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Managing Multi-jurisdictional Flooding Events in the Ottawa-Gatineau Region: A Comparative Policy and Media Analysis of Municipal and Provincial Responses to the 2017 and 2019 Floods

Dissertation submitted by

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Abstract:

In 2017 and 2019 Canada's capital region of Ottawa-Gatineau experienced significant flooding which posed severe challenges for residents, public infrastructure, and municipal and provincial government functioning. This flooding presented short and long-term challenges, as many of the homes that faced the most significant impacts in 2017 were once again impacted in 2019, with projected future flooding likely to occur in these same regions again. The management of these flooding events was complicated by the unique jurisdictional features of the Ottawa-Gatineau region, which is divided into two municipalities, in two different provinces. While all levels of government worked together to address the flooding, the municipalities and provinces had differing responses, with varying levels of effectiveness.

Using a comprehensive examination of existing governance structures and socio-political and cultural contexts, this thesis will illustrate the key factors that shaped the disaster management response to these flooding events. Using a media analysis of content that was released during the flooding and in its aftermath in both 2017 and 2019, the research seeks to understand the factors that influenced the short and long term policy response.

Findings from this research aim to support the broader understanding of disaster management and policy formulation in Canada. This is particularly prescient as Canada faces increasingly intense and frequent extreme weather events due to climate change. By identifying strengths and weaknesses in the recent past in response to climate impacts, this research may contribute to the emergence of more resilient communities in the face of future environmental challenges.

1. Introduction:

The 2017 and 2019 floods in Ottawa-Gatineau created significant challenges for residents, public infrastructure, and municipal government functioning. The differing policy responses across provincial and municipal jurisdictions to these floods underscore the complexity of disaster management. Factors that shaped the response include existing governance structures, socio-political contexts, and cultural dynamics. This master's thesis aims to investigate and compare the policy responses to the 2017 and 2019 Ottawa-Gatineau flooding, with a particular focus on understanding the pre-existing drivers and real-time media impacts of the differing approaches.

Ottawa-Gatineau are two separate cities, each with their own municipal government. Further, Ottawa is in the province of Ontario, while Gatineau is in the province of Quebec. The area is considered the capital region because of its position as the capital, with federal government institutions operating in both provinces. As such, it has special designation as Canada's Capital Region, with a specific Federal governing body called the National Capital Commission, which supports the functioning of the cities overall. Finally, Federal government legislation applies to the region, as it would to any other part of Canada.

This thesis will utilize a comparative analysis, drawing on theoretical frameworks from policy studies, disaster management, and media studies, to attempt to provide a holistic understanding of these short and long-term policy responses. By examining the pre-existing governance structures and media landscape, and the outcomes of the media discourse and flood management policies, this research aims to identify key factors that influenced decision-making, resource allocation, and overall effectiveness of the policy responses in each jurisdiction. This research will explore the role of various stakeholders, including federal, provincial, municipal governments, as well as the National Capital Commission, a unique to the region federal government body that governs public land across both jurisdictions in Ottawa-Gatineau (ie cross-provincially). Other significant stakeholders include civil society organizations such as the Canadian Red Cross, The Salvation Army, and others. The media will play a significant role in this thesis, and so several popular news sources such as Le Droit, Le Journal, the Canadian Broadcasting Corporation, the Globe and Mail, and others will be utilized. Attention will be given to the influence of cultural,

linguistic, political, and historic contexts, and dynamics between the provinces of Ontario and Quebec in shaping the divergent flood management approaches.

The research methodology will rely on the use of secondary sources. This will primarily include content analysis of municipal, provincial and federal policy documents, as well as media coverage during and immediately after the flooding occurred in both 2017 and 2019. This mixed-methods approach will allow for a comprehensive study of the differing policy responses and the impacts on stakeholders.

By providing insights into effective strategies for communicating climate events, enhancing resilience, and improving policy responses to future flooding events, this research may be valuable for policymakers, practitioners, and researchers who are involved in disaster risk reduction and management, climate change adaptation and mitigation, and city building. Overall, this thesis seeks to provide some insight into the complexities surrounding policy responses to the 2017 and 2019 Ottawa-Gatineau flooding, and in so doing, contribute to a deeper understanding of the factors that shape disaster management and their implications for community resilience and development.

a. Case study locations:

Gatineau, Quebec:

Gatineau, Quebec, is a city of 290,534 people in the Westernmost part of the province of Quebec, part of the Outaouais region. It is the fourth largest city in the province. In spring 2017, spring snowmelt and heavy rainfall resulted in flooding that damaged 217 communities across Quebec, with 5371 residences flooded and 4066 people being forced from their homes. Much of this happened in the Outaouais (Ottawa-Gatineau region) and Greater Montreal regions. In spring 2019 the Ottawa river flooded, causing damage to 6681 residences in 51 communities in Quebec, with 3458 residences being temporarily isolated and damaged due to landslides. In response to these unprecedented flooding events, and expanding on existing legislation, Quebec has created a number of policy measures to address short and long term impacts of flooding, including the *The General Indemnity and Financial Assistance Program Regarding Actual or Imminent Disasters* program to provide financing to homeowners who have experienced flooding. These measures also include limiting new development in flood-prone areas, and offering financial support to homeowners should they wish to move from

flood-prone areas that have been identified as areas for ‘managed retreat’. Many residents have taken advantage of the latter program, with some communities in flood-prone areas emptying out as people move elsewhere. Critics have pointed out that the compensation offered to homeowners is not at market rate, while renters, farmers, and others have not received similar support (Doberstein, et al, 2021).

Ottawa, Ontario:

Ottawa sits directly across from Gatineau, QC, separated by the Ottawa River. The river has caused similar flooding issues in parts of the city and neighbouring towns as that of Gatineau. The city currently has a population of 1,017,449 (the fourth largest city in Canada). The province of Ontario has laid out reasonably thorough flood management and response plans, however has received criticism in recent years about pulling funding and staffing resources from related departments and initiatives, while simultaneously allowing increased development in ecologically sensitive areas. There is currently no home buyback program in the province, nor any other long-term program to support residents impacted by severe weather events. The currently available government relief program, Disaster Recovery Assistance for Ontarians (DRAO), only provides assistance for property owners to rebuild in the same location and manner that they were in prior to flooding. Critics point out that this promotes communities that are at greater risk of flooding and other issues, as well as ‘ghost’ communities where residents choose to rebuild only with the intention of selling (often at a loss) and moving away. The City of Ottawa has made notable strides towards a more comprehensive emergency preparedness and climate aware city in recent years, which will be discussed in this text (Doberstein, et al, 2021).

b. Useful Definitions:

Managed Retreat: This concept has varying definitions, however it can be broadly understood as the 'retreat' of human settlement in areas that are persistently shown to be sensitive to increases in extreme weather events, or to changes in local ecosystems that impact the feasibility of safe and cost effective human settlement. For example, a city may see that the current or future threat of sea level rise is significant in a specific neighbourhood, and thus will support residents to move to other areas while using the newly depopulated area as a buffer zone between the rising sea levels and the other parts of the city (Coastal Processes, Hazards, and Society, 2023).

'Hold the line' method: Involves using infrastructure and other means to slow down or mitigate risks in those same weather sensitive regions. Examples of this may include the construction of a seawall, or other infrastructure tools that lessen the threat of sea level rise in a city. While 'hold the line' has been the predominant policy method to respond to changes in climate, 'managed retreat' is now gaining in popularity in some areas (Coastal Processes, Hazards, and Society, 2023).

Adaptation: Adjusting human systems to prepare for current or future effects of climate change, with the aim of reducing harm to current systems, or possibly achieving benefits from new systems. An example of this may include the planting of trees in urban areas in order to provide shade for residents and limit the urban heat island effect as the climate warms (Lisa, Schipper, 2020).

Maladaptation: A 2014 IPCC report defined maladaptation as "actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future." (IPCC, 2014). Examples of this may include a significant increase in the use of air conditioners in response to an intense or prolonged heat wave. While the air conditioners are often needed, their use increases carbon emissions. A preferred method of cooling for buildings would be efficiency focused renovation and construction that allows for less frequent and intensive use of air conditioners during times of prolonged heat (Lisa, Schipper, 2020).

2. Literature Review:

This thesis will rely on three theories: Policy Implementation Theory, Punctuated Equilibrium Theory, and Agenda Setting Theory. The reasoning and use for each of these is listed below.

Drawing on **Policy Implementation Theory**, and the concept of Path dependency within that, this thesis will argue that both jurisdictions relied to varying degrees on the pre-existing paths that they were on to respond to the floods. In this context, policy implementation theory will provide insight into the policy response to the flooding by examining the factors that influence effective execution of flood management policies. The theory is useful here as it highlights the importance of understanding the connections between policy design, implementation processes, and the contextual factors that shape policy outcomes. In the case of Ottawa-Gatineau, the floods served as a catalyst for policy action, prompting the expansion of existing policy, or creation of new flood management strategies. However, it should be noted that the responses varied greatly between different levels of government. This theory emphasized the necessity of goals, coordination amongst varying actors, sufficient resources, and effective collaboration and communications between government, civil society, and impacted communities. It emphasizes the importance of adaptive capacity and flexibility in responding to flood risks. This theory is relevant for this case study as it gives insight into the challenges faced by different stakeholders, such as bureaucratic hurdles, limited resources, and highlights the importance of addressing these barriers to achieve successful policy outcomes and enhance future flood resilience in the area (Cerna, 2013).

Punctuated equilibrium theory, which posits that long periods of stability (equilibrium) are interrupted by sudden changes brought about by shocks. In this case, the shock is the extreme weather events that necessitated a response from governments, civil society, and private actors such as insurance companies. The required response pushed each government jurisdiction to make short and long-term policy changes that they may not have otherwise made (Cerna, 2013). In the case of the Province of Quebec and the City of Gatineau, the response was more immediate, with both governing bodies adopting a managed retreat model that has enabled the region to support recent flood victims, and to protect against some of the impacts of future extreme weather events. It should be pointed out that

this can be partially attributed to some of the existing institutions and laws that were in place to handle flooding prior to 2017 (Doberstein, et al, 2021). In Ontario, the City of Ottawa embraced the opportunities that arose from the moment of punctuated equilibrium, investing in modernizing infrastructure to be more climate resilient, declaring a climate emergency that acts as a base for on-going public consultations on how the city can better support residents before, during, and after extreme weather events, among other measures (City of Ottawa, 2023). The Province of Ontario on the other hand has leaned more towards a path dependence model that embraces the current administration's business-first stance. This can be seen through on-going defunding of conservation bodies, refusals to update flood compensation models, and the recent opening up of previously protected ecologically sensitive regions to development (Balkissoon, 2023).

The final theory that will be utilized in this thesis is **Agenda Setting Theory,** which analyzes the role of media in shaping public opinion and policy agendas concerning flood management. The historic floods were heavily discussed across various media channels. The media played a crucial role in framing the floods as a pressing problem, emphasizing the impacts on communities and individuals, on infrastructure, and reinforcing the need for immediate action. Agenda setting theory highlights the power of media and public discourse in influencing policy priorities, and in the case of Ottawa-Gatineau, it played a crucial role in informing residents of the evolving flooding situation, and available resources. Further, the media may have played a role in mobilizing political will and public knowledge development around the floods and flood response (McCombs, 2015).

This thesis will draw on information presented in the 2022 Intergovernmental Panel on Climate Change (hereafter referred to as IPCC) Sixth Assessment Report, Climate Change 2022: Impacts, Adaptation and Vulnerability, released February 27th, 2022. This report specifically studies the current challenges and existing opportunities and success stories that exist for climate adaptation globally, briefly summarized with the following quote: "Progress in adaptation planning and implementation has been observed across all sectors and regions, generating multiple benefits (very high confidence). However, adaptation progress is unevenly distributed with observed adaptation gaps (high confidence). Many initiatives prioritize immediate and near-term climate risk reduction which reduces the opportunity for transformational adaptation (high confidence)." (IPCC, 2022).

The 2014 IPCC Fifth Assessment Report (WGII AR5), North America section cites several examples of climate change adaptation across Canada, the United States and Mexico, including examples of success stories or newly implemented policies in the province of Quebec. They predict with a 'very high level of confidence' that climate linked flooding events will continue to increase in frequency and severity, although they cannot confidently say that flooding events in the recent past are climate change linked. In regards to the overall concern for water issues in the continent, the IPCC says this "Many adaptation options currently available can address water supply deficits; adaptation responses to flooding and water quality concerns are more limited". They go on to explore the challenges that have been presented globally in creating a proactive rather than reactive response to climate adaptation and explore the lack of clear and consistent information on lessons learned across industry, government, the insurance sector, or academia. Because flooding events are felt across regions and often sporadically, there is a lack of awareness and communication across regions about both proactive and reactive measures that can support the effective flood management (IPCC, 2014).

The report *Government-sponsored home buyout programs and post-flood decision to retreat: Case studies in Constance Bay, Ontario and Pointe Gatineau, Quebec ICLR Quick Response Program Final Report* (2021) looks specifically at the area in question and has thus far proven to be extremely useful in gaining a deeper knowledge on this topic as this is the region and issue currently being studied. This article also introduced the concept of 'managed retreat', which will be a central theory around which this research builds upon. Pointe Gatineau has been deemed an area of managed retreat in Quebec since 2017, with on-going support in that regard put in place in that year, and renewed and expanded in response to the 2019 floods. Constance Bay was formerly a small town outside of Ottawa, but as the city has grown, it has become a de facto suburb of Ottawa, with a population that was growing quickly prior to the 2017 floods. While growth has slowed, the community is still seeing new residents. There are no significant short or long-term flood management plans in the Constance Bay or wider Ottawa area. Both Pointe Gatineau and Constance Bay are considered to be the most impacted by flooding in Ottawa-Gatineau thus far.

Academic articles on disaster response in Canada and abroad provide examples of what has been done elsewhere, as well as what possibilities could exist for the future. There is a growing body of research that discusses the concept of managed retreat. An American

paper on Managed Retreat in response to Hurricane Sandy, *Evaluating drivers of coastal relocation in Hurricane Sandy affected communities* (2015) looks at the drivers of uptake of managed retreat programs, which have been generally low. This paper also explores how a managed retreat approach impacts individuals and communities differently, looking at socio-economic and cultural drivers of relocation vs rebuilding preference. Exploring the different impacts for communities as residents leave piecemeal, vs a group retreat is an interesting and relevant perspective for this thesis research. This paper also explores the differences between planned retreat and unplanned retreat, explaining that in some areas, retreat will occur regardless, but planning may create a smoother, safer, and more affordable transition.

Many news articles from Canada's main public news source, the Canadian Broadcasting Company (CBC), as well as various Quebec and Ontario newspapers, provided extensive knowledge on the topic in both provinces and cities. These articles have given context from both the 2017 and 2019 floods, as well as reflection on the flood response overall. They have also been very useful in providing a deeper understanding of how impacted residents were experiencing the flooding in 2017 and 2019, as well as how they experienced the post-flood rebuilding and insurance application process. Many articles have also provided a visual reminder of the flooding, such as the use of before and after pictures juxtaposed together to illustrate the severity of the impact in certain parts of these cities.

Municipal, provincial and Federal government resources have been useful in clarifying the official position of different levels of government. These resources generally reflect the 2021 or 2022 stance on the topic. As a key piece, the Federal government recently commissioned a report looking at examples of Planned or Managed Retreat across Canada, discussing successes, challenges, and lessons for the future from several communities across Canada that have implemented some kind of managed retreat approach, including in Pointe Gatineau, QC. Further, the federal government has created reports on current and anticipated climate impacts for each province and territory of Canada (Government of Canada 2022).

Finally, the insurance, banking, or overall financial sector has published reports on addressing climate issues overall and flooding more specifically. Notably, REMAX Canada (a housing development corporation in Canada) in partnership with the Insurance Board of Canada, the Smart Prosperity Institute, and the Intact Centre on Climate Adaptation (University of Waterloo) has recently published two reports *Unlocking the future 5-year*

housing outlook, Chapter 2: The Economy (2022), and *Unlocking the future 5-year housing outlook, Chapter 2: Climate Change* (2022). These two reports present an outlook for the short and long-term housing market across Canada, presenting current and future risks. Notably, they explore how 25% of Canadians rank the importance of considering environmental issues while purchasing a home. They also present some of the challenges that the private sector is struggling with in terms of addressing climate concerns and explain that a more coordinated approach from government could also help support a more streamlined proactive process in addressing a changing climate, using updated national flood maps, developing systems to identify climate risk prior to purchasing a home.

3. Research questions:

- Did media coverage support a concept of managed retreat in either jurisdiction and did that have a meaningful contribution to flooding-related agenda setting by policymakers?
- What conditions existed prior to, during, and after the floods that may have led to a policy response that was more or less in favor of managed retreat?
- Was there a link made by the media between increasing numbers of extreme weather events and climate change?

4. Hypothesis:

For this research I will explore the question of how media representation of the floods may or may not have influenced public and policy response in the short and long term. Using Agenda Setting Theory, my hypothesis is that media coverage was part of a larger ecosystem of elements that played a role in shaping public opinion and policy direction, potentially including existing regulations and the municipal and provincial governments that were in power at the time. The media framing of the floods as an important issue with community, economic, and environmental causes and consequences may have influenced policymakers' perception of the necessity of addressing flood management. Further, I hypothesize that the media's coverage and framing of the flooding events contributed to a heightened focus on flood resilience, adaptation measure in Ottawa-Gatineau, and increased resources allocated to flood management in Ontario and Quebec.

Regarding policy, and based on Policy Implementation Theory's Path Dependency concept, I suggest that policies were created and implemented in Quebec and Ontario which have shaped the long-term approach to building and flood management, in such a way that ultimately benefited Quebec. Using Punctured Equilibrium Theory, we can analyze the floods as a 'puncture' moment which changed the equilibrium that these municipalities and provinces were on. Further to that, I propose that the City of Ottawa has significantly increased its efforts to prepare for these types of events in the future. However, we can see how this is not universal - at the provincial level Quebec continues to outperform Ontario, which has continued with Path Dependency.

5. The role of stakeholders

Municipal Government (City of Ottawa, Ville de Gatineau):

The municipal governments of the City of Gatineau and the City of Ottawa play a critical role in disaster preparedness, in on-the-ground short-term support for residents, as well as in long-term response to emergencies. According to Park People, 90% of natural disaster response and emergency preparedness is currently managed by municipalities (Park People, 2023). This leaves cities across the country with significant power to prepare for increasing extreme weather events, while also exposing them to a much higher share of the burden of managing a changing climate. This also applies to Ottawa and Gatineau, who are each exploring how best to address their local environmental challenges. This section will begin by exploring the municipalities' shared tasks, and will also include an update of more recent updates to flood response post-2019.

Emergency Planning and Response:

The City of Ottawa and the City of Gatineau develop and implement comprehensive emergency plans, which are updated on a regular basis. These plans pertain to natural disasters (floods, wildfires, storms), public health crises, and other events that may require a coordinated response. They have been put in place for the 2017 and 2019 flooding, as well as 2018's tornado, 2021's heat wave, and 2022's derecho (a sudden storm with extreme winds),

all of which caused significant damage to individual homes and public infrastructure. The cities also plan for and implement policies that are intended to protect public health during extreme weather events, as these events also create numerous public health risks. These risks include the immediate danger posed by floodwaters, heat, and tornado paths, as well as long-term impacts for residents, particularly those who lack reliable housing or who do not have the ability or resources to prepare for storms or participate in clean-up afterwards. This emergency planning includes conducting comprehensive risk assessments to identify potential hazards and vulnerabilities (City of Ottawa, 2023) (Ville de Gatineau, 2023).

Coordination and Communication:

Both cities work in tandem as the central coordinating authorities for their respective jurisdictions. They collaborate with various municipal, provincial, and federal government agencies, first responders, civil society organizations, private business, and other stakeholders to respond to short and long-term crises. They also communicate with media and civil society organizations, in addition to providing updates through their own platforms, in order to communicate with the public on important aspects of the disaster response (City of Ottawa, 2023) (Ville de Gatineau, 2023).

Recent updates, Ottawa:

The City of Ottawa declared a climate emergency on April 24th, 2019, "for the purposes of naming, framing, and deepening our commitment to protecting our economy, our ecosystems, and our community from climate change…The declaration provides additional direction to staff for expanded work on the Climate Change Master Plan, Energy Evolution, and the future Climate Resiliency Plan." (City of Ottawa, 2023). The Climate Change Master Plan lays out the city's commitments to reduce its carbon emissions in its operations by 100% by 2040 and within its community by 2050. In the years since, the municipality has significantly expanded programs to support residents to make structural changes to their homes and properties to reduce flood risk and reduce emissions. They regularly publish information on climate resiliency, Ottawa's climate record, and how residents can participate in the transition towards a more sustainable city (City of Ottawa, 2023). These efforts can be seen as the result of the punctured equilibrium moment that the city took advantage of after the 2017 and 2019 floods.

Recent updates, Gatineau:

In 2020 The City of Gatineau launched the *Master Plan for the development of vacant lots in the Pointe-Gatineau and Lac-Beauchamp districts*, led by the Regional Council for the Environment and Sustainable Development of the Outaouais. This initiative seeks to work with impacted communities to determine the best use of newly vacant lots, with the possibility of revitalizing these areas to natural spaces that will support the wider city to adapt to climate change impacts, while enabling on-going use of the spaces for the enjoyment of citizens (CREDDO, 2023). Similar to Ottawa, the municipality is using its moment of punctured equilibrium to re-envision what the city could look like in the future, while developing resiliency and community spirit in the present.

Provincial Government (Government of Ontario, Government of Quebec):

This section will explore the role of the governments of Ontario and Quebec. Given the notable difference in roles and response, this section will divide the two jurisdictions into their own sections.

Government of Quebec:

In response to the 2017 flooding, the Quebec provincial government embraced the moment of punctured equilibrium and has pursued a pathway of managed retreat. In 2017 it passed a law to prohibit home construction in 1 in 20 year (1:20) floodplains, which parts of Gatineau sit within. It also expanded on an existing 'Financial Assistance for Disaster Victims' program, to provide up to $200,000 in funding for homeowners as an incentive to permanently move from homes that were significantly damaged, as well as an additional $50,000 for the accompanying land. The City of Gatineau complemented this program by waiving administrative fees and expediting application processes for demolition and construction permits.

As flooding once again occurred in spring 2019, the province announced an extension of the disaster relief program that more intentionally facilitated a managed retreat approach. Essentially the program limits compensation available to homeowners in flood zones, in

order to encourage them to move elsewhere. For homes where flood damage exceeds 50% of the home's value, or whose repair costs exceed $100,000, homeowners were offered up to $100,000 to rebuild or $200,000 for the home and $50,000 for the land to relocate. For homeowners who chose to rebuild and who live outside of the 1:20-year floodplain, the $100,000 flood compensation became a lifetime limit. By November 2019, 185 homeowners in Gatineau had accepted buyouts. This largely consisted of single detached homes, although the 2019 flooding also resulted in the buy-out and demolition of a 16-unit condo building.

While this program is an ambitious one that is already acting as an overall positive example to other extreme-weather impacted regions, it is not without flaws. For homeowners whose damage costs were less than $100,000 but who continue to live in a high-risk flood zone, they must contend with the possibility of future flooding that will once again damage their homes. 2017's buyout applications took several months, with overall delays lasting into 2019 for some households. These delays can be attributed in large part to the scale of the disaster, which overwhelmed staff at the Quebec public safety department, who were responsible for assessing flooded properties and issuing buyout application paperwork (Doberstein, et al, 2021). Regarding compensation levels, some have critiqued the amounts being offered - many of the properties that are being impacted by repeated flooding were previously considered high-value waterfront property and stories of residents whose homes were previously valued at far more than $200,000 now being forced to accept that much smaller amount are common (Bruemmer, 2019). Beyond the buyout program itself, there was limited support offered to impacted residents. This included a lack of information offered on where to move to (as ideally people would move to low flood risk areas). Further, the cost of moving, and a new cost of living may prove high for households that were previously anticipating a higher eventual return on their investment in their homes. The managed retreat program offers long-term financial benefits to the province by limiting future rescue and repair costs, however there is a high initial cost. It is estimated that the cost of the program for the 2017 and 2019 floods could exceed $30-50 million CAD. Some of this funding is coming through the Federal Disaster Financial Assistance Arrangement, which will be discussed further in the Federal section of this document (Doberstein, et al, 2021).

Part of the reason that Quebec was better equipped initially to handle the 2017 and 2019 flooding was because the province has a long history of major floods. In 1974 the province had major flooding, which led to the development of a 1979 law to limit

construction in floodplains. Unfortunately the law allowed for many exceptions, and many municipalities utilized these exceptions to disregard the central intention of the law, in the name of gaining high tax revenue from building often high value waterfront property. More flooding in 2005 brought about the first managed retreat style law, which offered property buy-outs and limited repeat funding for high risk housing. This law was also often overlooked (Buzzetti, 2017)

Government of Ontario:

An excellent summary of the challenges that impacted Ontario homeowners faced in navigating post-flooding decisions can be found in the quote below, from a previously cited study looking at managed retreat in Ottawa-Gatineau.

> Interviewees reported that Constance Bay homeowners who experienced flood damage were assisted financially through a combination of household insurance, the Disaster Recovery Assistance for Ontarians (DRAO) program, and some limited funding or in-kind assistance from organizations such as the Red Cross, Salvation Army, and the Canadian military. Eligible residents could receive a maximum DRAO payment of $250,000, less any compensation paid out by homeowners insurance, with applications being paid at 90% of the eligible amount after the $500 deductible was applied (Government of Ontario, 2019). A condition attached to the DRAO payment was that homeowners must rebuild on their property, but the payment could not be used for retreat purposes (Government of Ontario, 2019, emphasis added). Interviewees who helped individuals with their DRAO applications noted that the application is lengthy and tedious, and can be rejected if portions are filled out improperly. Interviewees further highlighted that homeowners must attach quotes for their needed home repairs, and any funds granted must be used to rebuild or repair the house to the pre-flood condition, rather than to upgrade to a higher standard (e.g. elevating homes, adding flood-proofing components). Neither the DRAO program nor homeowner's insurance provides funding for home buyouts for properties located in floodplains, and so flooded Constance Bay homeowners were forced to rebuild in place in order to qualify for financial assistance. As a condition of funding, these programs quite literally force flooded homeowners to rebuild their flood risk (Doberstein, et al, 2021).

The Ontario program Disaster Recovery Assistance for Ontarians (DRAO) supports Ontario owners of private property to recover costs when they have been adversely impacted by a natural disaster. The program applies to large-scale weather events such as flooding and tornadoes that have caused costly and widespread damage in an area. The program will cover clean-up expenses, repair or replacement costs for essential property, and basic emergency expenses like evacuation travel costs. While the program is useful in supporting property-owning residents with some funding, it has several gaps (DRAO, 2023). As discussed in the above quote from Doberstein et al, the program only provides funding to rebuild in the same place and manner, which exposes residents in high risk areas to repeated repair costs, as well as the trauma of repeated damage to their homes. Renters receive no benefit from this program. There is no long-term program to support residents in repeated high risk areas to move, thus creating unofficial retreat from certain areas, which generally comes at a financial loss for households. This can also create patchy neighborhoods that may be difficult for municipalities to ensure efficient service provision within (Doberstein, et al, 2021).

Ontario Conservation Authorities

> For nearly seven decades, conservation authorities like his have protected drinking water, preserved endangered species habitat and helped shield people from the worst effects of natural hazards like floods, largely through oversight of the development process. And, if federal disaster payments are an indication, much of what they've been doing works (Balkissoon, 2023).

Ontario has 36 Conservation Authorities, who are responsible for maintaining watersheds across the province. These organizations are mandated by the province to conserve and restore water, land, and natural habitats in the province, using an integrated water management approach that aims to balance human and natural needs. These bodies are unique to Ontario and are often credited with limiting the impact of flooding in a province that has some of the largest amounts of freshwater anywhere in the world, as well as the largest share of Canada's population, many of whom live in flood zones. They came into effect in 1946 under the *Conservation Authorities Act*, in response to severe flooding and erosion (Conservation Ontario, 2023).

In 2019, just prior to the spring flooding in Ottawa-Gatineau, the Ontario provincial government announced that it would be cutting funding for Conservation Authorities by 50%. As this quote illustrates, Conservation Authorities are key players in addressing flooding risk and response in the province, and their role is more important than ever as extreme weather events increase.

> "Cutting natural hazards funding is particularly problematic right now in light of the fact that — like everywhere else — Ontario is experiencing stronger and more frequent flood events as a result of climate change impacts," general manager Kim Gavine said in a statement…Conservation authorities forecast flooding and issue warnings, monitor stream flow, regulate development activities in flood plains, educate the public about flooding and protect natural cover that helps reduce the impacts of flooding. (Jones, 2019)

To date, the province of Ontario has continued to defund Conservation Authorities, with the stated aim of reducing the debt burden. Although there have been no major floods in Ottawa since 2019, flood risk continues to increase across the province as climate change shifts weather patterns (Balissoon, 2023).

Federal Government:

The Canadian Federal government played a supporting role to the affected municipalities and provinces (as is the norm with natural disasters in Canada). In the long-term, as has been explored in the literature review, they also play a critical role in shaping policy regarding protection of federal lands, developing and implementing climate policies to reduce the frequency and intensity of climate impacts, and guiding other jurisdictions in flood management.

In regards to the 2017 and 2019 flooding, the Canadian Federal government's role included some of the areas listed below:

Disaster Assistance: The Federal government provided some financial assistance to support immediate response and long-term recovery efforts. Specifically, the Disaster

Financial Assistance Arrangements (DFAA) program exists to provide financial assistance to provinces and territories in addressing natural disasters. The program provides matched funding above a specific threshold. Currently, it is $31,592,381 for Quebec and $55,098,203 for Ontario. The funding applies to specific areas, including evacuation, transportation, emergency supplies, security measures, cost of damage inspection, and restoration efforts. It does not apply to repairs that are eligible for private insurance, that are covered in part or in whole by another government program, assistance for large businesses, among other things. Further, they provided equipment and technical expertise to municipalities aid in managing floodwaters and in mitigating impacts (Public Safety, 2023).

Canadian Armed Forces deployment: In order to help with immediate flood response, the Canadian Armed Forces were deployed to support evacuations, sandbagging efforts to mitigate impact to homes and public infrastructure, and with logistics support for the municipalities and provinces (Dobenstein, et al, 2021).

In response to repeated floods throughout Canada, the Federal Government formed a Task Force, which released *Adapting to Rising Flood Risk: An Analysis of Insurance solutions for Canadians* (2022), which seeks to create a common understanding of what is needed for a national approach to flood insurance. This includes specific sections concerning provisions for relocation for households that are considered at high risk of extreme or repeated flooding. The report is not advocating for a specific form of insurance, as this will fall under the jurisdiction of provincial, territorial, and municipal governments, as well as the private sector.

National Capital Commission:

A governing body that is unique to the Ottawa-Gatineau region (in Canada) is the National Capital Commission (hereafter known as the NCC). They are a federal agency that is responsible for planning and managing the capital region, given its unique cross-provincial situation. The NCC has a mandate to protect and enhance natural and cultural assets of Ottawa-Gatineau, which includes addressing the challenges posed by flooding. During the 2017 and 2019 floods, the NCC worked closely with other levels of government, emergency management agencies, and civil society organizations to coordinate and support response efforts. Specifically, they provided technical expertise, such as monitoring water levels;

resources, such as flood maps; and guidance in flood management based on experience with previous floods in the area. They supported flood mitigation efforts, including installing temporary barriers to slow down spread of flood waters. The NCC also played a role in public education, providing regular updates about the status of flood waters in specific areas, and advising residents on flood risks and safety measures (NCC, 2023).

Civil society:

Civil society also played a crucial role in providing on-site and logistical support with relief efforts for the affected communities. Areas of support were multi-faceted and are elaborated upon below:

- Emergency response: Various organizations including the Canadian Red Cross, the Salvation Army, and community organizations such as Constance Bay Flood Relief, actively participated in on-site response. This included offering shelter, food, clothing, and medical assistance to impacted community members. They also worked with all levels of government and impacted communities to coordinate provision of needed services (CBC News, 2019).
- Volunteer support: Numerous volunteers from civil society organizations, as well as individuals supported with sandbagging, evacuation assistance, and site clean-up. Sandbagging was seen as a critical initiative to mitigate the impacts of the flooding on some residents' homes. Volunteer efforts also created or enforced a sense of community that played a key role in supporting impacted residents through the flooding and its aftermath.
- Fundraising: Civil society organizations initiated fundraising campaigns, or redirected existing funds and materials towards flood relief efforts. Fundraising campaigns included online appeals and in-person events, as well as collaborations with local businesses, governments, and individuals to raise money. These funds were key in providing immediate and long-term support to impacted individuals and communities (Cohen, 2017).
- Information dissemination: Civil society organizations played an active role in sharing information about the floods as they were happening, in order to inform residents at large, and to specifically support impacted communities. Additionally, these organizations advocated for support for impacted communities during and after the

floods, and pressed for wider policy change to help mitigate impacts of future flooding. During the floods they provided information relating to safety measures, and available resources. After the flooding subsided, they continued to offer information to impacted residents about clean-up and home repair options.

- Long-term recovery: Civil society organizations and individuals continued to play a role in on-the-ground support for impacted residents. They also continued to work with residents and government to advocate for material support and policy change to mitigate impacts of future flooding and provide greater support for impacted residents (Doberstein, et al, 2021).

6. Research Design and Methods:

This research will rely on two complementary methods. The first is a study of media coverage from the 2017 and 2019 periods. I will use secondary data, namely, articles spanning the 2017 and 2019 floods in Ottawa and Gatineau. The articles will span from the beginning of the flooding to the subsequent several months after flooding subsided in each year. Because of different jurisdictions, language, and cultural elements, there is some differing media for each region. At the same time, these are highly linked cities and media that discusses both is relevant. Media sources are intentionally varied across the most popular print/digital, radio, and tv news sources in the region.

The second methodology is an extensive literature review that dives into the municipal, provincial, and federal response, as well as the civil society response, at the time and in the years since. The City of Ottawa in particular has made some significant steps towards improving their overall climate response and this should be noted. This literature review also explores in-depth the pre-existing legislation that may have influenced how the different jurisdictions were more. or less, prepared to respond to flooding of this nature.

I analyzed 40 media reports relating to the flooding. As illustrated in the tables in the methodology section below, these articles spanned the 2017 and 2019 floods. I looked for specific keywords and concepts in each. These included managed retreat, climate change, etc. I also looked to see if the articles discussed topics relating to long-term flood management. In general, I observed the tone of the article to see how they treated the policy response to the flooding, to see if they made links to climate and the likelihood of increased future flooding

or extreme weather events overall. In order to understand whether or not the Quebec or Ontario media reports had a greater number of managed retreat, climate, or long-term planning related content that may have contributed to the policy discussion around short and long-term policy response, I counted mentions of these in each article.

Below is a list of the number and type of each article. In the annex there are charts with a comprehensive breakdown of each article's key contents.

Location	Number of articles
Ottawa, 2017	8
Gatineau, 2017	8
Ottawa-Gatineau or Federal, 2017	4
Ottawa, 2019	8
Gatineau, 2019	8
Ottawa-Gatineau, or Federal, 2019	4

Year	Total articles
2017	20
2019	20
Total articles	40

7. Methodology Limitations:

This media analysis will not include social media. This decision was made based on a general observation that there were limited posts in regards to the topic. There are some neighborhood facebook groups that discuss various resources for residents. Although this was a very stressful time for residents, it was also marked by a high level of community solidarity

and general belief in the importance of the response. The few social media posts that were found generally seemed to reflect this. That being said, social media can also be an excellent way for more diverse voices to gain a public platform - by excluding these platforms, this research may have inadvertently lost access to underrepresented voices that shared the experiences of more marginalized citizens during and after the flooding. Additionally, one of the darker sides of social media is its ability to rapidly spread misinformation - although this was not a big issue that emerged with this case, there may nonetheless have been smaller rumors that emerged that are not reflected in this research. That being said, social media is a huge component of public discourse in our present era, and it certainly may have played a role in shaping this conversation in both 2017 and 2019.

Another potential source of information to gauge public opinion may have been comments on articles, the responses to call-in shows on the radio, or the discourse that emerged at public events at the time. While potentially very interesting, these have not been included in this thesis given the lack of easily accessible information, or due an insignificant number of resources available. These omissions in a media analysis may constitute a methodology limitation to this research.

News sources are divided by city, however there is overlap in readership and it is not possible to determine where or when that is the case. I have tried to look at which jurisdiction the articles themselves discuss, as well as the main community target of the article (Ottawa, vs Gatineau, or Ontario vs Quebec). This is an imperfect system, but it is hoped that it may nonetheless present interesting findings.

8. Empirical analysis:

Notable trends:

a. A study of all of the articles found eight mentions of ‘managed retreat’, or ‘relocation’. The articles generally framed it in a favorable light, although several did include discussions of the challenges that exist with the currently available program in Quebec. More of these were articles from Quebec, however several Ontario articles also discussed the topic.

b. Twelve articles discussed the links between increasing frequency and intensity of extreme weather events and climate change. Many of these discussions constituted a central

argument of the article, however several others merely mentioned the topic as part of a larger discussion of the floods. These spanned both jurisdictions.

c. Thirteen articles discussed insurance and government compensation for the floods. These articles were also divided across both jurisdictions.

Overall, some trends emerged in the media analysis research, however there was no overwhelming theme that would suggest that the media had a measurable impact on the subsequent policy decisions. That is not to say there was no impact - the policy updates by the City of Ottawa in particular suggest that the city was listening to the media and residents and is invested in making positive changes. However, it is difficult to attribute this specifically to the media.

As was discussed in previous sections, the response to the flooding may suggest that there was a moment of 'punctured equilibrium' that allowed for more significant measures to be taken in regards to future flood management. Particularly in the City of Ottawa, we have seen significant improvements in flooding preparedness provisions, such as the programs that support residents to renovate their properties to be better protected against future flooding. There is also much more public education on the topic. At the same time, we can see that the Province of Ontario has made few changes, suggesting that they continue to rely on Policy Implementation Theory's Path Dependence concept. The DROA program advocates for a 'hold the line' method that other jurisdictions no longer view as tenable. By continuing to favor policies that advocate for building in floodplains, the province may be continuing on a road of maladaptation practices that ultimately make it more difficult for the City of Ottawa to prepare for future climate impacts.

With the managed retreat programs, The province of Quebec is favoring an adaptation approach that will likely better support the City of Gatineau and other flood-impacted municipalities in the future. While the province had put in place laws to better address flooding in the 1970's, it had favored path dependance by allowing for development in floodplains, using exceptions in the original law. It is hoped that the 2017 and 2019 floods can truly act as a 'punctured equilibrium' moment to really force municipalities to abide by the laws, to their own long-term interest.

9. Conclusion:

In conclusion, this thesis conducted a comprehensive comparative policy and media analysis of the provincial and municipal responses to the 2017 and 2019 flooding in Ottawa-Gatineau. The research sought to assess the effectiveness of existing and newly introduced policies at the time of the flooding. As the research progressed, it emerged that some significant strides had been made in the City of Ottawa, which was briefly discussed.

By examining policy documents, media reports, and civil society organizations' publications, this research revealed some notable findings. Firstly, municipal, provincial, and federal governments recognized the severity of the flooding and provided support in addressing immediate challenges in their respective jurisdictions. Secondly, long-term response to the flooding varied across jurisdictions and levels of government.

The municipal governments' responses focused on on-the-ground response and recovery activities such as emergency preparedness and response. While the City of Ottawa initially lagged in addressing longer-term challenges, it has been playing catch-up in recent years, and there have been significant strides made to prepare for future climate related disasters. The City of Gatineau was initially more prepared, however gaps in policy implementation still left it vulnerable. Over time, both cities have acknowledged the challenges that emerged and have taken steps to prepare for the future. At the provincial level, the government of Quebec was quicker to address issues that arose from the flooding, and has played a more proactive role in preparing for future flooding, by relying on its managed retreat model. The government of Ontario had an initially weak response, and the province continues to backslide in its environmental legislation. At the Federal level, the government played a relatively strong supporting role and has made some important updates in supporting provinces, territories, and municipalities in planning for future flooding.

The media analysis revealed that media sources likely played a key role in disseminating information during the floods, as well as playing a role in shaping public perceptions and influencing policy debates during and after the flooding events. Media coverage highlighted the challenges faced by impacted communities, gave voice to individual stories, and tied governments to their response efforts. However, it is difficult to quantify the extent to which these messages were able to influence policy decisions or individual perceptions of the flooding and the government response later.

Overall, this comparative policy and media analysis, which drew on Policy Implementation Theory, Punctuated Equilibrium Theory, and Agenda Setting Theory, may contribute to the existing body of knowledge on climate linked disaster management in a broader Canadian context. In examining the policy responses and media documentation of the 2017 and 2019 flooding in Ottawa-Gatineau, this thesis has highlighted the importance of effective short and long-term governance, clear communication which accurately illustrates the long-term and worsening impacts of climate change, so that residents can make well-informed decisions on where to live now and in the future; and finally, the importance of building resilient communities.

10. Annex:

Table 1: 2017 articles

	Article name	News source	Article date	Location	Description
	'We can never say thank you enough': Constance Bay looks back on devastating floods	CBC	April 22, 2018 *Note: Article chosen for relevance, despite later date	Ottawa	• 200 community member in Constance Bay came together to celebrate/thank volunteers that helped with 2017 floods • 380 homes damaged, 4 demolished and rebuilt fully • Provincial funding and local relief funds insufficient for some to cover repair costs • Gatineau homes also impacted, with many opting for demolition
2	Constance Bay residents band together to fight	CBC	May 6, 2017	Ottawa	• Strong volunteer presence • Many homes/individuals impacted during floods • Sandbagging efforts

	'heartbreaking' flooding				• Forecast calling for more rain, which may cause more flooding
3	Nerves fray in Cumberland from the flooding, even as water recedes - slightly	The Ottawa Sun	May 8, 2017	Ottawa	• Worse flooding in Cumberland & Clarence-Rockland moreso than 1974 • Floodwater receding but damage remains • Emergency shelters closing due to lack of use • Very high levels of interest in volunteering to support with flooding mitigation/response
4	The great flood of 2017: aftermath finds many in limbo	The Ottawa Citizen	July 2, 2017	Ottawa	• Personal stories of people whose insurance does not cover overland flooding, therefore they are not eligible for private insurance for this flood • Uncertainty over whether flood repairs for private homes and businesses will be covered by government assistance • Overview of Quebec renovation vs relocation program
5	Homeowners rebuilding after May flood could get	CBC	September 6, 2017	Ottawa	• City of Ottawa considering relaxing building regulations for residents of specific flood-impacted streets, to enable residents

	zoning break from the city				to make their homes more flood resilient and speed up construction process
6	Constance Bay homes deemed uninhabitable 2 months after flooding	CBC	2017	Ottawa	• Homes being deemed uninhabitable due to on-going flooding from underground water sources • 2 months after flooding, many homes still without hot water or drinking water • Constance Bay Flood Relief supporting impacted residents
7	How the city is handling the 2017 flood differently from the 2009 flood	The Ottawa Sun	May 12, 2017	Ottawa	• Referencing damage from major storm flooding in 2009 • Same neighborhoods in city's west end impacted in both cases • 2009 flood primarily created sewage back-up issues, creating unique public health concerns that differs from 2017 floods • Flooding that causes damage to homes and personal items can cause trauma for residents
8	Ottawa's soggiest year just won't stop	The Ottawa Citizen	October 30, 2017	Ottawa	• Spring rains set record for rainfall, but extremely high levels of precipitation

					continued throughout the year, breaking previous records for rainfall
9	Where not to rebuild exactly?	Le Devoir	May 10, 2017	Gatineau	• Climate change increasing flood risks • Municipalities face high costs associated with floods • Debate of rebuilding houses in flood zones • 2016 study forecasts Federal government to pay $673 million CAD/year in following 5 years • Overview of Federal financial aid program for flood victims • 2005 Quebec law to prevent building in floodplains insufficient • Homeowners awareness of flood risks limited • Government relocation/property purchasing programs • Discussion of limits of governments willing to not support residents impacted by flooding, due to political pressure • Significant and unpredictable increase in urban flooding
1	Water levels reaching peak:	CTV Montreal	May 7, 2017	Gatineau	• Update on flooding, including list of impacted homes

	public security minister				• Advisory on dates for anticipated peak in flooding and floodwaters receding • Advisory on on-going State of Emergency in several Quebec municipalities
1	Gatineau flooding 'tip of iceberg', climate scientist warns	CBC	May 4, 2017	Gatineau	• Flooding and extreme weather events are 'here to stay' • Accelerating climate change • Gatineau evacuations on-going
1	Residents brace for more flooding as Gatineau River rises	Global News	May 4, 2017	Gatineau	• Documenting residents' personal experience with managing the floods to protect their property • List of evacuations and sandbagging efforts
1	Disaster politics and the floods of 2017	Macleans	May 13, 2017	Gatineau	• List of politicians who visited Quebec flood sites for photo ops, including the Prime Minister • Discussion of the challenges and opportunities of handling disasters from a political perspective • List of homes lost and limited number of residents with 'overland home insurance' that will cover flooding damages

					• Discussion of community spirit/volunteering that emerges during disasters
1	Gatineau Flooding 2017: Boat Ride Shows Streets Turned Into Eerie Canals	Huffpost	May 8, 2017	Gatineau	• Photo and video series showcasing the flooding impacts • List of impacted homes • 1500 volunteers helped in Gatineau with floods
1	Le Grande Debordement: Chronologie des inondations de 2017	Journal de Montreal	May 19, 2017	Gatineau	• Photo series documenting a timeline of the flooding across the province of Quebec • Explanation of causes of flooding (heavy rainfall) • Personal experiences of some residents • Explanation of role of military • Showcase of some social media posts concerning the flooding
1	Canada floods: 3 missing in Quebec and British Columbia	CNN	May 9, 2017	Gatineau	• Father and child swept away by floods in Quebec • 2800 residents voluntarily leave their homes in Pontiac, Rigaud, Montreal • 1200 Canadian Armed Forces deployed • Montreal & Laval State of Emergency

1	Floods and how to harness a deluge of good intentions	The Ottawa Citizen	May 8, 2017	Ottawa-Gatineau	• Large number of community volunteers to support with flood management and cleanup • Volunteers are well intentioned, but require alot of work by government and civil society actors • Proposal for federal program to harness volunteer enthusiasm during extreme weather events • List of recent natural disasters, with associated costs
1	Updates on flooding in Ottawa and Gatineau Areas	The Ottawa Sun	May 9, 2017	Ottawa-Gatineau	• 'Floods at a glance' provides overview of impacted areas and services; public information sessions; volunteer opportunities; available relief • Weather outlook • Overview of municipal and federal response
1	Majority of Canadian Homeowners not insured for flooding: experts	The Globe and Mail	May 8, 2017	Ottawa-Gatineau	• Insurance Board of Canada says only 10-15% of Canadian homeowners are insured for flooding (overland flood insurance) as this form of insurance only came out in 2015 as a response to 2013 Toronto & Alberta floods

					• Partially due to lack of floodmaps for whole country • Most homeowners will be left relying on government support, which provides less money than private insurance • More education needed from governments on flood risks • Climate change and flooding increases
2	The Ottawa and Gatineau flood: A photo timeline	CBC	May 14, 2017	Ottawa-Gatineau	• Photo series documenting a timeline of the flooding and its impacts on residents in Quebec and Ontario • Facts about rainfall and flood impacts • List of municipalities in Quebec that declared a State of Emergency • List of evacuations

Table 2: 2019 articles

	Article name	News source	Article date	Location	Description
2	In-depth coverage of flooding in the Ottawa region	CTV News	April 26 2019	Ottawa	• Provincial premier visits Ottawa to support with sandbagging • Discussion of merits of calling the military for support

					• Discussion of impacted communities (Constance Bay, Cumberland) • Comparison to 2017 floods • Hundreds apply for flood assistance in Gatineau
2	Letting nature take its course: insurance, relocation may be part of the solution	Ottawa Citizen	May 2, 2019	Ottawa	• Climate change • Quebec disaster relief program (managed retreat program) • Dutch 'strategic retreat' program • Risk of building in floodplains • Disaster resilience • Insurance Bureau of Canada • Flooding and relocation assistance • Federal response to flooding - limited future financial support for those who build in flood zones
2	Ontario flood task force holds closed-door meeting; Ottawa pushes for independent inquiry	Global News	May 24, 2019	Ottawa	• Meeting between Federal, Provincial, Municipal governments to discuss Ontario flooding of Ottawa River • Discussion of merits of open-door meetings (this one was closed-door) • Discussion of request for independent review of causes of dam issues

					• Ottawa mayor requests province to consider a property buy-out program
2	Nature, not human error, to blame for Ottawa River flooding: report	CBC	May 28, 2019	Ottawa	• Report finds that Ontario Power Generation (OPG) properly managed floodwaters - extremely high volume was the issue • Mattawa and Pembroke (ON) and Gatineau (QC) were hardest hit communities • Conservation Ontario points out that in April 2019 the provincial government cut funding for flood management in half, leaving conservation authorities to manage with significantly smaller capacity
2	Why we flood: Capricious climate complicates river regulations	CBC	2019	Ottawa	• Snowmelt was major cause of 2019 flooding • Very high snowfall in winter of 2018-2019 • 2/3ds of river is unregulated, contrary to popular belief • Reservoirs upstream can help to alleviate impacts of high levels of snowmelt/rainwater

					•
	A River Runs Through It…Your Basement, That Is	Ottawa Life Magazine	September 26, 2019	Ottawa	• West-Carleton March, Britannia, Cumberland were hardest hit Ottawa region communities impacted by 2019 floods • City of Ottawa State of Emergency April 12-June 12 • External consultant hired to help the province prepare for future flooding
2	Ottawa floods were the nation's top weather story of 2019	The Ottawa Citizen	December 18, 2019	Ottawa	• Description of causes of 2019 flood - above average levels of snow with below average temperatures • List of other notable weather events across Canada in 2019
2	Floods prompt city to think fast on climate change planning	CBC	May 7, 2019	Ottawa	• 2017 & 2019 flood, 2018 tornado prompting City of Ottawa to consider how its infrastructure will adapt to climate change • City has declared a state of emergency and is considering its plans regarding climate and renewable energy

					• City is working with consultancy to determine likely climate impacts in region • City looking at climate focused infrastructure improvements that can be made as infrastructure comes up for repair regardless • City considering where to spend money to develop greater climate resiliency
2	Floods: A worse toll than in 2019	La Presse	April 29, 2019	Gatineau	• List of impacted homes (across Quebec) • List of flood zones and impacted dykes • Landslide warning • Closed roads advisory • Areas of improvement/water subsiding
3	Larger floods than in 2017: Gatineau ready to enter an "unknown zone"	Radio-Canada	April 26, 2019	Gatineau	• Water levels reaching unprecedented levels, above 2017 levels • Advisory of impacted areas (similar to 2017) • Recommendations to limit travel in order to support with EMS services
3	Gatineau expects worse	Le Devoir	April 27, 2019	Gatineau	• Flooding/rainfall levels worse than in 2017

	flooding than in 2017				• Rainfall and evacuation advisories for all of Quebec • Lists of number of impacted households • City of Ottawa declare state of emergency, deployment of military support
3	The Bloc calls on Ottawa to give access to RRSPs to disaster victims	Le Devoir	September 20, 2019	Gatineau	• Bloc Quebecois (major political party in Quebec) to ask Federal Government to allow unique access for individuals to access retirement savings program to support with home repair o For those impacted in 2017 & 2019 • Climate change linked flood victims • Climate linked increasing storm frequency and intensity • Quebec government questioning Federal commitment to reducing GHG emissions • Desire for federal transfer of funds to Quebec for infrastructure
3	Rebuild or Relocate?	Le Devoir	April 27, 2019	Gatineau	• Quebec relocation program, focus on Pointe Gatineau neighbourhood • Floodzone mapping needed

					• Risks of relocation programs - higher costs for housing due to limiting stock, resulting in fewer housing options for low-income residents • Climate adaptation measures to limit flood impacts • Strengths and weaknesses of relocation
3	Is $200,000 a fair buyout price for a house in a Quebec flood zone?	Montreal Gazette	April 24, 2019	Gatineau	• Discussion of what constitutes fair compensation for property buy-back program • Overview of Quebec managed retreat program successes and challenges, including the suggestion by Monreal Mayor of offering compensation based on regional housing costs • Discussion in recent advances of mapping of floodplains in Quebec • Confusion across Canada regarding which level of government is responsible for floodplain mapping • Climate change and shifting weather patterns
3	Floods: Quebec pays	La Presse	April 27, 2019	Gatineau	• 1974 floods prompts Quebec to adopt law (Act respecting

	the price for half-century of laxity				land use planning and development) to prevent construction in flood-prone areas • Law restricts construction according to predicted floodzone risk • Law often disregarded, or worked around using exceptions under the law, by municipalities in favour of allowing high-value construction to occur • Blame for 2019 flooding situation on lax provincial government • Climate change and wetland destruction
3	Quebec facing the unknown	Le Devoir	April 27, 2019	Gatineau	• Various municipalities in Quebec declare State of Emergency to address flooding • No forced evacuations (which was utilized in 2017, with challenges for EMS and residents) • Residences rebuilt after 2017 floods being impacted in 2019 • Homeowner reluctance to leave homes

3	Under water, again	CBC	May 4, 2019	Ottawa-Gatineau	• 2 personal stories featured, one who chose to rebuild after 2017 flood and whose home was once again impacted by flooding in 2019, and one who decided to take provincial buy-out compensation and move after 2017 floods • Ottawa: 155 homes evacuated, Gatineau: 111 homes evacuated & 923 damaged • Discussion of use of DRAO program after 2017 floods in Ottawa Valley communities
3	Ottawa River levels smash records	CBC	April 28, 2019	Ottawa-Gatineau	• Ottawa River flooding at record levels and on-going • Significant concern from emergency services regarding people staying in homes in high risk areas • List of people evacuating and registering as flood victims • List of limited services across region
3	Spring melt and rains spawn floods as Ottawa and	CNN	April 26, 2019	Ottawa-Gatineau	• More rain forecast across Eastern Ontario and Western Quebec

	Montreal fear a messy weekend				• Use of military to support with efforts • Climate change and extreme weather • Ottawa declares state of emergency • On-going evacuations
4	2019 floods: Where to get sandbags in Ottawa and Gatineau	CBC	April 27, 2019	Ottawa-Gatineau	• List of locations to get sandbags for flood mitigation purposes

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Thesis Report

Submission: September 15, 2022

A note on this thesis report:

I was not able to finalize as much of the thesis report as I would have liked by September 15th. This is due to a number of factors, which I will loosely describe below. As a result, I have incorporated further research into my work plan for the coming months.

Over the course of this summer I was working a full-time research position during the day, as well as a part-time bartending position in the evening. This was both to ensure that I had adequate funds to support me in the program, as well as to support with some unanticipated familial expenses. These positions combined made it difficult to sufficiently

focus on my thesis and did illustrate some of the challenges in taking time off to do a full-time graduate program whilst further into your career/life. I had hoped to fully dedicate myself to this thesis report at the end of August but I have been very much wrapped up in sorting out on-going issues with my Residence Permit in both Austria and Spain, leaving me in limbo in Europe but not able to go to Spain and unclear whether I will be able to receive a permit in the near future, or at all. This has ultimately taken up a significant portion of my time and mental bandwidth. Further, during the final days before the due date I had computer issues that made it difficult to work and required time to repair. As I am currently between various accommodations given my residence permit situation, it has been difficult to secure alternate computer options. I'm looking forward to being able to more effectively focus on my studies again soon, and will be able to put more intention towards this part of the thesis as these issues are addressed.

Section 1: Introduction

Topic overview:

This thesis will explore the topic of climate change induced population displacement via a comparative case study of two major flooding events in Central-Eastern Canada. In 2017 and 2019 the Ottawa-Gatineau urban region (and neighbouring regions) experienced extreme flooding, each considered to be 1 in 100 year events. Thousands of people were temporarily displaced from their homes in both cases. Many residential dwellings were rendered uninhabitable or required significant repairs, meaning that people were forced to find alternate accommodations for weeks or months, while some have been permanently displaced. The long-term response and consequences of this displacement will be the central focus of this research. Additionally, commercial and public buildings, and public infrastructure all experienced significant damages. Ottawa-Gatineau is the capital region of Canada and is unique in that it is two cities separated across two provincial borders and facing each other from across the Ottawa River. Ottawa is located in the province of Ontario, while Gatineau is located in the province of Quebec. Each province has taken a different response to short and long term flood management, with demonstrably different outcomes for residents. The provincial contexts and policy responses are detailed below in the section

entitled *Case study locations.* Further, this topic will be explored using the concept of Managed Retreat, which will be described below in the section entitled *Useful Definitions*.

Case study locations:

Gatineau, Quebec:

Gatineau, Quebec, is a city of 290,534 people in the Westernmost part of the province of Quebec, part of the Outaouais region and the fourth largest in the province. In spring 2017, spring snowmelt and heavy rainfall resulted in flooding that damaged 217 communities across Quebec, with 5371 residences flooded and 4066 people being forced from their homes. Much of this occured in the Outaouais (neighbouring Ottawa) and Greater Montreal regions. In spring 2019 the Ottawa river flooded, causing damage to 6681 residences in 51 communities in Quebec, with 3458 residences being temporarily isolated and damaged due to landslides. In response to these unprecedented flooding events, and expanding on existing legislation, Quebec has created a number of policy measures to address short and long term impacts of flooding. These include limiting new development in flood-prone areas, and offering financial support to homeowners should they wish to move from flood-prone areas that have been identified as areas for 'managed retreat'. Many residents have taken advantage of the latter program, with some communities in flood-prone areas emptying out as people move elsewhere. Critics have pointed out that the compensation offered to homeowners is not at market rate, while renters, farmers, and others have not received similar support.

Ottawa, Ontario:

Ottawa sits directly across from Gatineau, QC, separated by the Ottawa River. The river has caused similar flooding issues in parts of the city and neighbouring towns as that of Gatineau (they share a river). The city currently has a population of 1,017,449 (the fourth largest city in Canada). The province of Ontario has laid out reasonably thorough flood management and response plans, however has received criticism in recent years about pulling funding and staffing resources from related departments and initiatives, while simultaneously allowing increased development in ecologically sensitive areas. There is currently no home buyback program in the province, nor any other long-term program to support residents impacted by severe weather events. Additionally, home insurance provisions require that homeowners rebuild their properties in the same location and manner that they were in prior to flooding. Critics point out that this promotes communities that are at greater risk of

flooding and other issues, as well as ‘ghost’ communities where residents choose to rebuild only with the intention of selling (often at a loss) and moving away.

Useful Definitions:

Managed Retreat: This concept has varying definitions, however it can be broadly understood as the ‘retreat’ of human settlement in areas that are persistently shown to be sensitive to increases in extreme weather events, or to changes in local ecosystems that impact the feasibility of safe and cost effective human settlement. For example, a city may see that the current or future threat of sea level rise is significant in a specific neighbourhood, and thus will support residents to move to other areas while using the newly depopulated area as a buffer zone between the rising sea levels and the other parts of the city.

‘Hold the line’ method: Involves using infrastructure and other means to slow down or mitigate risks in those same weather sensitive regions. Examples of this may include the construction of a seawall, or other infrastructure tools that lessen the threat of sea level rise in a city. While ‘hold the line’ has been the predominant policy method to respond to changes in climate, ‘managed retreat’ is now gaining in popularity in some areas.

IPCC: Intergovernmental Panel on Climate Change

Mitigation: human intervention that reduces carbon emissions or enhances carbon sinks. A climate mitigation effort may include prioritizing renewable energy in order to reduce carbon emissions, or protecting peatlands and forest to enhance the protection and potential of carbon sinks.

Adaptation: Adjusting human systems to prepare for current or future effects of climate change, with the aim of reducing harm to current systems, or possibly achieving benefits from new systems. An example of this may include the planting of trees in urban areas in order to provide shade for residents and limit the urban heat island effect as the climate warms.

Maladaptation: A 2014 IPCC report defined maladaptation as “actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change,

or diminished welfare, now or in the future.". Examples of this may include a significant increase in the use of air conditioners in response to an intense or prolonged heat wave. While the air conditioners are useful for some and needed for others in the moment, their use increases carbon emissions. A preferred method of cooling for buildings would be efficiency focused renovation and construction that limits the need for air conditioners.

Research Question and Research Question explanation:

Research Question

Why has Gatineau, Quebec pursued a Managed Retreat approach, while Ottawa, Ontario has chosen a status quo approach?

Why this Research Question?

As climate change accelerates, individuals and communities will be impacted with varying degrees of severity. Planning via methods such as Managed Retreat can help to ensure a more equitable distribution of impacts across communities. Given the geographic proximity that has resulted in Ottawa and Gatineau experiencing similar weather events, interesting comparisons can be drawn in how each jurisdiction reacts to events. The different governments, predominant languages (French vs English) and perceived cultural values around care for the environment, create a compelling case study that may allow for a deeper understanding of the managed retreat approach and process.

Section 2: Literature Review & Theory

Literature Review:

This thesis will draw heavily from the information presented in the 2022 Intergovernmental Panel on Climate Change (hereafter referred to as IPCC) Sixth Assessment Report, *Climate Change 2022: Impacts, Adaptation and Vulnerability,* released February 27th, 2022. This report specifically studies the current challenges and existing opportunities and success stories that exist for climate adaptation globally, briefly

summarized with the following quote: "Progress in adaptation planning and implementation has been observed across all sectors and regions, generating multiple benefits (very high confidence). However, adaptation progress is unevenly distributed with observed adaptation gaps (high confidence). Many initiatives prioritize immediate and near-term climate risk reduction which reduces the opportunity for transformational adaptation (high confidence).".

The 2014 IPCC Fifth Assessment Report (WGII AR5), North America section cites several examples of climate change adaptation across Canada, the United States and Mexico, including examples of success stories or newly implemented policies in the province of Quebec. They predict with a 'very high level of confidence' that climate linked flooding events will continue to increase in frequency and severity, although they cannot confidently say that flooding events in the recent past are climate change linked. In regards to the overall concern for water issues in the continent, the IPCC says this "Many adaptation options currently available can address water supply deficits; adaptation responses to flooding and water quality concerns are more limited". They illustrate how flooding events may have varying impacts on individuals and groups from different socio-economic groups, described as such: "Differences in the severity of climate impacts on human settlements are strongly influenced by context-specific social and environmental factors and processes that contribute to risk, vulnerability, and adaptive capacity such as hazard magnitude, populations access to assets, built environment features, and governance (high confidence)...Although larger urban centers would have higher adaptation capacities, future climate risks from heat waves, droughts,storms, and SLR in cities would be enhanced by high population density, inadequate infrastructures, lack of institutional capacity, and degraded natural environments (medium evidence, high agreement).". They go on to explore the challenges that have been presenting globally in creating a proactive rather than reactive response to climate adaptation and explore the lack of clear and consistent information on lessons learned across industry, government, the insurance sector, or academia. Because flooding events are felt across regions and often sporadically, there is a lack of awareness and communication across regions about both proactive and reactive measures that can support the effective flood management.

Academic articles on disaster response in Canada and abroad provide examples of what has been done elsewhere, as well as what possibilities could exist for the future. There is a growing body of research that discusses the concept of Managed Retreat. An American

paper on Managed Retreat across the US, *Managed Retreat in the United States* describes this as "the strategy that most effectively eliminates risk". This paper also explores how a managed retreat approach impacts individuals and communities differently, saying "When a household retreats, it is transformative for the household but not the community who remains. When a community relocates, it is transformative for the community but not the nation.". Exploring the different impacts for communities as residents leave piecemeal, vs a group retreat is an interesting and relevant perspective for this thesis research. This paper also explores the differences between planned retreat and unplanned retreat, explaining that in some areas, retreat will occur regardless, but planning will create for a smoother, safer, and more affordable transition.

The report *Government-sponsored home buyout programs and post-flood decision to retreat: Case studies in Constance Bay, Ontario and Pointe Gatineau, Quebec ICLR Quick Response Program Final Report* looks specifically at the area in question and has thus far proven to be extremely useful in gaining a deeper knowledge on this topic as this is the region and issue currently being studied. This article also introduced the concept of 'managed retreat', which will be a central theory around which this research builds upon. Pointe Gatineau has been deemed an area of managed retreat in Quebec since 2017, with on-going support in that regard put in place in that year, and renewed and expanded in response to the 2019 floods. Constance Bay was formerly a small town outside of Ottawa, but as the city has grown, it has become a de facto suburb of Ottawa, with a population that was growing quickly prior to the 2017 floods. While growth has slowed, the community is still seeing new residents. There are no significant short or long-term flood management plans in the Constance Bay or wider Ottawa area. Both Pointe Gatineau and Constance Bay are considered to be the most impacted by flooding in Ottawa-Gatineau thus far.

Many news articles from Canada's main public news source, the Canadian Broadcasting Company (CBC), as well as Ottawa's local newspaper, The Ottawa Citizen, provided extensive knowledge on the topic in both communities. These articles have given context from both the 2017 and 2019 floods, as well as later reflection on the flood response overall. They have also been very useful in providing a deeper understanding of how impacted residents were experiencing the flooding in 2017 and 2019, as well as how they experienced the post-flood rebuilding and insurance application process. Many articles have

also provided a visual reminder of the flooding, such as the use of before and after pictures juxtaposed together to illustrate the severity of the impact in certain parts of these cities.

Municipal, provincial and Federal government resources have been useful in clarifying the official position of different levels of government. These resources generally reflect the 2021 or 2022 stance on the topic (with the exception of the Province of Ontario, which has made minimal changes since 2017, prior to the flooding). As a key piece, the Federal government recently commissioned a report looking at examples of Planned or Managed Retreat across Canada, discussing successes, challenges, and lessons for the future from several communities across Canada that have implemented some kind of managed retreat approach, including in Pointe Gatineau, QC. Further, the federal government has created reports on current and anticipated climate impacts for each province and territory of Canada.

Finally, the insurance, banking, or overall financial sector has published reports on addressing climate issues overall and flooding more specifically. Notably, REMAX Canada (a housing development corporation in Canada) in partnership with the Insurance Board of Canada, the Smart Prosperity Institute, and the Intact Centre on Climate Adaptation (University of Waterloo) has recently published two reports *Unlocking the future 5-year housing outlook, Chapter 2: The Economy,* and *Unlocking the future 5-year housing outlook, Chapter 2: Climate Change.* These two reports present an outlook for the short and long-term housing market across Canada, presenting current and future risks. Notably, they explore how 25% of Canadians rank the importance of considering environmental issues while purchasing a home. They also present some of the challenges that the private sector is struggling with in terms of addressing climate concerns and explain that a more coordinated approach from government could also help support a more streamlined proactive process in addressing a changing climate, using updated national flood maps, developing systems to identify climate risk prior to purchasing a home.

Hypothesis/theory:

I believe that this thesis will ultimately lead me to explore a few of the topics listed below:

1. Who is responsible for questions of retreat and/or adaptation - Government? Insurance Industry? Construction industry? Homeowners?).

2. In the case of Quebec's approach vs Ontario's approach, who are the different actors and how and why are they interacting in a way that is producing such different results?
3. This thesis may also lead me to explore topics of cultural identity - Quebec is a province that prides itself on its perceived ambitious environmental track record, regardless of the current government administration. Ontario has created ambitious environmental legislation in the past but the current government administration has taken a notably populist and pro-development stance that has slowed or blocked most environmentally focused legislation since 2018. How does cultural identity play a role in advancing environmental legislation overall, and in this case, in response to extreme weather events that are publicly seen as linked to climate change?

Section 3: Methodology

Research Design and Methods

This research will draw on existing research available on these case study locations, primarily through the federal government, the University of Waterloo research institute on climate adaptation, various Canadian thinktanks, insurance companies' reports on climate adaptation. UI hope to use municipal data on development and infrastructure plans for each respective city and to draw on municipal flood management plans, zoning plans to understand how each city is addressing current climate impacts and preparing for the future as they either expand or reduce in size and population.

Possible considerations:

- Impact on Indigenous and racialized individuals and/or communities
- Impact on industry, hydro, agriculture, public infrastructure
- Impact on renters vs homeowners

Work Plan

My intention is to continue to finalize the methodology, literature review, and hypothesis or this thesis over the course of the fall semester at IBEI. The majority of the work for this project will be done during the winter-spring semester at IBEI. This will include the majority of the research (beyond what has already been done) and writing, based on the Mundus MAPP program design. It is estimated that this will take 4-6 weeks, with additional leeway time built-in at the end of the semester to ensure adequate thesis completion.

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