. T., Larrue, C., & Matczak, P. (2017). Varieties of flood risk governance in Europe: How do countries respond to driving forces and what explains institutional change? *Global Environmental Change*, *44*, 15–26. https://doi.org/10.1016/j.gloenvcha.2017.02.006

Worland, J. (2015). *Justin Trudeau Canada: How Election Affects Climate Change | Time*. Time. https://time.com/4080073/canada-climate-change-justin-trudeau/

Yelich, L. (2011, Nov. 1). "Ending the Long-Gun Registry Act". Canada. Parliament. House of Commons. *Edited Hansard 146*(41). 41st Parliament, 1st session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-1/house/sitting-41/hansard

Zimmer, B. (2014, May 30). “Flooding in High River.” Canada. Parliament. House of Commons. *Edited Hansard 147*(93). 41st Parliament, 2nd session. Retrieved from the Parliament of Canada website: https://www.ourcommons.ca/DocumentViewer/en/41-2/house/sitting-93/hansard

APPENDICES

APPENDIX A: CODEBOOK SUMMARY

Table 11: The number of references for each node and associated sub nodes in the codebook developed for this study.

Name	Description	Files	References
City			
0		113	175
BEAUCE	Beauce	1	1
BRAM	Brampton	1	1
BURL	Burlington	2	2
CAL	Calgary	7	8
CAPEB	Cape Breton	1	2
CHILL	Chilliwack	1	1
CORB	Corner Brook	1	1
EDM	Edmonton	0	0
FORTA	Fort Albany	1	1
FORTM	Fort McMurray	0	0
FRED	Frederickton	3	3
GASPE	Gaspe	2	2
GAT	Gatineau	1	1
GRANBY	Granby, Quebec	1	1
HIGHR	High River	1	1
HUNTS	Huntsville	1	1

Name	Description	Files	References
LAV	Laval	1	1
MACL	Macleod, AB	1	1
MONT	Monteregie	10	12
MTL	Montreal	2	2
OTT	Ottawa	2	2
QUEBC	Quebec City	2	2
RICHM	Richmond Hill	1	1
RIG	Rigaud	1	1
RIV	Riviere au Renard	3	3
ST JOH	St. John (New Brunswick)	3	3
THUN	Thunder Bay	1	1
TOR	Toronto	6	6
VAN	Vancouver	0	0
WHIT	Whitby	1	1
WIN	Winnipeg	4	4
WIND	Windsor	1	1
Consequences of Flood Framing			
Economic			
0	No	73	119
1	Yes	95	117
Political-Partisan			
0	No	92	125

Name	Description	Files	References
1	Yes	83	111
Social		0	0
0	No	95	125
1	Yes	81	111
Explicit Action to Reduce Flood Risk			
0	No	106	151
1	Yes	62	85
Flood Risk as Increasing			
0	No	112	156
1	Yes	55	80
Flood Risk as Manageable or Preventable			
0	No	109	160
1	Yes	57	76
Flood Risk as Natural or Anthropogenic			
0	None	47	54
Anthropogenic		68	98
Natural		65	84
Act of God		37	49
GeoPhysical		34	35
Flood Risk as Urgent			
0		123	189
1		41	47

Name	Description	Files	References
Focus In Terms of FRM			
0	None	23	25
MIT	Mitigation/Prevention	63	91
PREP	Preparedness	22	27
REC	Recovery	65	68
RES	Response	48	77
Indigenous Communities Linked with Flooding			
0	No	120	194
1	Yes	39	42
Negative		30	31
Positive		11	11
Mention of Climate Change as a Contributing Factor			
0	No	122	171
1	Yes	45	65
Future		5	5
Present		41	60
Ministry or Government Organization Linked with the Discussion			
0	No	95	130
1	Yes	79	106
Canada Water Agency		2	3
Canadian Centre for Climate Change Services		1	1
Canadian Forces		25	37

Name	Description	Files	References
Canadian Foundation for Climate and Atmospheric Sciences		1	1
Coast Guard		4	6
Department of Fisheries and Oceans		2	2
Department of Indigenous Affairs and Northern Development		4	4
Department of National Defense		2	2
Department of Public Safety and Emergency Preparedness		1	1
Emergency Management Ontario		1	1
Environment Canada		3	3
Government Operations Centre		8	8
Health Canada		2	2
Hydro Quebec		1	1
Infrastructure Canada		1	1
Insurance Bureau of Canada		3	3
Interdisciplinary Task Force on Flood Insurance and Relocation		1	1
International Joint Commission		3	4
Keystone Agriculture Producers of Manitoba		1	1
Local First Responders	The Red Cross, Fire Department, Police Forces, Emergency Medical Services	25	33
Ministere de la Securite Publique de Quebec		1	1
National Hydrological Service		1	1

Name	Description	Files	References
Natural Resources Canada		1	1
Ontario Ministry of Natural Resources		2	2
Ontario Power Generation		1	1
Parks Canada		1	1
Parliamentary Budget Office		1	1
Prince Albert Grand Council		1	1
Public Safety Canada		32	37
Public Services and Procurement Canada		1	1
RCMP		2	2
Saskatchewan Public Safety Department		1	1
Saskatchewan Watershed Authority		1	1
The Federation of Canadian Municipalities		4	4
Toronto Region Conservation Authority		2	2
Party Speaking On Flooding			
Member of Government			
0	No	0	0
1	Yes	149	236
Member of Cabinet			
0	No	140	216
1	Yes	17	20
Member of Opposition			
0	No	129	198

Name	Description	Files	References
1	Yes	32	38
Political Party			
BLQ	Bloc Quebecois	13	14
CPC	Conservative Party of Canada	47	54
GRP	Green Party of Canada	2	2
IND	Independent	3	3
LIB	Liberal Party of Canada	63	98
NDP	New Democratic Party	58	65
Policy Problem or Failure Stated			
0	No	99	141
1	Yes	73	95
Province			
0	None	30	46
AB	Alberta	16	17
BC	British Columbia	19	23
MB	Manitoba	25	27
NB	New Brunswick	18	27
NL	Newfoundland	3	3
NS	Nova Scotia	3	4
NU	Nunavut	0	0
NWT	Northwest Territories	1	1
ON	Ontario	45	57

Name	Description	Files	References
PEI	Prince Edward Island	1	1
QC	Quebec	46	70
SK	Saskatchewan	5	5
YK	Yukon	1	1
Specific Flood Referenced			
0	No	60	83
1	Yes	108	153
Specific Government Programs or Policies Identified			
0	No	118	177
1	Yes	54	59
Agri-Recovery			
N	Negative	0	0
P	Positive	2	2
Building Canada Fund			
N	Negative	0	0
P	Positive	1	1
Canada Economic Development			
N	Negative	0	0
P	Positive	4	4
Canada Water Act			
N	Negative	1	1
P	Positive	0	0

Name	Description	Files	References
Canadian Agricultural Income Stabilization (CAIS)			
N	Negative	0	0
P	Positive	1	1
Cover Crop Program			
N	Negative	0	0
P	Positive	2	2
Crop Insurance			
N	Negative	0	0
P	Positive	1	1
Disaster Assistance Program			
N	Negative	0	0
P	Positive	1	1
Disaster Financial Assistance Arrangements (DFAA)			
N	Negative	4	4
P	Positive	18	18
Disaster Mitigation and Adaptation Fund (DMAF)			
N	Negative	0	0
P	Positive	7	8
Economic Action Plan			
N	Negative	0	0
P	Positive	3	3
Emergency Management MOU	(Recognizes First Nations as partners in emergency management)		

Name	Description	Files	References
N	Negative	0	0
P	Positive	1	1
Emergency Measures Act			
N	Negative	1	1
P	Positive	1	1
Emergency Preparedness Act			
N	Negative	2	2
P	Positive	0	0
Environmental Enforcement Act			
N	Negative	0	0
P	Positive	1	1
Federal Carbon Tax			
N	Negative	2	2
P	Positive	0	0
Federal Disaster Fund			
N	Negative	1	1
P	Positive	0	0
Federal Sustainable Development Strategy			
N	Negative	0	0
P	Positive	1	1
Federal Tax Deferral Program	(Taxpayer relief post-disaster through the CRA)		
N		0	0

Name	Description	Files	References
P		1	1
Mitigation Contribution Program	(Levels of government to cost share eligible permanent flood mitigation measures)		
N	Negative	0	0
P	Positive	1	1
Municipalities for Climate Innovation Program			
N	Negative	0	0
P	Positive	1	1
National Disaster Mitigation Program (NDMP)			
N	Negative	1	1
P	Positive	7	8
National Flood Insurance Program			
N	Negative	0	0
P	Positive	3	3
Navigable Waters Protection Act			
N	Negative	1	1
P	Positive	0	0
Pan-Canadian Framework			
N	Negative	1	1
P	Positive	2	2
Provincial-Territorial Base Fund			
N	Negative	0	0
P	Positive	1	1

Name	Description	Files	References
Round Table on Flooding			
N	Negative	0	0
P	Positive	1	1
Shoreline Protection Program			
N	Negative	0	0
P	Positive	4	4
Stakeholder Identification			
0	No	7	7
1	Yes	146	229
Levels of Government to Share Flood Risk			
0	No	38	49
1	Yes	130	180
FED	Federal	121	166
MUN	Municipal	44	51
PRO	Provincial	89	112
Stakeholder			
N	Negative		
Coastal Communities		4	5
Federal Government		73	82
Insurers		1	1
Large Company or Corporation		1	1
Municipal Government		2	2

Name	Description	Files	References
Northern Communities		2	2
Provincial Government		13	14
United States Government		0	0
P	Positive		
Academic Researchers		2	2
Federal Government		76	115
First Nations Representative		23	23
First Responders		27	43
Insurers		10	10
Large Company or Corporation		0	0
Local Residents		31	41
Municipal Government		42	52
NGOs		3	3
Provincial Government		71	92
United States Government		1	1
Stakeholder Role or Function			
0	No	3	3
1	Yes	143	226
Climate Action		26	37
Community Outreach	(Includes public consultation, education initiatives, community-based management)	7	7
Develop a National Flood Plan		3	3
Ecological Infrastructure Restoration		2	2

Name	Description	Files	References
Emergency Preparedness		12	15
Emergency Response		53	84
Evacuation		21	24
Financing Post Flood		56	61
Flood Defense Infrastructure		28	30
Flood Insurance		4	4
Flood Mapping		10	10
Flood Plain and Watershed Management		8	10
Funding for Emergency Response Volunteer Organizations		4	4
Funding Risk Reduction Programs		44	54
Indigenous Relations		3	3
Infrastructure Reinforcement		22	27
Land Use & Zoning		5	6
Policy Reformation		3	4
Property Buyouts		2	2
Rebuilding		18	18
Relocation		12	13
Research & Development		5	8
Satellite Weather Forecasting & Warning		1	1
Telecommunications Implementation		1	1
Water Level Management		3	3
Temporal Aspects			

Name	Description	Files	References
Framing of Consequences			
Long Term		74	112
Short Term		91	124
Temporal Scale of Discussion			
Future		36	43
Present		126	193

APPENDIX B: TEMPORAL ASPECTS OVER STUDY PERIOD (2006-2020)

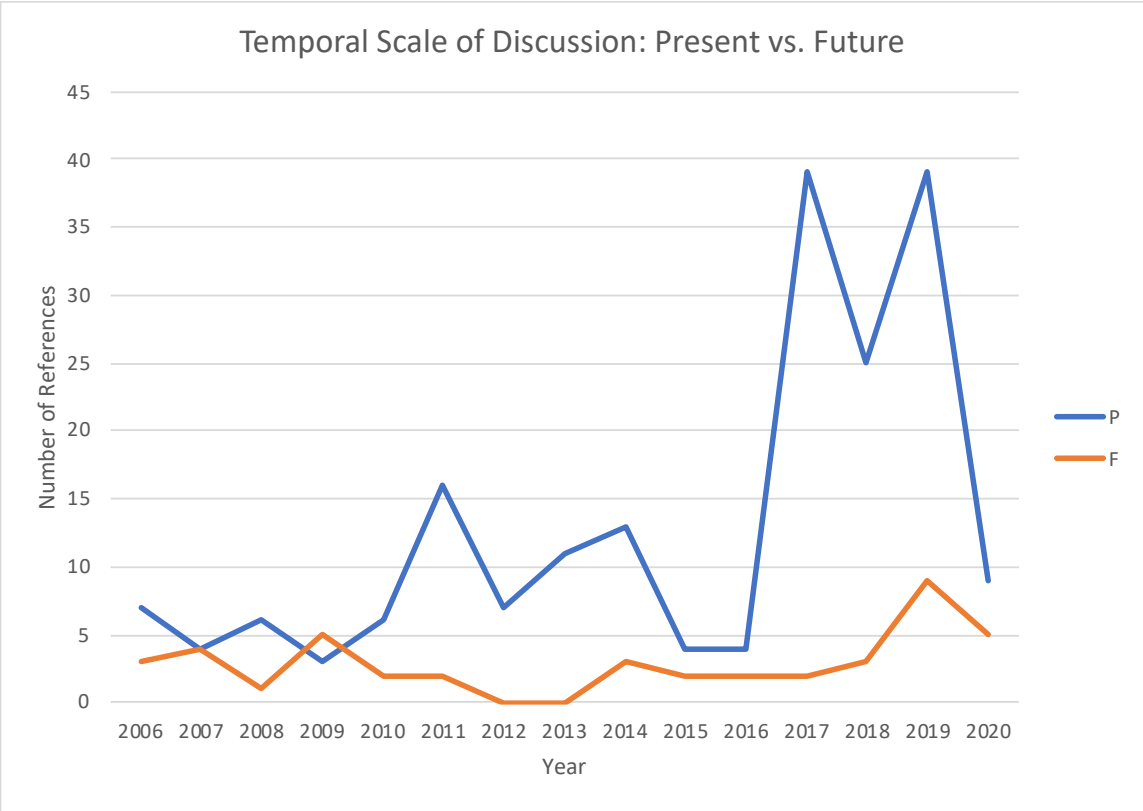

Figure 13:The number of flood references within the discourse sample from the Canadian Hansard Index that discuss flooding in a present (P) or future (F) context throughout the sample period of 2006 to 2020.

APPENDIX C: EXPLICIT ACTION TO REDUCE FLOOD RISK OVER STUDY PERIOD (2006-2020)

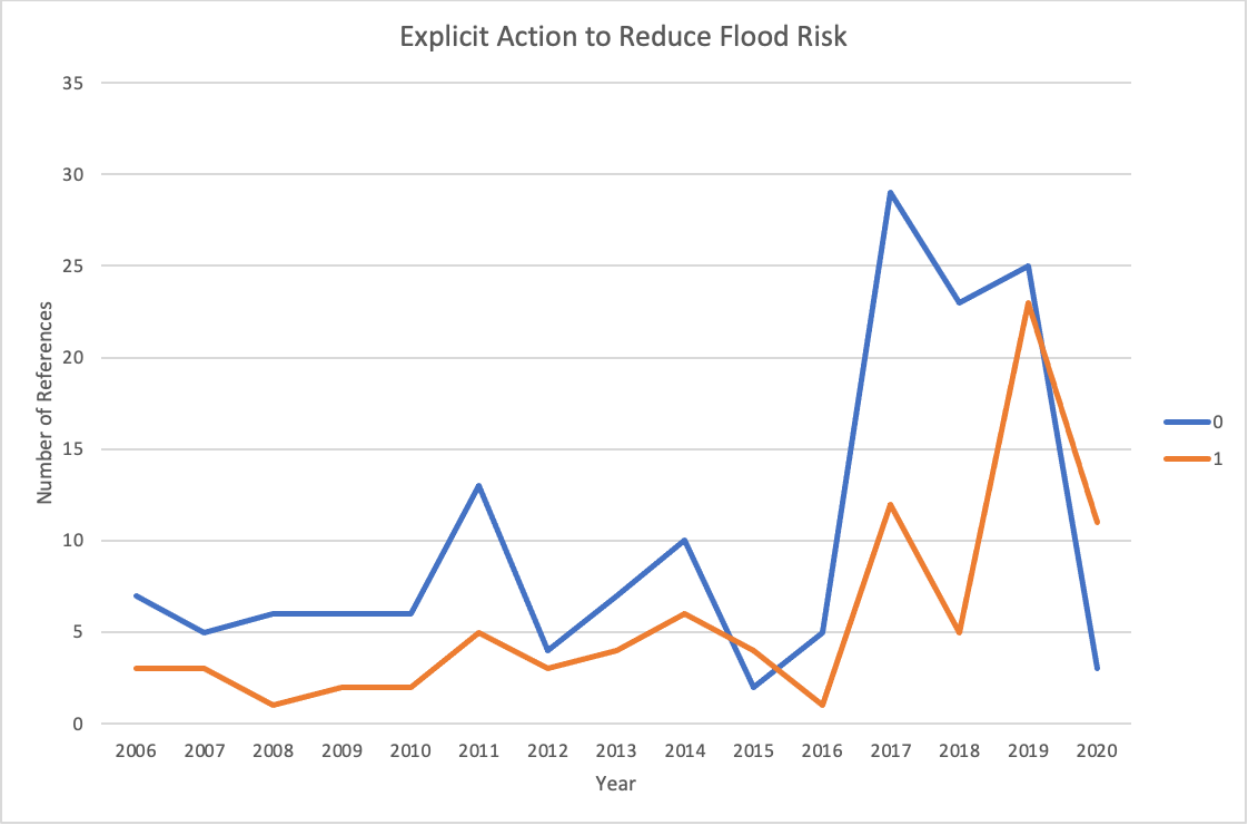

Figure 14: The number of flood references within the discourse sample from the Canadian Hansard Index that state explicit action (1) or do not state explicit action (0) to reduce flood risk throughout the sample period of 2006 to 2020.

APPENDIX D: FLOOD RISK AS URGENT OVER THE STUDY PERIOD (2006-2020)

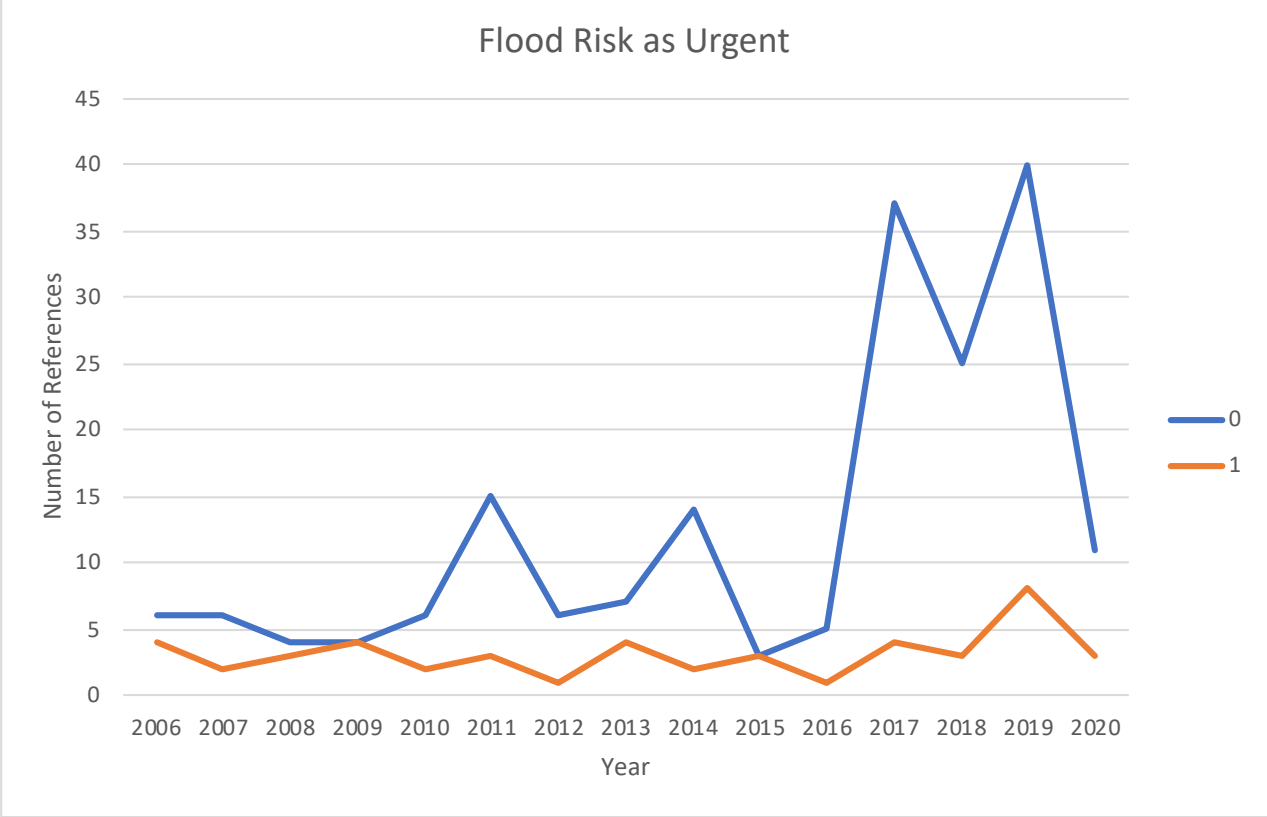

Figure 15: The number of flood references within the discourse sample from the Canadian Hansard Index that frame flood risk as urgent (1) or do not frame flood risk as urgent (0) throughout the sample period of 2006 to 2020.

APPENDIX E: FLOOD RISK AS MANAGEABLE/PREVENTABLE OVER STUDY PERIOD (2006-2020)

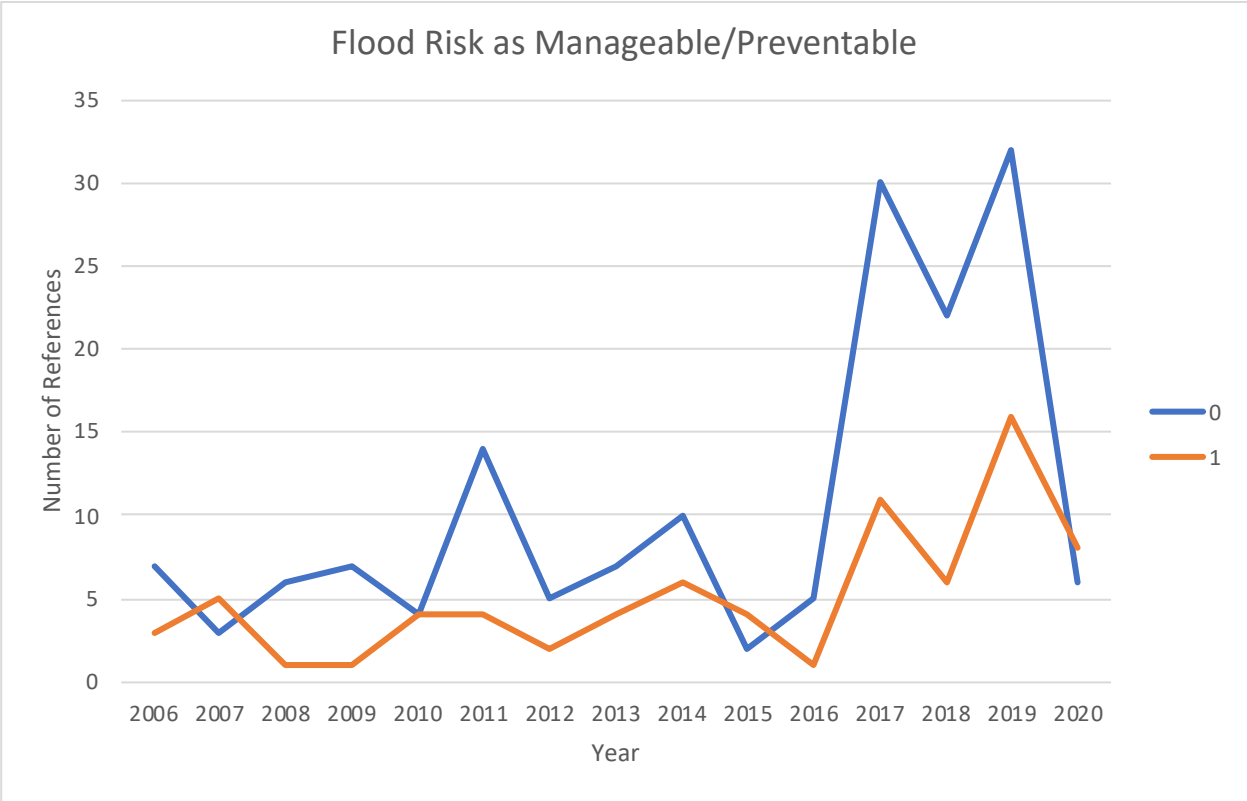

Figure 16: The number of flood references within the discourse sample from the Canadian Hansard Index that frame flood risk as manageable (1) or do not frame flood risk as manageable (0) throughout the sample period of 2006 to 2020.