The First Step to Future-Proof BC: Addressing Implementation Barriers Associated with Proactive Emergency Management

by

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Abstract

British Columbia has encountered numerous natural disaster events in the last decade. Despite this, and a growing body of evidence showing the number and magnitude of these disasters will only increase due to climate change, emergency management in the province is largely reactive. A proactive shift in emergency management is easier said than done, as the provincial government faces many barriers that prevent successful implementation of proactive emergency management. Thus, the policy issue this study seeks to address is that there are too many barriers preventing the British Columbian government from implementing proactive emergency management. A literature review, jurisdictional scan and multiple expert interviews were used to define the key barriers encountered by the provincial government. Four proposed policy options which seek to address these barriers were analyzed. The recommended policy bundle was selected based on the analysis conducted.

Keywords: emergency management; proactive; resilience; disaster risk reduction; implementation; barriers

Dedication

This one’s for me.

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Chapter 1. Introduction

Natural emergency management in British Columbia is commonly approached in a reactive way, meaning these emergencies are dealt with during or after an event. However, that does not imply proactive strategies are absent in the province. Although proactive measures exist, such as dikes, they are not free of issues. It is arguable that British Columbia is not equipped to address natural disaster trends using reactive emergency management policy paired with problem-laden proactive structures. The policy issues this capstone aims to address are the **many barriers preventing British Columbia from implementing proactive emergency management.**

The timeliness of addressing implementation barriers is especially prevalent considering how a number of disasters have impacted British Columbia in the last ten years, such as the 2014 and 2017 wildfires, the 2018 windstorm, heavy rain and subsequent flooding of the Peace Region in 2016[1] (Public Safety Canada, 2019), as well as British Columbia's 2021 wildfires and Atmospheric River events. On a related note, trends reveal that natural emergencies are occurring more frequently and to a more severe extent (Public Safety Canada, 2020). Therefore, damages and losses from these disasters are likely to increase as time proceeds due to key factors like climate change and dependence on critical infrastructure (Public Safety Canada, 2019).

The negative outcomes of climate change are coming to fruition with the frequency and severity of hazards such as floods, wildfires, extreme heat, storms, landslides, and erosion worsening. These hazardous events have negative individual, communal, social, economic, and environmental impacts (Public Safety Canada, 2019). Furthermore, vulnerability to these events are not equal; Indigenous communities are especially at risk due to their remote locations and lack of access to Emergency Management (EM) services (Public Safety Canada, 2019).

There are multiple barriers that hinder the British Columbia provincial government's ability to implement proactive emergency management strategies, but these barriers are not prevalently assessed in existing scholarly literature or news

[1] Recovery costs of these events are significant; $430M for the 2014 & 2017 wildfires, $52M for the 2018 windstorm, and $65M for the 2016 Peace Region's flooding.

media. Therefore, to emphasize the significant burden of these barriers when striving for proactive policies, I conducted expert interviews with provincial government employees. In addition to expert interviews, I completed a jurisdictional scan. Findings from both research methods serve to inform four proposed policy options. I use a number of key criteria (effectiveness, ease of implementation, short-term cost, long-term cost benefit, stakeholder acceptance) to evaluate each policy option and form a recommendation.

The severe weather British Columbia has endured in recent years highlights the importance of shifting into a proactive emergency management approach, making this an ideal time to explore policy options. The provincial government is already working on numerous proactive initiatives to promote disaster risk reduction and resilience. Thus, the proposed policy options and ultimately final recommendation serve to bolster these initiatives by attempting to address some of the major barriers associated with implementation.

Overcoming barriers to proactive emergency management is part of the critical path towards implementation. Implementation of proactive policy will ultimately necessitate disaster risk reduction and harness resilience.

Chapter 2. Background

2.1. Context: Canada's Emergency Management Strategy

Because disasters most frequently occur locally, the first response to an emergency is almost always provided by provincial or territorial emergency management authorities. In the instance where a local government requires resources and/or funding beyond their capacity during an emergency, the federal government responds quickly to any request for assistance made by a provincial or territorial government. Therefore, provincial and territorial governments must interpret the Federal Emergency Management Framework and the current Emergency Management Strategy (Public Safety Canada, 2019) in a way that does not undermine their jurisdiction.

There are four components of emergency management that work in tandem: prevention/mitigation, preparedness, response, and recovery. Although these can be done in any order, they are not independent of one another. Given how natural emergency events are likely to worsen in frequency and severity (Public Safety Canada, 2020), this increase in risk necessitates a shift from preparedness and response activities to proactive prevention and mitigation efforts. When disasters do occur, they can be significantly less costly for society, the economy, cultural heritage, and the environment if more funding is proactively provided to mitigative measures.

A key aspect of proactively shifting emergency management is Disaster Risk Reduction (DRR). Examples of DRR include lessening vulnerability to hazards for both people and property, and improved preparedness and early warning for adverse events (Public Safety Canada, 2019). To show commitment to DRR, Canada and other nations adopted the United Nations *Sendai Framework for Disaster Risk Reduction (2015-2030)* in 2015, demonstrating commitment to align Canadian emergency management more closely with DRR. As a result, the current strategy titled *Emergency Management Strategy for Canada: Toward a Resilient 2030* came into effect.

The aforementioned federal Strategy describes five priorities: enhance whole-of-society collaboration, improve understanding of disaster risks, increase focus on disaster prevention and mitigation activities, enhance disaster response capacity and coordination, and strengthen recovery efforts by building back better to minimize the

impacts of future disasters (Public Safety Canada, 2019). The third - increasing focus on disaster prevention and mitigation activities - is most relevant to this research. According to the Federal Strategy, "the most effective activities are proactive prevention/mitigation measures … These include structural mitigation measures (e.g. construction of floodways and dykes) and non-structural mitigation measures (e.g. building codes, land-use planning, and insurance incentives)" (Public Safety Canada, 2019). In addition to their efficacy, the "return-on-investment for these activities, while dependent on hazard type and location, would generate savings of $6 for every $1 invested in prevention" (Public Safety Canada, 2019). This statement justifies the importance of making a proactive emergency management policy shift.

In terms of British Columbia's response to the Strategy, it was the first province to adopt the Sendai Framework in October 2018 to demonstrate their commitment to improving the state of emergency management in the province. As a result, Emergency Management BC (Ministry of Public Safety and Solicitor General) is committed to thoroughly remodeling their emergency management legislation (the "Act"). Through this process, the new key piece of emergency management legislation aims to bolster preparedness and prevention through the requisition of risk assessments and emergency management planning (Emergency Management BC, 2022a). Furthermore, new and improved regulations will be released in tandem with the modernized legislation to provide additional support and enforcement. Overall, the modernization process seems to incorporate a proactive stance, but the new proactive measures alluded to in the Act and regulations will only stand the test of time if they are enforced properly.

2.2. Recovery Funding

2.2.1. Disaster Financial Assistance Program

Disaster financial assistance (DFA) in Canada is under the jurisdiction of provinces, but the Federal *Guidelines for the Disaster Financial Assistance Arrangements* (DFAA) outline financial assistance eligibility and federal-provincial cost-sharing for recovery costs.

Table 1: Disaster Financial Assistance Arrangements cost-sharing formula for 2022

Eligible provincial expenses (per capita of population)	Government of Canada share of costs
First $3.38	0%
Next $6.78	50%
Next $6.78	75%
Remaining expenses	90%

Source: Public Safety Canada (2022)

According to Public Safety Canada's (2007) DFAA Guidelines, the costs required for repairing or replacing an item or structure to its immediate pre-disaster condition is the maximum amount eligible. In the case of repairs or replacement to beyond (improved) pre-disaster condition, the amount eligible for financial assistance can be no more than the value associated with repair or replacement to immediate pre-disaster conditions. (Public Safety Canada, 2007).

To further exemplify how the DFAA Guidelines inhibit the ability to build proactively beyond pre-disaster conditions, the Guidelines provide additional barriers for mitigation funding. For mitigation costs encountered preemptively, the Guidelines state "In circumstances where danger to life and property is *imminent*, and instructions/orders are given by appropriate public authorities, costs for pre-emptive action may be eligible… However, members of the public and private sectors are expected to take reasonable measures, and absorb reasonable related costs, to protect themselves and their property. Examples of eligible expenses include material costs of sandbagging in the event of a flood…" (Public Safety Canada, 2007). The prior statement clearly indicates numerous obstacles that prevent the BC government from effectively implementing proactive emergency management. For one, costs *may* be eligible, which gives the provincial government little-to-no guarantee that costs to pre-emptively mitigate the effects of a disaster would be financially supported at the federal level. Secondly, these costs may only be eligible for federal support if danger is imminent, which does not permit the province to financially supplement proactive measures in the private or public sector for risks that *are known but do not possess immediate danger*. In other words, this section of the DFAA Guidelines gives the provincial government no incentive to

financially undertake proactive mitigative measures if the timeline is not imminent, or arguably, too late. According to Henstra & Thistlethwaite (2017), the fact that the DFAA funding model operates primarily on recovery rather than prevention/preparedness creates a “moral hazard” for provincial governments as there are no incentives, nor requirements for governments to change their policy direction to a proactive one to reduce disaster risk. For context, moral hazard refers to an instance where one party lacks any incentive to guard against a risk due to being protected from any potential consequences. In the case of emergency management, provincial governments encounter this as they have no incentive to be proactive because the reactive recovery funding has been consistently available.

It is apparent from the above paragraphs that provinces will only be supported by federal financial assistance to immediate pre-disaster conditions. Considering how assistance will only be given to build/repair to pre-disaster conditions (that were not strong enough to withstand the disaster’s impact), it is clear these guidelines do not give an opportunity for provinces to afford to build back proactively, nor better. Therefore, the federal DFAA funding program is evidently a barrier that prevents not only BC, but arguably all Canadian jurisdictions, from implementing proactive emergency management.

Disaster financial assistance (DFA) in BC has two different streams, one for the private sector (homeowners, residential tenants, small business owners, farm owners, charitable organizations), and one for the public sector (local governments, Indigenous governments). Regardless of sector, to be eligible for DFA, a disastrous event must first be declared officially by the provincial government. A key regulation that works in tandem with the DFA program’s guidelines is the *Compensation and Disaster Financial Assistance Regulation* (1995), but for the purpose of this section, the program guidelines will be used as they are expressed in simpler language, which is arguably best for contextualizing.

For the private sector, only essential, uninsurable damage expenses are eligible, and assistance is provided for each accepted claim at 80 percent of the amount of total eligible damage less $1,000, to a maximum of $400,000. Eligible essential items are compensated based on median value of the base model item Emergency Management BC, 2022b).

For the public sector, DFA is provided on a per capita cost share of total eligible damage. The local government/authorities' contribution is a minimum 5% to a maximum of 10% of the total project cost. The DFA program covers rebuilding or replacing essential public infrastructure to the pre-disaster condition and recovery measures to replace essential materials. Non-DFA-eligible works include those undertaken as preventative measures to guard against future damage, enhancements from pre-event functionality, for example replacing a wooden walkway with cement, and eroded or damaged land except for essential access routes and the removal of debris (Emergency Management , 2022c).

It can be concluded that British Columbia's DFA program does not give applicants the opportunity to proactively build back better. This is evidently a barrier that prevents the provincial government from actualizing a proactive policy shift. However, the Federal DFAA Guidelines effectively limit BC's ability to afford and therefore provide proactive disaster recovery. Therefore, it is indisputable that both the federal and BC's provincial DFA programs are major barriers that obstruct the province from implementing a more proactive emergency management policy approach.

2.2.2. Mitigation and Adaptation Funding

The Federal Government unveiled the Disaster Mitigation and Adaptation Fund in 2018, promising $2 billion over a decade to promote public sector community resilience across Canada (Infrastructure Canada, 2021). As part of the 2021 budget, it was announced that a supplemental $1.375 billion over no more than 12 years was announced to renew the Fund, with at least $138 million allocated for Indigenous recipients (Infrastructure Canada, 2021). Although this Fund is a positive step in a more proactive direction, it arguably serves as a barrier as it is simply not enough financial support for British Columbia (or any province) to significantly implement proactive emergency management, as it caps the federal cost share at 40% (Henstra & Thistlethwaite, 2021). In addition to the funding not being great enough, it is important to note that mitigation funding is not permitted to be stacked or paired with disaster financial assistance-related funding, which gives provinces and municipalities little incentive to invest in adaptation due to fears of not receiving federal recovery funding as time proceeds. Moreover, the funding is only available to the public sector or major private sector organizations (for profit or not for profit), so small entities in the private

sector (homeowners, small businesses, farmers) cannot apply, and therefore do not benefit directly from the funding.

2.3. Disaster Risk Governance

Emergency management policy, programs, mitigative structures and land usage are a province's responsibility. To complicate governance further, municipalities have the responsibility of upholding provincial emergency management standards but tend to face incentives to limit their strict compliance (Henstra & Thistlethwaite, 2017). To demonstrate this, numerous municipalities permit property development in known flood plains or hazard areas (Henstra & Thistlethwaite, 2017) because the tax revenue to be generated from the developed properties has a much faster return on investment than proactively preventing development. Ambiguous risk governance is especially problematic here in British Columbia, the recent destructive atmospheric river flooding events emphasized how incoherent governance and unclear accountability have left communities and critical infrastructure vulnerable (Henstra & Thistlethwaite, 2021).

To make matters worse, governments have gradually shifted the responsibility of disaster risk onto property owners to limit their disaster recovery spending. This is observable in BC, with the *Compensation and Disaster Financial Assistance Regulation* (1995) stating there will be "no assistance" given for repairs to structures developed in a floodplain, and that property owners must take sufficient measures to protect their property to be considered eligible for financial assistance. Although these regulatory measures may seem like an effective way to reduce disaster risk, they are arguably ineffective, not only because local governments are often incentivized to develop in at-risk areas, but also because there is no requirement of realtors, nor of past property owners, to disclose property risks to prospective buyers (Henstra & Thistlethwaite, 2021).

Due to this fragmented and decentralized responsibility of emergency management and disaster risk governance, the provincial government, and ultimately municipalities, are able act in their own interest because there is little oversight, minimal provincial enforcement, no obligation to disclose risk, nor any form of incentivization to manage emergencies or govern disaster risk proactively, all of which work in tandem to serve as an effective barrier to proactive emergency management.

2.4. Politics, Media, and Risk Perception

There are a number of political factors that make it more challenging for the provincial government to implement proactive emergency management. For one, the provincial (and federal) election cycles are mismatched, and planning cycles are often focused on the short-term. As a result of this, long term investments and policy are often not attractive to decision makers because the return on investment (financially and politically) is not fast enough. Thus, provincial governments are rarely oriented in a long-term direction. Aside from political cycles impeding the ability to plan, Haque, Choudhury & Siker (2019) claim that poor coordination between government departments and little coordination between the provincial and local authorities further exacerbate this inability to implement proactive policies with the future in mind.

This perception about the return on investment not being worthwhile is exacerbated by the attitude that disasters are a future issue that needn't be worried about in a short political cycle, and can instead be recovered from when necessary. According to Weber (2006), evidence implies that a sense of fear and/or worry drives emergency and risk management decision making, therefore, when decision makers lack a sense of concern for a climate-based emergency, they do not take a proactive stance. Moreover, ad-hoc perspectives held by politicians (and the general public) towards emergency management are worsened by the narrative perpetuated by the media, which tends to focus almost entirely on the short-term impacts of disasters/hazards than on the policy problems that underpin disaster risk (Thistlethwaite, et al., 2019).

Short political cycles, poor intergovernmental coordination, long-term investment benefits associated with proactive policy implementation, media's portrayal of risk being short-term, coupled with a common perspective that disasters are a future issue are all key political barriers that prevent the provincial government from implementing proactive emergency management.

2.5. Insurance

Prior to discussing insurance, it is crucial to note that although insurance acts as an implementation barrier, it is incredibly difficult to address, because the insurance

industry and the moral hazard[2] it carries will likely always exist, as there is little incentive to proactively mitigate against disasters. In British Columbia, insurance for wildfires, flooding and earthquakes are all available to the private sector. That being said, the areas that are most at risk for encountering these disastrous events will have the highest insurance premiums, or simply not be insurable at all due to such high risk (Insurance Bureau of Canada, 2021).

One may think that inflated premiums or simply the inability to acquire insurance would disincentivize property owners from living in risky areas, reinforcing a proactive approach. However, due to the previous segment regarding attitudes towards disasters, this idealistic dis-incentivization does not commonly occur. Instead, moral hazard persists; property development continues to occur in high-risk areas, and property owners are forced to pay boosted premiums or simply not have access to insurance. It can be said that the dependency on insurance in the private sector, thus, the moral hazard, is a barrier to implementing proactive emergency management. In other words, since the insurance industry is established and familiar in the private sector, it is extremely difficult to address the barrier of moral hazard upheld by insurance offerings. Therefore, the policy options sought at the end of this study will *not prioritize* addressing the barrier created by insurance.

2.6. Existing Mitigative, Proactive Strategies

2.6.1. Flood Dikes

There are more than 200 regulated dikes in BC with a total length of over 1100 kilometers, protecting 160,000 hectares of land (Northwest Hydraulic Consultants Ltd., 2015). British Columbia's diking authority is the Ministry of Forests, Lands and Natural Resource Operations (FLNRO). Thus, the FLNRO is responsible for flood protection legislation and has powers to establish guidelines, regulations, and flood hazard management plans with respect to flood protection, dikes, and the development of land subject to flooding. Despite FLNRO being the diking authority, local authorities oversee

[2] Moral hazard can be understood as a situation where a party lacks incentive to guard against risk as the party is protected from the risk's consequences. In alternate terms, it can be understood as a situation in which a party is incentivized to increase its exposure to risk as the party will not incur the full costs of that risk.

their own dikes. This can be problematic, as many dikes in BC are not up to a 1 in 200-year event standard (Northwest Hydraulic Consultants Ltd., 2015).

Therefore, the cost to repair dikes completely falls on municipalities. Local authorities have limited means to raise revenue and may compete against other municipalities for higher government funding. This results in diking needs not being met and disaster risk remaining unmanaged, thereby serving as a barrier to effectively implementing proactive emergency management.

The Northwest Hydraulic Consultants assessed nearly 75 dikes that span more than 500km throughout the Lower Mainland. This report, prepared for the Ministry of Forests, Lands and Natural Resource Operation, found that approximately 70% of the dikes assessed can be expected to fail in a significant disastrous flooding event (Northwest Hydraulic Consultants Ltd., 2015). Furthermore, none of the dikes assessed met seismic standards (Northwest Hydraulic Consultants Ltd., 2015). The report also found that approximately half the province's orphan dikes (equates to roughly 180 dikes) were in poor or failed condition (Northwest Hydraulic Consultants Ltd., 2015). An orphan dike can be understood as a dike that is abandoned under no government jurisdiction. The report estimates that amending orphan dikes *alone* would cost nearly $1.1 billion, or upwards of $900 million in 2015 Canadian dollars (Northwest Hydraulic Consultants Ltd., 2015).

Dikes are key proactive strategies that protect the province from flooding emergencies. However, it is clear that many of these dikes cannot offer guaranteed protection in a significant flooding disaster. This is troubling considering how the province adopted the Sendai Framework, which has priorities of proactive investment in disaster risk reduction and building back better to promote resilience in cases of future climate emergencies.

Another layer of complexity is the *Dike Maintenance Act* (1996, c95). Within this, specifically in terms of maintenance of dikes, the Act does not have much strength. This is primarily due to how deputy dike inspectors have no real enforcement powers. Thus, there is no real enforceable dike maintenance for those that fail inspection. This is problematic as there is no enforceable reason for dikes to be maintained. To make matters worse, dikes are under the jurisdiction of local authorities, not the province,

which has presumably led to gaps in maintenance and funding. Thus, local authorities often lack the necessary funding and human capacity to properly prepare their dikes and proactively prepare for flooding.

Dikes being under authority of municipalities/owners creates inequalities between levels of maintenance, funding and standards. Furthermore, the lack of enforcement held by deputy dike inspectors undermines compliance with existing dike standards, effectively serving as a barrier to implementing proactive emergency management more fully.

2.6.2. Flood and Hazard Mapping

Flood mapping is an important proactive measure that British Columbia has implemented, but it unfortunately serves as a barrier to effective proactive emergency management due to existing regulations. Within section 30 of the *Compensation and Disaster Financial Assistance Regulation* (1995) related to the *Emergency Program Act* (1996, amended) states that no financial assistance will be provided under the DFA program for structural repair if said structure was built in a designated flood plain (Raikes & McBean, 2016), this provision indirectly deters flood plain mapping by incentivizing local governments to avoid updating their floodplain maps in order to be eligible for assistance while continuing development in areas that might be at risk.

In addition to the regulation deterring local governments from updating their floodplain maps, it's worth noting that there is no legislation (nor regulation) related to flood mapping in the province (Henstra & Thistlethwaite, 2021). This serves as an additional barrier, because without any binding legislation or regulation, there is no real enforcement of floodplains in British Columbia. Therefore, local governments have little to no obligation to keep their maps updated.

Aside from flood mapping, it is worth noting that British Columbia's existing hazard map does not possess enough detail to effectively translate localized disaster risks (Government of British Columbia, 2022). Furthermore, the province does not have a localized database with historical disaster records, nor any authority that conducts hazard mapping to boost proactive disaster risk awareness. Hazard mapping is an important initial factor associated with risk awareness. Thus, the fact that the province

does not have a provincial hazard map, nor an authority within government to undertake this task, ultimately acts as a barrier preventing the province from implementing truly proactive emergency management. In short, if the magnitude of hazards in an area are not known across the province, the provincial government cannot begin to implement proactive emergency management.

2.7. Current Policy Context

As mentioned earlier, the provincial government is currently modernizing their emergency management legislation. The modernized legislation has many components that are rooted in proactive emergency management, such as requiring local governments, the province, and those who own critical infrastructure to conduct and maintain hazard risk assessments, which must factor in (to varying extents) science, climate change and Indigenous perspectives. Notably, the provincial government also employs a distinctions-based co-development approach to modernizing legislation and regulations. This acknowledges and affirms the specific rights, interests, priorities and concerns of Indigenous partners while harnessing an environment for shared decision making. It is important to note that a tripartite memorandum of understanding was signed between the BC Government, Government of Canada and First Nations leaders (Union of British Columbia Indian Chiefs, British Columbia Assembly of First Nations) in 2019 to ensure collaborative, constructive and regular dialogue on emergency management issues through a formalized relationship (Government of British Columbia, 2019). Another important aspect to consider is how Indigenous Services Canada has a bilateral agreement with the provincial government, which effectively requires the provincial government to provide emergency response and recovery funding on reserves like they would non-reserve land (Government of British Columbia, 2019). Although this is positive in theory, equity needs to be contemplated. It is worth recalling that existing *Compensation and Disaster Financial Assistance Regulation* (1995) permits the province to pay out only 80% of loss and damages up to a $400,000 maximum, and while this may seem a non-issue, reserves often lack sufficient housing, resources and capacity to recover following a disaster (Government of British Columbia, 2019); they also presumably have to wait longer than non-reserve applicants as they depend on the provincial government to process their DFA claim before they can access funding from Indigenous Services Canada.

Despite notable improvements, the current policy context is still largely reactive. To exemplify this, the provincial government did not begin to modernize their emergency management legislation and related regulations until after a significant hazard season in 2017 (Emergency Management BC, 2022a). Although reactive improvement is better than no improvement, Haque, Choudhury & Sikder (2019) argue that reactive, top-down methods of policy changes suffer from two major shortcomings; one being that reactive change relies solely on past significant hazards and fails to acknowledge that disaster risks are ever-changing, and the second shortcoming being that this approach does not acknowledge the importance of feedback systems that can generate forward-thinking policy implementation.

Although aspects of the modernized legislation are proactive and change demonstrates that the provincial government has proactive emergency management on their radar, modernized legislation alone is not nearly enough to *truly* implement proactive, resilient emergency management. This is not to say the legislative changes do not warrant positive recognition, but the aforementioned barriers, such as moral hazard from recovery funding, insufficient federal adaptation funding supports, fragmented disaster risk governance, short-term political landscapes and risk perception, as well as poorly managed existing proactive measures, all remain significant obstacles getting in the way of proactive emergency management implementation. As a result of these barriers, the provincial government remains far too rooted in the reactive pillars of emergency management (response and recovery), rather than their proactive counterparts (preparedness and mitigation).

Ideally, the provincial government would shift itself to be less dependent (morally hazarded) on recovery funding, reduce fragmentation of disaster risk governance to hold local governments more accountable, and manage their existing proactive measures more effectively through better enforcement. Even more ideally, the federal government would reduce their recovery funding guarantees, enhance their proactive funding supports and attempt to centralize disaster risk governance, or at least hold Canadian jurisdictions to the same standard. However, this is not an ideal world, and these barriers are ultimately too immense for the provincial government to address alone. Therefore, this study aims to find options to address the barriers encountered by the provincial government in the most feasible way.

Chapter 3. Methodology

This paper employs various qualitative research methods. After conducting a literature review, the present work employs a qualitative research method approach that includes a jurisdictional scan, interviews with experts and multi-criteria analysis to better understand and answer the following research question: *how can barriers faced by the British Columbia government to implementing proactive emergency management be addressed?* Simon Fraser University's Research Ethics Board provided approval of this study on October 27, 2022.

3.1. Literature Review

To contextualize current emergency management in Canada more broadly, I consulted the 2030 Resilience Strategy and Canadian Disaster Database. To better understand current emergency management practices in British Columbia, I assessed government resources, such as websites, legislation, regulations, and government-commissioned reports. Peer-reviewed sources regarding barriers associated with proactive emergency management were also used and were accessed from the SFU online library and Google Scholar.

3.2. Jurisdictional Scan

I selected provinces for the jurisdictional scan based on their comparability of government structure, climate, as well as emergency management governance and operations. The country scanned was selected primarily based on emergency management governance and operations, but special attention was paid to sociopolitical context and government structure. Each jurisdiction's government website was used principally to understand their approach to emergency management. If additional information was warranted, scholarly articles regarding select locations were found using the SFU online library and assessed for further context.

3.3. Expert Interviews

Five semi-structured[3] interviews were conducted with experts in the emergency management field in November 2022. Interviewees were selected based on their experience in the field and expertise with subject matter. All interview participants were from the provincial government's emergency management department. However, interview participants had differing titles such as senior policy analyst, manager, and executive director, and worked in varied divisions. All interviewees had direct experience working in British Columbia, but some interviewees were able to offer insight based on experiences working for/with other provincial governments in Canada. Interview findings were first transcribed and then coded with NVivo 12 for analytical purposes.

3.4. Multi-Criteria Analysis

To establish the suitability of each policy option to address implementation barriers associated with proactive emergency management, a multi-criteria analysis was completed. Five criteria were selected to evaluate each policy option: effectiveness, ease of implementation, short term cost, long term cost benefit, and stakeholder acceptance. All criteria were weighted based on the extent to which they effectively addressed implementation barriers, they complexity associated with implementation, the approximate cost to provincial government, the anticipated return on investment, and level of stakeholder acceptance, respectively. As a result, policy options have been given ratings (good (3), moderate (2), or poor (1)) based on how they perform for each criterion with a maximum possible score of 15. The criteria selected for this analysis are discussed in detail in Chapter 6 while the multi-criteria analysis itself is presented in Chapter 7.

[3] The subject matter of interview questions was kept consistent across all interviewees, but these questions were not asked in a pre-determined/structured order. Additionally, interviewee responses were permitted to be open-ended.

Chapter 4. Jurisdictional Scan

Before proceeding with the jurisdictional scan, it is worth noting that no jurisdiction in Canada has truly been able to implement proactive emergency management. Like British Columbia, other provinces and territories are bound by many of the same barriers, such as the Disaster Financial Assistance Arrangements, insufficient Disaster Mitigation and Adaptation funding supports, fragmented disaster risk governance and lacking political will. However, some jurisdictions do offer examples that the BC government could look to for improvement. Although these jurisdictional examples do not address every barrier previously discussed, they were selected based on how they possess similarities with BC, such as similar governance, population size, unique hazards and disaster financial assistance programs.

4.1. Manitoba

4.1.1. Review of Funding Programs

In 2018, Manitoba's Emergency Measures Organization (EMO) requested feedback from key stakeholders to improve their DFA program. The EMO released a final report outlining what feedback was heard, the actions EMO will take to improve DFA, and what areas were to be explored further (2018). Stakeholders identified they would like better coordination between Manitoba EMO and other agencies responsible for permitting additional sources of funding. In relation, stakeholders recommended the EMO do the following: assist communities with navigation of funding sources that may be used to assist or 'stack' on top of DFA funding; and support municipalities in determining other funding sources that may be accessed, in combination with DFA (Manitoba Emergency Measures Organization, 2018). Ultimately, the EMO concluded that these stakeholder suggestions were beyond the scope of their initial program review.

However, two years later, the EMO undertook a separate project in hopes to improve their DFA program, which included modernizing the provincial/municipal DFA cost-sharing formula and introducing a new DFA Mitigation and Preparedness Program (MPP) to assist municipalities in mitigating against future disasters (Manitoba Emergency Measures Organization, 2020). Unlike the DFA program, the MPP permits

that the compensation amount does not have to be invested in a damaged site. Rather, the MPP amount is meant to be invested into anything that will benefit disaster preparedness or mitigation in the municipality and is distinct from DFA compensation (Manitoba Emergency Measures Organization, 2020). Additionally, the EMO states that municipalities will not be eligible for MPP unless they can prove their mitigation projects will promote resilience and reduce disaster risk. MPP guidelines state that once submissions under the program are approved, the DFA program would reimburse municipalities the full cost of eligible DFA expenses rather than having the DFA deductible withheld by the EMO (Manitoba Emergency Measures Organization, 2020). In essence, if a municipality is approved, their originally paid DFA deductible would be returned to them, in which communities would then invest their DFA deductible in the MPP project.

The above discussion demonstrates how a provincial emergency management organization's decision to undertake an independent program review facilitated a shift towards implementing proactive emergency management. The Manitoba EMO's decision to conduct a program review gave way to the creation of a new proactive mitigation program that encourages municipalities to undertake proactive measures. Although Manitoba is a much smaller province in terms of its population, it is still a justifiable jurisdiction for British Columbia to look towards as it has encountered numerous disasters in recent years. Moreover, even though this example does not address every barrier that British Columbia faces, it demonstrates how a dedicated review of a longstanding provincial recovery funding model can generate proactive policy change.

4.1.2. Dikes and Diking Authority

The province of Manitoba encounters floods frequently, so it is a predictable choice when seeking jurisdictional examples that BC could look to for their own diking shortcomings. Dike ownership is a mix of provincial, municipal, and private ownership across Manitoba (Government of Manitoba, 2013).

Dike improvements alone are not enough to support proactive emergency management, regulations with enforceable standards are essential to ensure these dikes do not fall below standards again. Another instance by which Manitoba sets an example

for British Columbia is with its Dyking Authority Act (1987). One of BC's issues with its existing dikes is how there is a lack of enforcement held by deputy dike inspectors, which effectively undermines compliance with existing dike standards. Unlike BC, Manitoba's Dyking Authority Act (1987) outlines clear responsibilities of a dyking commissioner, providing evident enforceable capacity and standards. This demonstrates how enforcement is a critical part to uphold proactive emergency management acts. Therefore, the BC government may wish to improve their Dike Maintenance Act (1996) by looking at Manitoba's equivalent legislation.

4.2. Ontario

4.2.1. Conservation Authorities

Ontario is a unique jurisdiction as it is the only province in Canada to have Conservation Authorities. These authorities were created by the provincial government in the 1940s to counter poor land-use regulation and were later reinforced after catastrophic flooding caused by Hurricane Hazel in 1954 (Perreaux, 2021). community-based watershed management agencies, whose mandate is to undertake watershed-based programs to protect people and property from flooding, and other natural hazards, and to conserve natural resources for economic, social and environmental benefits. Conservation Authorities are legislated under the Conservation Authorities Act (1990).

The Authorities map flood-prone areas, as well as map other hazards, and restrict development on them. Furthermore, these Authorities monitor and predict flood flows and water levels year-round, operate flood control structures and relay flood messages to local municipalities and emergency management officials (Conservation Ontario, 2022). The Conservation Authority has numerous additional responsibilities around flood management, such as monitoring streamflow, rainfall and snowpacks, regulating development in hazard-prone areas in cooperation with municipalities and the Province, giving planning support and advice to municipalities to minimize disaster impacts and issue warnings, acquiring flood vulnerable structures, and operating more than 900 dams, dikes, channels and erosion control structures (Conservation Ontario, 2022). Interestingly, monitoring weather and flood conditions is a shared responsibility of Conservation Authorities, the Ontario Ministry of Natural Resources, and Environment Canada (Conservation Ontario, 2022).

Since the provincial government does not have an effective hazard map, nor has the province been able to effectively hold local governments accountable for land use, serving as barriers to implement proactive emergency management, the Ontario Conservation Authorities provide an example that the BC government could look to for improvement. Not only do these Authorities demonstrate the ability to effectively map hazards and manage dikes, but they have also successfully regulated land usage and prevented development in hazard-prone areas over the last seven decades. It is also worth noting that Ontario has a larger population than British Columbia but is not larger geographically. Due to British Columbia and Ontario serving as two of Canada's largest provinces by both population and geographical standards, Ontario is a justified jurisdictional comparison, as it can be inferred the government capacities held by the two provinces would be similar.

In closing, it is worth noting that political will and cycles can impact the precedence of these authorities. To exemplify this, two years ago, the Ford government reduced funding to Conservation Authorities (McClearn & Gray, 2020) and just recently, Ford's provincial government made the decision to reduce powers of these Authorities, such as requiring Authorities to hand off land that could be suitable for housing development and residential zoning changes, without permitting Authorities to consider suitability in relation to pollution, environmental conservation, nor climate change (Syed & McIntosh, 2022). In other words, it can be inferred from Ontario's proposed regulatory changes that unless a hazard is quite imminent, land must no longer be restricted for development.

4.3. Newfoundland & Labrador

4.3.1. Provincial Disaster Financial Assistance Program

According to Newfoundland and Labrador's Disaster Financial Assistance program's policy statement (2020), guidelines, mitigative enhancement projects are not consistently eligible, rather "upgrading or improvement costs may be eligible when it can be verified that such costs are for mitigative purposes only, and reimbursement is limited to 15% of the estimated cost of repair" (p. 5). Relatedly, if a local government decides to make mitigative enhancements (for the community or individuals) during the response and/or recovery phase of a disaster, a needs assessment and cost benefit analysis must

be provided to the Emergency Services Division. If the Emergency Services Division approves a mitigative project, the province's disaster financial assistance program would cover the costs associated with the project (Newfoundland and Labrador Department of Justice and Public Safety, Emergency Services Division, 2020). This is interesting as Newfoundland is the only jurisdiction in Canada that will cover proactive disaster mitigation projects (if approved) with disaster financial assistance funds. However, this example is not fully proactive, as projects are only considered for funding should they occur in the response/recovery phase of the disaster.

British Columbia's disaster financial assistance program does not permit proactively building back better. Therefore, Newfoundland and Labrador's disaster financial assistance program's approach to mitigative enhancements serves as an example for the British Columbia government to look to when seeking improvements for their disaster financial assistance program. Although Newfoundland and Labrador's approach demonstrates implementation of proactive emergency management (despite it being in a reactive phase of emergency management), it is worth noting that this jurisdiction is not equally comparable with British Columbia. Although Newfoundland and Labrador experiences numerous instances of severe weather and natural disasters, it is geographically and populationally much smaller; this undermines the applicability of Newfoundland and Labrador's program in a British Columbian context.

4.4. United States of America

4.4.1. Mitigation Funding

Unlike Canada's Disaster Mitigation and Adaptation fund capping the federal cost share at 40 percent, the United States' Hazard Mitigation Grant Program covers at least 75 percent of eligible projects, often upwards of 90 percent (Henstra & Thistlethwaite, 2021). The Canadian fund committed $2 billion dollars over the span of a decade, while the Hazard Mitigation Grant Program is funded much more aggressively, with more than $15 billion (over $20 billion CAD) available to states, tribes, and local jurisdictions over the last three decades to make communities more resilient and reduce risks from future disasters (Federal Emergency Management Agency, 2022). To boost the proactive investment further, President Biden recently committed nearly $3.5 billion for additional mitigation projects under the Grant Program; this one-time investment represents a 23%

increase in the funding made available for declared disasters since the program's inception in the 1990s (Federal Emergency Management Agency, 2022).

The program's purpose is to provide funding to states, communities, and individuals to implement proactive emergency management projects that will help them reduce risks of property damage, property loss and loss of life from future natural disasters and hazards. This program offers funding that can be used for a range of activities that can promote resilience to climate change, including: retrofitting facilities to build them back better, acquiring properties that are at risk, relocating or demolishing unsafe structures, elevating existing structures, building/improving flood protection infrastructure, and developing mandated (enforceable) state and local mitigation standards (Federal Emergency Management Agency, 2022). Projects must conform to the required state or local Hazard Mitigation Plan, demonstrate alignment with legislation, regulations, and land use codes in the region, be cost-effective, and have proof of significantly reducing risk of future damage or loss (Federal Emergency Management Agency, 2022).

In contrast to its Canadian counterpart, the Hazard Mitigation Grant Program is also available to the private sector, such as homeowners and businesses. Private sector applicants have to apply in tandem with their jurisdiction, meaning they must demonstrate how their mitigation improvements will support the jurisdiction's application goals and uphold the state and/or local Hazard Mitigation Plan (Federal Emergency Management Agency, 2022). Although private sector members cannot apply directly, this is still a positive approach as it encourages states, local governments, and property owners to work together to reduce disaster risk.

One of the barriers the provincial government faces to truly implementing proactive emergency management is a lack of federal mitigation funding. Although this jurisdictional example is not directly applicable to a provincial government like British Columbia's, it is directly applicable to Canada's federal government. Therefore, the Canadian government could look to the American Hazard Mitigation Grant Program to improve the Disaster Mitigation and Adaptation Fund. If the Canadian government were to implement a more aggressively funded mitigation grant program, the British Columbia government could directly benefit from the additional funding available and could

therefore overcome a critical barrier preventing them from implementing proactive emergency management more effectively.

Chapter 5. Interview Findings

The analysis of findings from expert interviews follows subsequently. Experts include policymakers from the provincial government's emergency management division, with varying positions, such as senior policy analyst, manager, and executive director. The perspectives of these experts primarily serve to inform policy analysis, particularly within the context of stakeholder acceptance.

5.1. Barriers to Implementation of Proactive Emergency Management

To commence every interview, I asked interviewees about the barriers associated with the implementation of proactive emergency management in the province. Some of the barriers mentioned by interviewees included: *"lies in federalist system", "ability to approve building lies with local governments", historical decisions … can't be fixed without undue burden…", "floodplains", "dikes", "lack of experience … reluctance … with a proactive approach", "depth of experience with recovery", "complicated funding", "roles not clearly defined at all", "unclear governance", "lack of interest … will", "resistance to change", "idea that … climate is static"*.

The terms used by interview participants indicate the great significance of barriers associated with implementing proactive emergency management, establishing precedence for the policy issue guiding this capstone. Furthermore, the barriers highlighted by interviewees evidently reinforce the obstacles discussed in the second chapter of this study.

5.2. Potential Approaches to Address Barriers

After discussing barriers associated with implementing proactive emergency management, I asked interviewees for their perspective as to how the barriers described could be addressed. Some of the options to address barriers stated by interview participants were: *"modernizing legislation … regulations", "greater funding", "permanent bans on land development … in hazard areas", "culture shift", "accountability … enforcement", "improve funding programs".*

The terms used by interviewees indicate that potential policy avenues to address key implementation barriers could consist of ameliorating funding programs, increasing funding available, better accountability and/or enforcement regarding land usage, shifting perspectives, and making edits to outdated legislation and/or regulation.

5.3. Thoughts on Current Preparedness for the Future

An underpinning of this study, demonstrated by its title, is that overcoming barriers to proactive emergency management implementation is the first step to "future proofing" the province. That said, there's very little accessible information regarding any ways in which the province may currently be "future proofing" itself, aside from modernizing legislation, as described in the second chapter. Interviewees were asked about whether there are any major current strategies that prepare the province for future climate change-related events. Interviewees unanimously indicated that the provincial government is "*starting*" to prepare for future disaster risks but is "*not there yet*". Some interviewees advised that the barriers are to blame for this lack of preparedness/mitigation, but also indicated that there is a lot of "*potential*" for proactive emergency management due to "*recent weather events*" in the province. Overall, interviewee responses to this aspect of the interview demonstrated that the province is not well enough prepared for future disaster risk, but that it is on the provincial government's radar.

5.4. Unintended Consequences of Proactive Emergency Management

For the final part of the interview, I asked interviewees to discuss any potential unintended consequences and important considerations relative to proactive emergency management implementation. Some of the key considerations described were: *"difficult to assess cost", "some mitigation projects are good for select hazards … not others", "no standards for mitigative building", "concern about overspending".* Although many interviewees indicated negative considerations and possible unintended outcomes associated with implementing a more proactive approach, one interviewee provided more positive consequences, such as: "*future-thinking shift … a more holistic approach*", and "*may be costly in the short term, but long term … creates a resilient society*". This

last component of the interview illuminates important considerations, both positive and negative, associated with implementing proactive emergency management.

Chapter 6. Policy Criteria, Measures, and Options

6.1. Policy Criteria & Measures

As stated earlier, a multi-criteria analysis was employed to assess potential policy options to address this study's key policy issue - there are too many barriers preventing British Columbia from implementing proactive emergency management. The criteria, their definitions, measurement, and rating scale have been summarized in Table 2. The rest of this chapter discusses each criterion thoroughly to exemplify how each criterion serves to evaluate policy options.

Table 2: Summary of Policy Criteria & Measures

Criteria	Definition	Measure	Rating
Effectiveness	Degree to which a policy improves the province's ability to implement proactive emergency management (by addressing barriers)	Greatly improves implementation ability	Good (3)
		Moderately improves implementation ability	Moderate (2)
		Minimally improves implementation ability	Poor (1)
Ease of Implementation	Level of complexity associated with the implementation of a policy option	Low level of complexity	Good (3)
		Moderate level of complexity	Moderate (2)
		High level of complexity	Poor (1)
Short Term Cost	Approximate upfront cost to provincial government	Low cost to provincial government	Good (3)
		Medium cost to provincial government	Moderate (2)

		High cost to provincial government	Poor (1)
Long Term Cost Benefit	Anticipated return on investment for the provincial government	High return on investment	Good (3)
		Medium return on investment	Moderate (2)
		Low return on investment	Poor (1)
Stakeholder Acceptance	Level of acceptance of a policy option by stakeholders	High acceptability of the policy option	Good (3)
		Moderate acceptability of the policy option	Moderate (2)
		Low acceptability of the policy option	Poor (1)

6.1.1. Effectiveness

The key objective of this capstone is to address barriers that prevent the provincial government from truly implementing proactive emergency management. Therefore, one of the criterions used to evaluate how well a policy option achieves that objective is effectiveness. This criterion is measured by the degree to which a policy improves the province's ability to implement proactive emergency management, based on how a policy addresses the following barriers:

- Insufficient federal mitigation funding
- Moral hazard associated with guaranteed federal cost-shared recovery funding
- Fragmented disaster risk governance
- Short-term political cycles and risk perception
- Poorly managed (enforced) existing proactive measures (dikes, hazard maps)

Policy options that greatly improve the provincial government's ability to implement proactive emergency management will be given a good rating, options that moderately

improve implementation ability will be given a moderate rating, and policies that minimally improve implementation ability will be given a poor rating.

6.1.2. Ease of Implementation

Considering how the main objective of this study is to address implementation barriers by improving the provincial government's ability to implement proactive emergency management, the implementation feasibility associated with policies is also crucial to assess. Thus, a criterion to evaluate a policy's ease of implementation will be used and will be measured based on the level of complexity associated with the implementation of a policy option. Policy options that have a low level of complexity (thereby easier to implement) are given a good rating, options that have a moderate level of complexity (thereby moderately difficult to implement) have a moderate rating, and policies with a high level of complexity (thereby more difficult to implement) are given a poor rating.

6.1.3. Short-term Cost

The significant short-term costs associated with proactive emergency management have been an ongoing factor in emergency management policy decision making. This is primarily due to how benefits of proactive disaster mitigation are only fully realized when the next disaster occurs, but in contrast, the short-term costs of disaster mitigation are incurred immediately, are easy to calculate, and typically encountered by a relatively small number of stakeholders (Prater & Lindell, 2000, p. 75). This criterion is measured based on the approximate upfront cost to the provincial government. Policies with a low upfront cost have a good rating, options with a medium upfront cost have a moderate rating, while options with a high upfront cost have a poor rating.

6.1.4. Long-term Cost Benefit

One of the greatest defining features of proactive emergency management is that it has a major return on investment - between $2 and $10 for every $1 invested (Perreaux, 2021), making the long-term cost benefit a necessary criterion to evaluate policy options. Predictably, this criterion is measured based on the anticipated return on

investment for the provincial government. Policy options with a high return on investment are given a good rating, options with a medium return on investment have a moderate rating, and options with a low return on investment have a poor rating.

6.1.5. Stakeholder Acceptance

Although effectiveness, implementation ease and costs are all important criteria to evaluate policies, the adoption of a policy is largely rooted in acceptance by stakeholders. Therefore, stakeholder acceptance is the final criterion used to assess various policy options in this study. For the purpose of this analysis, "stakeholders" are to be understood as those who make policies in the emergency management field of the provincial government.[4] This criterion will be measured by a policy option's level of acceptance by stakeholders. Expert interview findings serve to inform inferences regarding the extent to which a policy option could be accepted by stakeholders. Policies with high acceptability are given a good rating, those with moderate acceptability have a moderate rating, and options with low acceptability have a poor rating.

6.2. Policy Options

I developed four unique policy options based on research conducted through the literature review and jurisdictional scan. All options intend to address barriers that currently prevent the provincial government from implementing proactive emergency management. Policy options are designed with special consideration towards the provincial-federal relationship since emergency management is under provincial jurisdiction but is heavily tied to federal funding.

6.2.1. Enhanced Federal Disaster Mitigation Funding

One of the greatest barriers associated with the implementation of proactive emergency management faced by the provincial government is insufficient federal mitigation funding. As outlined earlier in the study, the Canadian government currently

[4] In an ideal scenario, this analysis would employ a great variety of stakeholder perspectives from various backgrounds/agencies. Due to limited resources and time, only experts from the BC provincial government were interviewed. As a result, inferences can only be *confidently* made about stakeholder acceptability based on findings from expert interviews.

employs the Disaster Mitigation and Adaptation fund, committing a measly few billion dollars over the span of just over a single decade (Infrastructure Canada, 2021), caps the federal share of financial support for mitigative undertakings at a sub-majority 40% (Henstra & Thistlethwaite, 2021), and is primarily targeted at the public sector (Infrastructure Canada, 2021) with the exception of for-profit and non-for profit organizations.

Before proceeding, it is unreasonable, and arguably impossible to propose a singular province attempt to solve a federal insufficiency. Therefore, this policy option sees the federal government making major improvements to their existing funding program. These improvements include increasing the amount of funding committed, increasing the proportion of federal funding provided for mitigation projects, expanding private eligibility and eliminating the time restriction. In the jurisdictional scan section of this study, the United States of America's Hazard Mitigation Grant Program (Federal Emergency Management Agency, 2022) was examined, this program serves as the precise model underpinning this entire policy option.

In order to augment the amount of funding committed, this policy option entails that close to $20 billion be dedicated for mitigation efforts over the span of approximately three decades. To enhance the program's federal cost share, this option necessitates that the federal government's proportion of a proactive project's cost increases to a range of 75-90% (Henstra & Thistlethwaite, 2021). To align as closely as possible to its American counterpart, this option also requires that the applicability to the private sector (beyond major organizations) be expanded to homeowners and small businesses who wish to undertake mitigation efforts in alignment with the public sector's project goals, as well as their jurisdiction's local legislation, regulations, risk assessments, while demonstrating cost effectiveness and risk reduction. The ultimate goal of this policy option is to address insufficient provincial mitigation funding supports offered by the federal government, but it is expected that this option will address other barriers to varying extents. In terms of implementation, the federal government would be the primary actor, but the British Columbia provincial government could play a minor role in implementation by reiterating the significant barrier of insufficient federal funding.

6.2.2. Trailblazing Improvement of the Provincial Disaster Financial Assistance Program

British Columbia's disaster financial assistance program is outdated due to the *Compensation and Disaster Financial Assistance Regulation* (1995). This regulation creates a barrier as it only provides assistance up to an amount that will return damages to their pre-disaster conditions, leaving no opportunity to build or repair better, nor proactively. This is exacerbated by how the federal financial assistance guidelines leave the province bound by moral hazard due to providing guaranteed recovery funding, but only for restoration of pre-disaster conditions.

To address the province's current disaster financial assistance approach, this policy option proposes that the provincial government undertake an independent review of their disaster financial assistance regulation and program based on Manitoba's strategy of requesting stakeholder feedback (Manitoba Emergency Measures Organization, 2018). Although the Manitoba government's review of their financial assistance approach was not ideal - recalling that they ultimately found much of their crucial feedback to exceed their scope - it did pave the way for proactive emergency management a couple years later (Manitoba Emergency Measures Organization, 2018, 2020), demonstrating that program and regulatory reviews are beneficial regardless of the initial outcome.

Since Manitoba's review is not a flawless example, this policy option looks to Newfoundland and Labrador's disaster financial assistance program for inspiration. Recalling from the jurisdictional scan, this province will permit disaster financial assistance funding to be used for mitigative projects on two conditions: one being it is approved based on evidence of need and cost benefit analysis; two being it was implemented during the recovery phase of the disaster (Newfoundland and Labrador Department of Justice and Public Safety, Emergency Services Division, 2020). Although this jurisdiction is an anomaly in how it will permit the use of disaster financial assistance funds for mitigative projects, it is not without flaws, as requiring the project to be undertaken during the reactive phases of a disaster does not truly uphold proactive emergency management. Therefore, this policy option requires British Columbia to trailblaze improvements to its program and regulation by permitting disaster financial assistance funding be used for mitigation projects (with proof of need and cost efficacy)

in *any* phase of a disaster, whether it be pre-emptive mitigation or future-looking in the recovery phase. Overall, the main goal of this policy option is to address how the current disaster financial assistance regulation (and therefore program) does not provide funding for mitigation projects, but I anticipate that this option will address other barriers to varying extents. Although this option is constrained by the federal Disaster Financial Assistance Arrangements, this option was designed with the optimism that trailblazing improvements may be a strong enough indicator to the federal government that their Disaster Financial Assistance Arrangements guidelines need to change. With regards to implementation, this policy option would be implemented by the provincial government. In terms of a timeframe, this option sees that the review be completed by 2030 to uphold the province's commitments to resilience and alignment with the *Emergency Management Strategy for Canada: Toward a Resilient 2030*.

6.2.3. Legislated Conservation Authorities

As discussed earlier, emergency management policy, programs, mitigative structures and land usage under the province's jurisdiction, but municipalities are supposed to ratify these provincial standards, but tend to face incentives to limit their strict compliance, such as allowing property development in known flood plains or hazard areas to benefit from property tax revenue (Henstra & Thistlethwaite, 2017). Furthermore, although the province utilizes proactive structures like dikes, maintaining these dikes are the responsibility of local authorities, not the province - while some are even under *no* responsibility - yet another demonstration of fragmented authority. The unsurprising result of this is that the majority of dikes in the province cannot offer guaranteed protection in a significant flooding disaster (Northwest Hydraulic Consultants Ltd., 2015).

Since local authorities have limited abilities to raise revenue to address the dikes that fall under their jurisdiction, disaster risk remains unmanaged, serving as a barrier to effectively implementing proactive emergency management. Fragmented responsibility over disaster risk governance has led to municipalities being able to act in their own interests as there is no form of incentivization to manage emergencies or govern disaster risk proactively, acting as a great obstacle for the provincial government. Related to risk governance and poor management of proactive flood structures, there is no legislation (nor regulation) related to flood or hazard mapping in the province

(Henstra & Thistlethwaite, 2021). This serves as an additional barrier, as there is no enforcement of floodplains or hazard maps in British Columbia.

To address these barriers, this policy sees that the government of British Columbia legislates conservation authorities, using Ontario's Conservation Authorities as the basis for this option. Modeling directly from the jurisdictional scan, this policy option would first require that Conservation Authorities be officially legislated in the province, such as through a piece of legislation similar to Ontario's *Conservation Authorities Act* (1990). Provincial funding is primarily used to fund these Authorities, but a minor tax levy is also placed on municipalities (Conservation Ontario, 2022). This policy necessitates that these Authorities would then be directly responsible for floodplain mapping, hazard mapping, managing land use and regulating development in hazard-prone areas in cooperation with municipalities and the Province, supporting municipalities to minimize disaster impacts, acquiring flood vulnerable structures, and operating/managing proactive emergency management structures, like dikes (Conservation Ontario, 2022). Ultimately, the goal of this policy option is to effectively address the barriers of ambiguous disaster risk governance (poor land management) and suboptimal hazard/flood management. For implementation, this policy option would be legislated by the provincial government. In terms of a timeframe, this option entails that Conservation Authorities be implemented by 2030 to uphold the province's commitments to resilience.

6.2.4. Amending the Dike Maintenance Act

British Columbia's *Dike Maintenance Act* (1996, c95) creates another barrier as there is a lack of enforcement held by deputy dike inspectors, which diminishes compliance with dike maintenance standards. Even with the previous policy option creating a distinct, clear authority to manage proactive structures, such as dikes, creating clear disaster risk governance alone is not enough to support proactive emergency management; regulations with strong enforceable means are essential to ensure British Columbia's dikes do not remain substandard. Therefore, this policy option is designed to address the barrier caused by poor enforceable measures found in the aforementioned *Act*.

To seek amelioration of the existing *Act*, this policy option looks to Manitoba's *Dyking Authority Act* (1987), which clearly defines the responsibilities of a dyking

commissioner and enforceability of the commissioner's (and Minister's) orders. The goal of this policy option is to ensure British Columbia's dikes do not continue to offer little flood protection by amending the provincial *Act* by providing coherent enforceable capacity and standards. This policy option seeks to address the barrier caused by the unenforceability of the *Maintenance Act* (1996, c95); thus, it is estimated that this option will minorly address other barriers. Regarding implementation, this policy option would be driven by the provincial government. This option sees that edits would be made to the *Dike Maintenance Act* before 2030 to uphold the province's commitments to resilience.

Chapter 7. Multi-Criteria Analysis of Policy Options

This chapter analyzes the policy options described in the previous chapter, while simultaneously employing the multi-criteria analysis also presented in the prior chapter. Table 3 provides a concise summary of the analysis to clearly portray how each policy option scores.

Table 3: Summary of Policy Analysis

Criteria	Enhanced Federal Disaster Mitigation Funding	Trailblazing Improvement of the Provincial DFA Program	Legislated Conservation Authorities	Amending the Dike Maintenance Act
Effectiveness	Moderate-Good (2.5)	Moderate (2)	Moderate (2)	Poor-Moderate (1.5)
Ease of Implementation	Moderate (2)	Moderate (2)	Moderate (2)	Good (3)
Short-term Cost	Poor (1)	Poor (1)	Poor (1)	Poor (1)
Long-term Cost Benefit	Good (3)	Good (3)	Good (3)	Good (3)
Stakeholder Acceptance	Good (3)	Good (3)	Good (3)	Good (3)
Total	**11.5**	**11**	**11**	**11.5**

7.1. Enhanced Federal Disaster Mitigation Funding

7.1.1. Effectiveness

- Insufficient federal mitigation funding

One of the most significant barriers faced by the provincial government when seeking to implement more proactive emergency management is insufficient federal mitigation funding. This policy option increases the current amount of mitigation funding nearly ten-fold and augments the federal funding share offered by the current Disaster Mitigation and Adaptation Fund. Thus, it can be said that this policy option addresses the barrier of insufficient federal mitigation funding to a high degree, thereby greatly improving the provincial government's ability to implement proactive emergency management.

- Moral hazard associated with guaranteed federal cost-shared recovery funding

Another major barrier is the moral hazard the province encounters from the federal cost-sharable recovery funding offered by the Disaster Financial Assistance Arrangements. As stated by Henstra & Thistlethwaite (2017), this funding model creates a “moral hazard” for provincial governments as there are no incentives, nor requirements for governments to change their policy direction to a proactive one to reduce disaster risk. Although this policy option is not designed to directly influence the DFAA, it is projected that significantly augmenting federal mitigation funding would reduce the level of moral hazard held by the provincial government. Ideally, mitigation funding would be used to implement proactive emergency management projects, ultimately reducing damages from a disaster, thus addressing the barrier by reducing the amount of recovery funding needed/cost shared between the province and federal. Thus, it can be said that reducing moral hazard greatly enhances the provincial government's ability to implement proactive emergency management.

- Fragmented disaster risk governance

This option also requires that proactive projects (public or private sector) must align with the public sector’s project goals, as well as the jurisdiction’s local legislation, regulations, risk assessments, while demonstrating cost effectiveness and risk reduction.

Although this policy option does not directly improve disaster risk governance, this option does facilitate strong collaboration between the province and municipalities. Thus, it can be projected that this option addresses the barrier of fragmented risk governance to a moderate extent, thereby moderately improving the province's ability to implement proactive emergency management.

- Short-term political cycles and risk perception

This policy option does not directly address the barrier posed by short-term political cycles and common perception of disaster risk being a future issue. That being said, it can be inferred that since this policy option is equipped with a three-decade timeline, short political cycles will not hinder the ability of the provincial government to access this funding. Although the three-decade timeframe may not impact the common perception that disasters are a future issue, the three-decade proposal possessing an approximate concluding time arguably incentivizes the province to access federal funding support. Therefore, this option demonstrates moderate ability to effectively address the barrier of politics and risk perception.

- Poorly managed (enforced) existing proactive measures (dikes, hazard maps)

Addressing the barrier associated with poorly managed existing proactive measures was not the primary goal of this policy option. Even though this option requires that proactive projects must uphold the public sector's project goals, as well as the jurisdiction's local legislation, regulations, and risk assessments, while demonstrating cost effectiveness and risk reduction, this option is not solely enough to effectively improve the management of existing proactive structures. Thus it can be said that this option demonstrates minimal ability to effectively address the barrier of poorly managed (enforced) existing proactive measures.

Overall, this policy achieves its main goal of addressing the barrier caused by insufficient federal mitigation funding and is also projected to address the barrier associated with moral hazard from recovery funding to a high degree. However, this option addresses the barriers of fragmented disaster risk governance as well as politics and risk perception to a moderate degree but shows minimal ability of addressing poorly managed existing proactive structures. This policy addresses all barriers to a moderate-high degree cumulatively, thereby moderately-greatly improving the province's ability to

implement proactive emergency management by overcoming select barriers. Thus, this policy receives a moderate-good rating for the criteria of effectiveness.

7.1.2. Ease of Implementation

This policy option is not designed to be adopted at a provincial level, therefore making implementation extremely complicated and arguably infeasible. However, this option was designed with particular consideration towards the provincial-federal relationship, since emergency management is under provincial jurisdiction but is heavily tied to federal funding. Rather than giving this policy a poor rating due to its infeasibility at the provincial level, I analyze this specific option in the federal context.

Although the jurisdictional example that this policy is modeled from strongly demonstrates a successful, longstanding federal mitigation funding program, that is not enough to reasonably assume it could *easily* be adopted in Canada. Although American disaster governance and emergency management agencies are quite similar in structure to their Canadian counterparts, America's economy is larger than Canada's. To demonstrate, in 2021, America's gross domestic product (GDP) was $22117 billion USD, while Canada's GDP was 1990 billion USD (O'Neill, 2022). Due to this notable economic difference, this policy could be implemented with a moderate level of complexity. This inference stems from how the option is not excessively complex, as a similar program has already begun to be implemented - the Disaster Mitigation and Adaptation Fund in 2018, with slight budget reinforcements in 2021 (Infrastructure Canada, 2021). Yet, economically, this policy does not offer a guaranteed low level of complexity. When contemplating American versus Canadian governance, economic considerations and the existing Canadian Fund, this criterion receives a moderate rating. It is important to note that at the time this capstone was written in 2022, the Fund received an additional $1.6 billion top-up; a step in the right direction but still not nearly as significant of an investment that is necessary (Radwanski, 2022). Although this policy receives a moderate rating for federal ease of implementation, if it were being analyzed in a provincial context, it would receive a poor rating due to its excess degree of complexity, thereby infeasibility for adoption at a provincial level. That said, I specifically did not analyze this policy within a provincial context as the provincial government would likely only play a minor role during this policy's implementation, such as corresponding with their federal counterparts to show their support for further mitigation funding. This

can be predicted based on the close funding relationship between the federal and provincial governments.

7.1.3. Short Term Cost

When committing to a mitigation project, the policy option requires that the federal government's share of funding must be 75-90%, while the province's share of funding would be 10-25%. To estimate the province's shorter-term costs, 10-25% of the $20 billion total was calculated, producing a range of $2 to 5 billion. However, this policy option is a federal program, meaning not all $20 billion committed will be allocated to one province, thus, a smaller proportion of the $2 to 5 billion calculated would actually apply to the provincial government. To determine a closer estimate of short term, upfront provincial costs, I conducted a pan-Canadian review of state of emergency declarations. In the last two decades, British Columbia has declared a state of *provincial* emergency five times due to natural hazard emergencies, Alberta has declared two, Manitoba has declared three, Quebec, Nova Scotia and Prince Edward Island have declared one, while no other provinces or territories have declared any (States of emergency in Canada, 2022). British Columbia has declared five of thirteen states of provincial emergencies across Canada, equating to 38%. Measuring this percentage against the $2 to 5 billion range, a closer estimate of British Columbia's short-term costs roughly $760 million to 1.9 billion. Since this is a significant short-term cost, it can be said that this policy has a high cost to the provincial government, and therefore receives a poor rating for this criterion.

7.1.4. Long Term Cost Benefit

According to Public Safety Canada (2019), the anticipated return on investment for proactive mitigation projects is a 1:6 ratio. This means that for every dollar spent or invested on proactive mitigative works, the return on this investment should equate to $6 in the long term. To estimate the long-term cost benefit, I will use the previous paragraph's approximation of shorter-term costs.

The province's approximate short term costs range between $760 million to $1.9 billion. When comparing these numbers to the 1:6 ratio provided by Public Safety Canada (2019), the return-on-investment measure can be approximated to $4.5 billion to

$11.4 billion. This is a high return on investment, so this policy option receives a good rating for the criterion of long-term cost benefit.

7.1.5. Stakeholder Acceptance

Insufficient mitigation funding support from the federal government was a major barrier that was demonstrated not only through literature review but reinforced by expert interviews. The majority of interview participants named funding as a key obstacle when seeking to implement proactive emergency management further in British Columbia and indicated that increased funding could address barriers. Recalling from the previous chapter, stakeholders are provincial government policymakers. Considering how interviewees have experience creating provincial emergency management policies, their perspective can be used to infer this option's acceptability. Based on how the majority of interviewees indicated insufficient funding as a barrier, I project that this policy option has high acceptability by key stakeholders. Thus, this policy receives a good rating for this criterion.

7.2. Trailblazing Improvement of the Provincial Disaster Financial Assistance Program

7.2.1. Effectiveness

- Moral hazard associated with guaranteed federal cost-shared recovery funding

This policy option entails that the provincial government undertake a thorough review of their disaster financial assistance program and regulation to make, both of which are bound by moral hazard due to guaranteed cost-shared recovery funding from the federal government. Although this policy option does not completely release the provincial government from moral hazard, it would reduce the degree of moral hazard encountered due to how the program and regulatory review would provide disaster financial assistance for not only disaster recovery, but disaster mitigation, too. By trailblazing the provision of mitigation efforts pre-emptively (not solely in the recovery phase), the provincial government will ultimately be less dependent on federal cost-shared recovery funding due to mitigating works reducing disaster risk and damages.

Therefore, it can be said that effectively reducing moral hazard enhances the provincial government's ability to implement proactive emergency management.

- Insufficient federal mitigation funding

This policy option does not entail the amount of federal mitigation funding increasing. Although the provincial government trailblazing proactive reforms to their disaster financial assistance program and regulation may demonstrate the importance of pre-emptive mitigation undertakings to the federal government, there is insufficient evidence that this policy would directly encourage improvements in federal mitigation funding. This option potentially addresses the barrier of insufficient federal mitigation funding to a minimal extent, thereby minimally improving the province’s ability to implement proactive emergency management.

- Fragmented disaster risk governance

This policy option does not have a goal of amending the fragmentation of disaster risk governance. Thus, this option potentially addresses the barrier of fragmented risk governance to a minimal extent, thereby minimally improving the province’s ability to implement proactive emergency management regarding governance specifically.

- Short-term political cycles and risk perception

This policy does not seek to directly address barriers caused by short-term political cycles and common perceptions of disaster risk. However, a major, trailblazing regulatory and program review to incorporate pre-emptive mitigation projects would ultimately begin to shift the common stance (held by politicians and the public alike) that disasters are a future issue. Therefore, it is estimated that this policy addresses the barriers caused by short-term politics and risk perception to a moderate extent, moderately improving the province's ability to implement proactive emergency management in this regard.

- Poorly managed (enforced) existing proactive measures (dikes, hazard maps)

This policy aims to provide disaster financial assistance funding for proactive mitigation efforts during the preparedness (pre-emptive) or recovery phase of a disaster.

The current disaster financial assistance program and regulation will provide recovery funding for existing proactive structures that were *properly* maintained, but it will only restore these structures, like dikes, to their immediate pre-disaster conditions. The post-review program and regulation would permit proactive structures to be built back to a better standard due to the new mitigation provisions and could therefore at least partially address barriers caused by poorly managed proactive measures - although it would not address or incentivize better management of hazard maps. Therefore, this policy addresses barriers caused by poorly managed measures to a moderate extent.

Overall, this policy achieves its main goal of addressing the barrier caused by moral hazard effectively - greatly improving proactive emergency management implementation ability. However, it demonstrates minimal ability to address barriers associated with insufficient federal mitigation funding and fragmented governance but shows moderate ability of addressing short-term political cycles and risk perception as well as poorly managed existing proactive structures. Therefore, this policy addresses all barriers to a moderate degree cumulatively, thereby moderately improving the province's ability to implement proactive emergency management by overcoming select barriers. Thus, this policy receives a moderate rating for the criteria of effectiveness.

7.2.2. Ease of Implementation

When assessing the Government of Manitoba's Emergency Management Organization's program review, it does not appear as though a program review is particularly complex. However, Manitoba's program review ultimately found much of their crucial feedback and review to exceed their scope and abilities. Based on Manitoba's experience, this policy option has a moderate level of complexity, therefore it receives a moderate rating for this criterion.

7.2.3. Short Term Cost

When reviewing Manitoba's program review report, it does not demonstrate evidence of new staff being hired to undertake the review process. Thus, it can be inferred that the provincial government would not encounter any additional short-term costs associated with hiring staff to undertake the trailblazing review and program/regulatory amendments. In terms of short-term costs associated with disaster

financial assistance being provided for mitigation, there is no evidence of definitive cost, largely stemming from how British Columbia would be trailblazing and the first government to provide disaster financial assistance for pre-emptive mitigation. Based on how one interviewee indicated that proactive emergency management would be "costly in the short term…", this criterion should receive a poor rating.

7.2.4. Long Term Cost Benefit

Similar to the above criterion, there is no accessible evidence available of what pre-emptive mitigation provisions through disaster financial assistance. Reflecting on what was stated by one interview participant, that proactive emergency management can "*costly in the short term, but long term … creates a resilient society",* the return on investment would be high. Therefore, this criterion has a good rating.

7.2.5. Stakeholder Acceptance

Interviewee insight serves to inform inferences about stakeholder acceptability. No interviewees mentioned a major program review as a method of overcoming implementation barriers, but the majority of interviewees indicated that modernizing regulation and a 'culture' or paradigm shift could address implementation barriers. Therefore, stakeholder acceptability of this policy is inferred to be high, thus, this criterion receives a good rating.

7.3. Legislated Conservation Authorities

7.3.1. Effectiveness

- Moral hazard associated with guaranteed federal cost-shared recovery funding

This policy option does not directly reduce moral hazard due to guaranteed recovery funding. That said, it is possible that legislated conservation authorities would ultimately manage disaster risk better than it currently is in the province, and that could reduce moral hazard. Yet, there is little evidence that demonstrates these authorities would directly reduce moral hazard. Thus, this policy option addresses/reduces moral hazard to a minimal extent.

- Insufficient federal mitigation funding

This policy option does not directly address the lack of sufficient federal mitigation funding. Therefore, this policy addresses this barrier to a minimal extent.

- Fragmented disaster risk governance

This policy option entails the legislation of a designated authorities to govern disaster risk as they would be directly responsible for floodplain mapping, hazard mapping, managing land use and regulating development in hazard-prone areas in cooperation with municipalities and the Province, supporting municipalities to minimize disaster impacts, acquiring flood vulnerable structures, and operating/managing proactive emergency management structures, like dikes. Although this policy cannot feasibly address the fragmented governance that stems from minimal federal oversight upon provincial and municipal jurisdiction, it does create a clearly defined governance entity for disaster risk. Interviewees indicated that unclear governance was a major barrier, thus, the ways in which this policy greatly clarifies disaster risk governance, this policy effectively addresses this barrier.

- Short-term political cycles and risk perception

This option does not directly address barriers caused by short-term political cycles and risk perception. Recalling how the Ford government recently reduced the powers of these authorities in Ontario, this policy option is clearly not invincible to the impacts of political cycles and perceptions of risk. Thus, it is apparent this option minimally addresses obstacles that result from short-term perceptions and politics.

- Poorly managed (enforced) existing proactive measures (dikes, hazard maps)

Another goal of this policy option was to address the poor management of existing provincial measures in the province. Through clear lines of governance, this policy would greatly address barriers caused by the subpar management of proactive measures in the province currently.

Overall, this policy effectively achieves its goal of effectively addressing the barriers of ambiguous disaster risk governance and suboptimal hazard/flood management to a great extent. It addresses barriers related to short-term political cycles

and risk perception to a moderate degree, but only minimally addresses barriers stemming from insufficient federal mitigation funding and moral hazard. Therefore, this option receives a cumulative moderate rating for this criterion.

7.3.2. Ease of Implementation

This option entails an entirely new piece of legislation be written and approved, based on Ontario's *Conservation Authorities Act.* Modelling the legislation directly from another province reduces complexity, but drafting new legislation is not an abundantly easy process. Reflecting on how the provincial government has been modernizing their *Emergency Program Act* for approximately five years. Barring a pandemic and unprecedented disastrous events inhibited this modernization from occurring sooner, this exemplifies how legislation does not entail low complexity. Therefore, this policy would have a moderate degree of complexity, therefore receiving a moderate rating.

7.3.3. Short Term Cost

The provincial government primarily funds conservation authorities, but a minor tax levy is also placed on municipalities (Conservation Ontario, 2022) to help fund them further. Although specific cost figures could not be accessed, based on the previous sentence, it is estimated that the province would have to incur the vast majority of costs to legislate and staff conservation authorities in the province. Therefore, this criterion receives a poor rating.

7.3.4. Long Term Cost Benefit

Although the previous criterion indicates the province would incur the majority of costs associated with legislation conservation authorities, their implementation has a great return on investment. This is exemplified by how these authorities successfully demonstrated the ability to effectively map hazards and manage dikes, regulated land use and prevented development in hazard-prone areas over the last seven decades in Ontario. Therefore, this criterion receives a good rating.

7.3.5. Stakeholder Acceptance

Ambiguous governance was indicated by many interviewees as a barrier to implementing proactive emergency management. Additionally, *"permanent bans on land development … in hazard areas", "culture shift", "accountability … enforcement"* were mentioned as some strategies to address barriers to proactive emergency management. The legislation of Conservation Authorities seeks to address ambiguous governance, thereby addressing some of the barriers described during interviews. As a result, it can be inferred that this policy has high acceptability by stakeholders, and therefore receives a good rating.

7.4. Amending the Dike Maintenance Act

7.4.1. Effectiveness

- Moral hazard associated with guaranteed federal cost-shared recovery funding

Even though this policy option does not directly address moral hazard, it can be projected that this policy option would indirectly reduce moral hazard associated with cost-shared recovery funding. This is because enforceable dike standards would lead to dikes being maintained better by 2030 and functioning more effectively to reduce flood damage, thereby reducing the amount of recovery funding required over time. Therefore, this policy addresses this barrier to a moderate degree.

- Insufficient federal mitigation funding

This policy does not aim to address the barrier caused by insufficient federal mitigation funding. Thus, this option addresses this barrier to a minimal extent.

- Fragmented disaster risk governance

This policy does not to address the barrier caused by fragmented disaster risk governance. Hence, this option addresses this barrier to a minimal extent.

- Short-term political cycles and risk perception

This policy does not address the barrier caused by political cycles or perceptions of risk. Thus, this option addresses this barrier to a minimal extent.

- Poorly managed (enforced) existing proactive measures (dikes, hazard maps)

This policy option directly improves the enforceability of dike standards in the province through amendments to key dike legislation. Therefore, this policy greatly addresses the barrier caused by poorly managed and enforced dikes.

Despite how this policy option achieves its goal of addressing a barrier caused by poorly managed and enforced dikes, it minimally addresses all other barriers. Therefore, it cumulatively receives a poor-moderate rating for the effectiveness criterion.

7.4.2. Ease of Implementation

Making amendments to a singular section of a piece of legislation is often not very complex, especially when amendments have a direct jurisdictional example to be modeled from. Therefore, this policy receives a good rating for this criterion.

7.4.3. Short Term Cost

Although amending legislation itself would not be costly, the ramifications of giving the legislation more enforceable capacity are that the government would have to incur major expenses associated with dikes under its jurisdiction. Based on the immense cost figures provided by the Northwest Hydraulic Consultants Ltd.'s (2015) report, this policy receives a poor rating for this criterion.

7.4.4. Long Term Cost Benefit

Despite the predicted likelihood of significant short-term costs as described in the previous paragraph, the long-term cost benefit would high as a result. This is based Public Safety Canada's (2019) statement that return on investment for proactive measures would generate savings of $6 for every $1 invested in prevention. Hence, this option receives a good rating for this criterion.

7.4.5. Stakeholder Acceptance

Interviewees with direct emergency management experience indicated that the current state of dikes serve as an implementation barrier to proactive emergency management, and that modernizing legislation was a possible method to address barriers. Therefore, updating/amending a key piece of legislation with a goal of improving the status of dikes in the province would be highly acceptable by stakeholders. Therefore, this policy receives a good rating for this criterion.

Chapter 8. Recommendation

In light of the analysis completed in the previous chapter, I recommend that a policy bundle approach be used, which entails implementing each of the aforementioned policies at different stages in time.

In the short term (before 2023, ideally before 2025), I recommend that the provincial government make amendments to their *Dike Maintenance Act*. This policy option has a low level of complexity, thereby rating well for ease of implementation, making it a suitable first recommendation. Making amendments to the *Act* that strengthen the enforceability of dike maintenance will ultimately result in better maintained dikes. This is a crucial first step to improving the state of existing proactive emergency management structures in the province, and effectively addresses the barrier to implementation caused by poorly managed dikes.

Also within the short term (before 2030, ideally before or during 2025), I recommend that the provincial government undertake a holistic review of their disaster financial assistance program and regulation. Completing a thorough review with the intention of trailblazing improvements for both a program and regulation is more complex than the previously discussed policy option and will therefore take more time and be less easy to implement. Thus, a review is a reasonable second recommendation.

In the final stretch of the short term (between 2025-2030), I recommend that conservation authorities be legislated in the province. This policy option scores the same as the previous option, thus, I recommend that it is also implemented in the short term so that its benefits can be realized, and proactive emergency management can begin to take shape sooner than later.

For the long term (three decades), I recommend that the federal government undertake enhancing their federal disaster mitigation funding approach. Although I concluded this policy would be incredibly complex and likely infeasible at a provincial level, the provincial government could play a minor role in corresponding with their federal counterparts to show their support for enhanced mitigation funding. Ultimately, this policy will have to be explored further by the federal government before being implemented over numerous years.

Chapter 9. Limitations

This study's scope is rooted in addressing barriers to implementing proactive emergency management in the province of British Columbia, which is demonstrated by the policy analysis and options I generated. Yet, it is important to note that there are other factors that make the implementation of proactive emergency management more challenging that could not be successfully addressed due to limited written evidence. That is not to say verbal accounts are not a suitable, accurate form of evidence, but for the purposes of this capstone and its scope, I selected the barriers that had existing written evidence associated with them.

Relative to the aforementioned point, it is also worth acknowledging that there is little scholarly research available on the topic of proactive emergency management, which serves as a limitation. Relatedly, there are also very few jurisdictional case studies in which proactive emergency management has been successfully implemented to a large extent, also serving as a minor limitation to this research.

Another limitation of this study is the lack of engagement with those who have lived experience. The outcomes and impacts of climate change, thus, climate-based disasters do not impact everyone in the province equally. Therefore, it would have been valuable to conduct interviews with individuals who have lived through a disaster. However, due to the time constraints of this capstone, and potential ethical implications associated with seeking out individuals based on their experiences with likely traumatic weather events, I did not conduct this type of interviews.

In relation to the previous limit, a shortcoming of this capstone is how it does not utilize equity as a criterion in its multi-criteria analysis. Equity is ultimately an important factor associated with emergency management. Yet, due to there being a limited number of successful jurisdictional examples, and even fewer that employ equity as a component of their emergency management policies, I therefore did not incorporate it into this study.

Chapter 10. Conclusion

Canada is experiencing more severe weather and disastrous events; the frequency and severity of these events are likely to worsen as the outcomes of climate change are realized over time. British Columbia has seen a number of these events in the last few years. These events are typically dealt with in a reactive manner, but the recent severe weather events mark the importance of shifting towards a more proactive emergency management approach. Yet, this shift necessitates that numerous barriers be overcome prior to implementation. These barriers include moral hazard from guaranteed recovery funding, insufficient federal mitigation funding, fragmented disaster risk governance, politics and the common ideology that disasters are a 'future issue', and poorly managed existent mitigation structures. Overcoming these obstacles to proactive emergency management is part of the critical path to achieve implementation.

It is important to recognize that this capstone possesses suggestions for how proactive emergency management can be approached in other Canadian jurisdictions facing similar obstacles. Although every province/territory has its own political agenda, natural hazards, risks and budgetary considerations, the barriers associated with implementation of proactive emergency management are likely consistent across the nation, as each jurisdiction in Canada has a close recovery funding-based relationship with the federal government due to the Disaster Financial Assistance Arrangements.

Implementing proactive emergency management is evidently a challenging, complex goal. A singular policy option cannot workably address every single barrier to a great extent. Thus, the proposed policy options and final recommendation serve to address each barrier to varying degrees of effectiveness, complexity, long- and short-term costs, and stakeholder acceptance. Overcoming barriers to proactive emergency management is the first step towards achieving implementation. Although the proposed policy options come with variable costs and complexities, the benefits of overcoming barriers and beginning to implement proactive emergency management will ultimately outweigh any initial concerns. Implementation of proactive policy will ultimately future-proof the province and harness resilience.

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Appendix A.

Interview Guide

1. **Introduction** (3 minutes) *[start audio recording]*

- Thank you for taking the time to meet virtually with me today.
- As you know, I am a graduate student in the Master of Public Policy program at Simon Fraser University.
- I am conducting research regarding proactive emergency management and the barriers the BC government faces with implementing it.
- I am interviewing you today given your experience/knowledge of emergency management. I anticipate the interview will last no longer than 30 minutes.

Consent

- I sent you a consent form via email recently. Can you confirm if you have reviewed and understood the consent form?
- Do you have any questions regarding the consent form?
  **Answer any questions*
- Are you willing to proceed with the interview under the conditions outlined in the consent form?
  **Record consent in fieldnotes*

Guidelines

- Please know there are no right or wrong answers to the questions I am asking you today.
- I am seeking your perspective and want to capture your knowledge and views. My pre-existing thoughts and opinions do not matter.
- Do you have any questions for me before we begin? If not, please know you're able to ask questions at any point during the interview.
  **Answer any questions*
- Additionally, you can refuse to answer any question and can withdraw from the interview at any point without any negative outcomes.

Preamble:

- My research is looking to unpack the barriers associated with proactive emergency management. After unpacking all of the obstacles, I intend to seek possible solutions to address the aforementioned obstacles. Thus, I hope to get your thoughts and perspectives on the following key subject areas:
  - Barriers associated with implementing proactive emergency management strategies/policy
  - Ways in which these barriers could be addressed
  - The extent to which the BC government's current emergency management efforts are equipped for the future.

2. Barriers (10 minutes)

I want to start by exploring your thoughts on the barriers associated with implementing more proactive emergency management policy/strategies. Therefore, I am asking you:

- What are the key barriers preventing the BC government from implementing proactive emergency management strategies/policy?

Expected responses include: cost to government, DFA program limitations, federal-provincial emergency management relationship, jurisdiction over proactive structures (ie. dikes)

- *Possible probe question:* Can you provide more detail about the significance of the barrier(s) you just mentioned?

3. Policy Options (10 minutes)

Next, I want to explore your perspectives regarding possible solutions to these barriers. Therefore, I am asking you:

- How do you think these barriers could be addressed?

Expected responses include: funding (DMAF), editing legislation, amending DFA/DFAA program, better enforcement of proactive structures

- *Possible probe question:* Of the option(s) you just mentioned, do you think it/they is/are feasible?

4. Consideration of Climate Change (10 minutes)

Since BC adopted the Sendai Framework in 2018, I am interested in how the current emergency management approach contemplates “future-proofing” the province. Therefore, I am asking you the following question:

- In what ways are the BC government's current emergency management efforts equipped for the future of natural emergency events due to climate change?

Expected responses include: New modernized legislation, reworked regulations, new requirements

- *Possible probe question:* Can you provide more detail about that?

5. Presenting Evaluation Criteria for Policy Option Analysis (15 minutes)

I now want to transition our conversation to the criteria I intend to evaluate policy options with. When I am thinking of criteria, I am thinking of incorporating pieces of the key societal and government objectives of emergency management.

Now, I am going to show you or read to you from a table that outlines my objectives, criteria and measures for policy option analysis.

- Would you prefer I show you this table by sharing my screen on Zoom, or read to you from the table?

Criteria	Definition	Measure
Effectiveness	Degree to which a policy improves the province's ability to implement proactive emergency management (by addressing barriers)	Greatly improves implementation ability
		Moderately improves implementation ability
		Minimally improves implementation ability
Ease of Implementation	Level of complexity associated with the implementation of a policy option	Low level of complexity
		Moderate level of complexity
		High level of complexity
Short-term cost	Approximate upfront cost to provincial government	Low cost to provincial government
		Medium cost to provincial government
		High cost to provincial government
Long-term Cost Benefit	Anticipated return on investment for the provincial government	High return on investment
		Medium return on investment
		Low return on investment
Stakeholder Acceptance	Level of acceptance of a policy option by key stakeholders	High acceptability of the policy option
		Moderate acceptability of the policy option
		Low acceptability of the policy option

- Now that you are aware of my intended criteria to evaluate policy options, do you have any comments regarding these criteria?

Expected responses include: possibly equity (due to tripartite and bilateral agreements)

6. Unintended consequences (5-7 minutes)

The last thing I want to discuss with you is potential unintended consequences of implementing proactive emergency management policies.

- Can you think of any unintended consequences associated with addressing some/all of the barriers we previously discussed?

Expected response: Administrative/staff impact

- *Possible probe question*: Do you think the negatives of the unintended consequences outweigh the positives of possible solutions discussed earlier?

7. Closing (2 minutes)

- Is there anything that we didn't discuss today that you would like to talk about now? I want to give you a chance to share any other opinions and/or thoughts you may have.

**end of interview - thank participant for their time today, and remind them that I will share a one-page summary document with the study's results upon completion of the study*