

UNIVERSITY OF CALGARY

An Investigation of the United Nations Sendai Framework for Disaster Risk Reduction and Its
Applicability to the Fort Chipewyan Community

by

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Abstract

Since disasters occur at a local level, it is important to assess community-based disaster risk management to ensure that the community can prevent and reduce new or existing risks. In response, the United Nations Sendai Framework for Disaster Risk Reduction (Sendai Framework) (2015-2030) was adopted to strengthen community resilience through disaster risk management. The research question that this project examines is: can the United Nations Sendai Framework build community resilience through improved disaster risk management, including climate change adaptation measures in Fort Chipewyan? This report will employ an extensive literature review to assess some of the environmental, technological, and man-made hazards in Fort Chipewyan, as well as provide a thorough description of lessons learned from the 2016 Horse River wildfire, and current policies, legislations, and regulations in place. This will allow the report to determine the benefits, and challenges to implementing the Sendai Framework within Fort Chipewyan's emergency management programs.

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List of Abbreviations

AEMA	Alberta Emergency Management Agency
AR5	Fifth Assessment Report
AR6	Sixth Assessment Report
CAO	Chief Administrative Officer
CEG	Community Emergency Guide
CEMP	Community Emergency Management Plan
DEM	Director of Emergency Management
EAC	Emergency Advisory Committee
ECCC	Environment and Climate Change Canada
EMA	Emergency Management Agency
GEMR	Government Emergency Management Regulation
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
NGO	Nongovernmental Organization
OCAP	Ownership, Control, Access, and Possession
OUV	Outstanding Universal Value
PAD	Peace-Athabasca Delta
PCA	Parks Canada
REMP	Regional Emergency Municipal Plan
RMWB	Regional Municipality Wood Buffalo
SAGD	Steam-Assisted Gravity Drainage
SDG	Sustainable Development Goal
WBNP	Wood Buffalo National Park
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations Office for Disaster Risk Reduction

Chapter One: **Introduction**

1.0 Overview

Climate change is an urgent matter that is negatively impacting the environment and socio-economic structures. In response and to address climate change, international organizations such as the Intergovernmental Panel on Climate Change (IPCC) were created “to provide policy makers with regular scientific assessments on climate change, its implications and potential future risks” (IPCC, n.d.a, para. 1). Ultimately, the IPCC is to provide governments with valuable insight in order to move forward with adaptation and mitigation strategies to combat the adverse impacts of the climate crisis. However, for nations to implement effective strategies, there must be a comprehensive understanding of both the causes and accompanying risks¹ associated with climate change.

Anthropogenic activity (e.g., increased greenhouse gas (GHG) emissions caused by the energy supply sector) is largely attributed as the main cause of climate change, which has collectively contributed towards global temperature increases since the Industrial Revolution (Government of Canada, 2019). However, natural occurrences (e.g., volcanic activity, solar radiation) can also influence the natural variability of the Earth’s climate. Climate change has negatively impacted global ecosystems, including the Canadian Prairies. Particularly, the Canadian Prairies have experienced some of the greatest temperature increases in southern Canada due its geographical location, which has amplified changes in the area. “The impacts of flooding, drought and wildfire in recent years are unprecedented, and climate models suggest an increased risk of these events in the future” (Sauchyn et al., 2020, p. 5). Even though there is evidence that suggests the frequency of natural events may increase due to climate change, effective disaster risk management is valuable to communities regardless of the variability of disastrous events. Effectively, community-based disaster risk management has the potential to “protect persons, [...] their livelihoods, health, cultural heritage, socioeconomic assets and

¹ The definition of risk is “the combination of the probability of a hazard event and its consequences which result from interaction(s) between natural or man-made hazard(s), vulnerability, exposure and capacity (United Nations Office for Disaster Risk Reduction (UNISDR), 2015b, p. 27).

ecosystems, and thus strengthen their resilience” (United Nations Office for Disaster Risk Reduction (UNISDR), 2015c, p. 10).

According to the Government of Canada (2021a), remote Indigenous and northern communities are especially vulnerable to the impacts of climate change. This is due to a combination of factors, including community inaccessibility, socio-economic factors, and aging infrastructure, which has emphasized the need to ensure that these communities have access to the appropriate resources and capacities. Specifically, the hamlet of Fort Chipewyan is in the Wood Buffalo National Park (WBNP) next to the Peace-Athabasca Delta (PAD) in northern Alberta. Although the Government of Canada (2018) classifies Alberta’s oldest settlement as non-Indigenous, “many of the residents of Fort Chipewyan are Mikisew Cree First Nation, Athabasca Chipewyan First Nation, and Fort Chipewyan Métis” (Regional Municipality of Wood Buffalo (RMWB), n.d.b, para. 3). In addressing climate change, this must be taken into consideration since “a range of factors, including geographic location, historic marginalization, legal and institutional barriers and socio-economic factors mean that climate change disproportionately affects Indigenous Peoples” (Government of Canada, 2021d, para. 4). These factors in combination with environmental, technological, and man-made hazards² emphasize the need to strengthen disaster risk management within this community in order to reduce future risks.

In response to the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, the United Nations Sendai Framework for Disaster Risk Reduction (Sendai Framework) (2015-2030) was established in order to continue to improve the prevention and reduction of disaster risk through global coalitions. Overall, the UNISDR (2015c) specifically affirmed that the goal of this framework is:

To prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, education, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience. (p. 12)

² A hazard can have different origins, including natural, man-made, technological, and environmental.

Furthermore, the Sendai Framework identifies the importance of monitoring areas that are vulnerable to potential disaster risks, man-made or natural, and the need to strengthen or develop policies and plans to achieve sustainable development (UNISDR, 2015c). Canada was one of 187 countries that signed this international legally non-binding agreement. This leads to the research question that this capstone project will examine: can the United Nations Sendai Framework build community resilience through improved disaster risk management, including climate change adaptation measures in Fort Chipewyan?

1.1 Multidisciplinary Dimensions

This study will employ a multidisciplinary approach and analyze energy, environmental and policy dimensions of emergency management. In terms of the energy dimension, this project will analyze provincial, national, and global emissions from the energy sector. An important component of this research will provide some informative data on global and national energy emissions and describe how this has been a major contributor to climate change, increasing the importance of implementing climate change adaptation measures. Moreover, this research will briefly explore how Fort Chipewyan is reliant on diesel to supply their energy needs. Although emissions emitted in northern remote communities do not significantly contribute to national and global emissions, it is important to consider remote communities in the energy transition to low-carbon alternatives.

In reference to the environmental dimension, this research will analyze the key hazards and risks faced by the community. Currently, wildfires and flooding have been identified as major environmental risks to the community, which have been exacerbated due to climate change. Some of which is attributed to the expected increase of wildfires in boreal forests, and recent ice-jam warnings in the area. Additionally, this research will analyze whether surrounding anthropogenic developments are contributing to disaster threats in the community. Notably, the Mikisew Cree First Nation has recently advocated for a local research hub, which has introduced the possibility of installing an environmental monitoring and research institute in Fort Chipewyan. The proposed Delta Institute would enable scientists and Indigenous Knowledge Keepers to work collectively to “preserve research for future generations” (Williscraft, 2021,

para. 7). This is aligned with the importance of identifying, monitoring, preventing, and reducing risks in the future in order to build community resilience in Fort Chipewyan.

Lastly, this research will analyze case studies from Poland and Cameroon, who have faced challenges implementing the Sendai Framework into their disaster risk management. This will provide insight on the possible challenges associated with incorporating this framework in Fort Chipewyan. Additionally, this project will explore federal, provincial, regional (RMWB), and municipal (Fort Chipewyan) legislation, regulations, and emergency management policies. By analyzing these alongside the Sendai Framework, this will provide insight on potential benefits and challenges associated with adopting this framework based on the guiding principles and priorities of action.

1.2 Sustainable Development Goals

In 2015, the United Nations adopted 17 Sustainable Development Goals (SDG) to “provide a shared blueprint for peace and prosperity for people and the planet, now and into the future” (United Nations, n.d.d, para. 1). Particularly, the Sendai Framework was formed to include poverty eradication, sustainable development, and climate action SDGs. For this research, the SDGs that will be incorporated are no poverty (Goal 1), and sustainable cities and communities (Goal 11). Climate action (Goal 13) will not be addressed, since the research question aims to include climate change adaptation measures, instead of climate mitigation measures.

Since natural disasters³ tend to increase poverty, it is important to assess how community resilience plays a role in addressing this problem through disaster risk management. Notably, some of the most expensive disasters in Canadian history have taken place in Alberta within the last decade. For example, in 2013, Calgary faced the largest flood since 1932, which resulted in \$6 billion in financial losses. According to The City of Calgary (2021), this includes:

\$55 million to cover the emergency response for Calgary, and \$323 million for recovery cost. Since 2013, The City [of Calgary] and Government of Alberta have invested an

³ “Natural hazards are a sub-set of all hazards” (UNISDR, 2015b, p. 23).

additional \$150 million in flood mitigation and resilience projects to help mitigate the risk of future flooding. (para. 14)

Additionally, the Insurance Bureau of Canada estimates that the 2016 Horse River wildfire, that occurred in northern Alberta, cost \$3.58 billion in insured losses (Insurance Bureau of Canada, 2016), and total economic losses from the “impact of the Wildfire (including reduced oil sands revenue, losses to public infrastructure and private property, impact on the environment, and to the physical and mental health of residents and first responders) are currently estimated at almost \$8.9 billion” (KPMG, 2017, p. 2). These disastrous events have collectively contributed towards the need to build resilient communities with effective disaster risk management in Alberta.

Importantly, effective policies and strategies have the ability to strengthen sustainable development within communities (Goal 11) by protecting people, sustaining ecosystems, and preserving cultural heritage (UNISDR, 2015c). This research aims to assess emergency management policies, strategies, and plans in place and their role in achieving a sustainable community in Fort Chipewyan.

Chapter Two: **Methods**

To investigate the research question, a qualitative method was used for this project. This research methodology was employed to assess the three dimensions (i.e., energy, environment, policy) through a combination of primary and secondary sources. All research findings are related back to Fort Chipewyan, as a case study, to evaluate whether the Sendai Framework could be an applicable blueprint used to strengthen community resilience through disaster risk management.

2.0 Qualitative Methods

An in-depth literature review was performed to enhance the overall findings presented in this research. This was through peer-reviewed academic papers, published reports, newspaper articles, and grey literature, in addition to any publicly available literature. This investigation included a discussion of the historical evolution and current state of climate change research, Canada, and Alberta's role in contributing to anthropogenic-induced climate change, and a brief discussion of diesel reliance in Fort Chipewyan. The insights from this investigation are related back to the importance of climate change adaptation through effective disaster risk management.

To evaluate the disaster risks in Fort Chipewyan, an extensive literature review was conducted to appropriately describe the potential environmental, technological, and man-made hazards presented to Fort Chipewyan, and how climate change has increased the likelihood of these events. In reference to the policy dimension, local, provincial, and federal emergency management published policies, legislation and regulations were analyzed in detail. Lastly, a summary of the 2016 Horse River wildfire was included to demonstrate how the Sendai Framework was referenced to develop future recommendations. Ultimately, literature review was conducted to develop a thorough understanding of the potential hazards the community may face and the need to ensure that policies, legislation, and regulations support strong emergency management measures to effectively reduce or prevent disaster risks from occurring in the future. Finally, the Sendai Framework was assessed to determine if it could be of use to Fort Chipewyan to strengthen their community resilience while reducing the likelihood of poverty and attaining a sustainable community.

2.1 Limitation of the Approach

Before this research could pursue an interview qualitative analysis with the Fort Chipewyan community, there needs to be prior community engagement, which could take up to two years. Due to time restrictions, this project was not able to engage with community members in Fort Chipewyan. Thus, the findings in this report do not necessarily reflect the opinions or views of Indigenous communities, or individuals in the area, and are based on publicly available literature (e.g., news articles, reports, and academic literature). Furthermore, it is acknowledged that all Indigenous communities in the RMWB, WBNP, and Fort Chipewyan do not necessarily share the same views and opinions. This project does not aim to provide any specific community-based recommendations within the field of emergency management since it could not effectively incorporate the perspectives of Indigenous residents in Fort Chipewyan.

This project attempts to remain respectful and considerate to the affected community members. While conducting the research for this report, published reports were referred to, which included interview results with Indigenous community members in the RMWB and Fort Chipewyan. However, these direct quotes were not included in this report since the author did not speak directly to the individuals and did not want quotes to be taken out of context. Below is a list of some selected reports that should be read to develop an understanding of some of the emergency management concerns and views of Indigenous people within the region.

1. Rebuilding Resilient Indigenous Communities in the RMWB: Final Report (Timothy David Clark, 2018)
2. Drawing a line in the oilsands (Kyle Bakx & Geneviève Normand, 2018)
3. Reactive Monitoring Mission to Wood Buffalo National Park, Canada Mission Report, March 2017 (World Heritage Centre and International Union for Conservation of Nature, 2017)
4. Review of Hydrologic & Geomorphic Downstream Impacts of Site C (Martin Carver, 2012)
5. Athabasca Chipewyan First Nation Inquiry WAC Bennett Dam and Damage to Indian Reserve 201 (Indian Claims Commission, 1998)

Due to the historic mistreatment of Indigenous peoples because of colonization, social injustices, and systemic racism, it is important that Indigenous peoples can freely express themselves

through their political, economic, and social structures (United Nations Declaration on the Rights of Indigenous Peoples, 2007). This includes being able to establish how academic data is collected, used, or shared through the Ownership, Control, Access, and Possession (OCAP) principles (First Nations Information Governance Centre, n.d.). Although OCAP is centered around providing a set of principles from a First Nations perspective, the concept could be beneficial to Métis and Inuit communities as well. This directly applies to academic research to ensure that there is no misuse of information, and that there is ongoing consent, guidance, and direction from the community throughout the research. This allows the community to voice their priorities but is also essential for relationship-building.

Chapter Three: **Energy**

3.0 Purpose

The purpose of this chapter is to describe how GHG emissions have contributed to climate change. Accordingly, the effects of climate change have contributed to hazards (e.g., environmental, technological, man-made) and have increased the need for hazard risk management. Since hazards⁴ vary depending on numerous factors, such as geographical location, and its surrounding ecosystems, it is important to address risks⁵ in specific communities. To understand how Fort Chipewyan fits into the big picture, there needs to be a comprehensive understanding of how anthropogenic-induced activities have contributed to the problem, and the need to incorporate climate change adaptation into emergency management.

3.1 Intergovernmental Panel on Climate Change and the United Nations Framework Convention on Climate Change

There are two main bodies that assess and address climate change: the IPCC and the United Nations Framework Convention on Climate Change (UNFCCC). The IPCC is an intergovernmental body that published its Fifth Assessment Report (AR5) in 2014 outlining scientific evidence of climate change, and the UNFCCC has established international treaties to prevent further anthropogenic-induced interference on Earth's climate (UNFCCC, 2021). Both bodies have influenced international policies regarding climate change; however, it is essential to describe their differing definitions of climate change. A peer-reviewed article written by Kelman (2015), *Climate Change and the Sendai Framework for Disaster Risk Reduction*, confirms the following information. The IPCC (2014a) defines climate change as:

A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural

⁴ The definition for hazard is “a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation” (UNISDR, 2015b, p. 19).

⁵ The definition of risk is “the combination of the probability of a hazardous event and its consequences which result from interaction(s) between natural or man-made hazard(s), vulnerability, exposure, and capacity” (UNISDR, 2015b, p. 27).

internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. (p. 557)

In contrast, the definition of climate change by the UNFCCC (1992) “means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (p. 7). In comparing the definitions, the IPCC’s version of climate change includes both anthropogenic and natural activity, while the UNFCCC focuses on human induced causes. Although there are many uncertainties regarding climate variability, there appears to be clear consensus among the IPCC and Parties to the Convention that human-related activity has impacted GHG emissions in the atmosphere (UNFCCC, 1992, p. 2). This showcases the importance of monitoring human activities that can “enhance the natural greenhouse effect, and that this will result on average in an additional warming of the Earth’s surface and atmosphere and may adversely affect natural ecosystems and humankind” (UNFCCC, 1992, p. 2). One potential adverse effect of climate change is that it can directly and indirectly influence hazards, contributing to the importance of disaster risk management. Prior to addressing specific community-based disaster risk management in any community, including Fort Chipewyan, there needs to be a broad understanding of how anthropogenic developments have contributed to climate change.

3.2 Global Energy and Climate Change

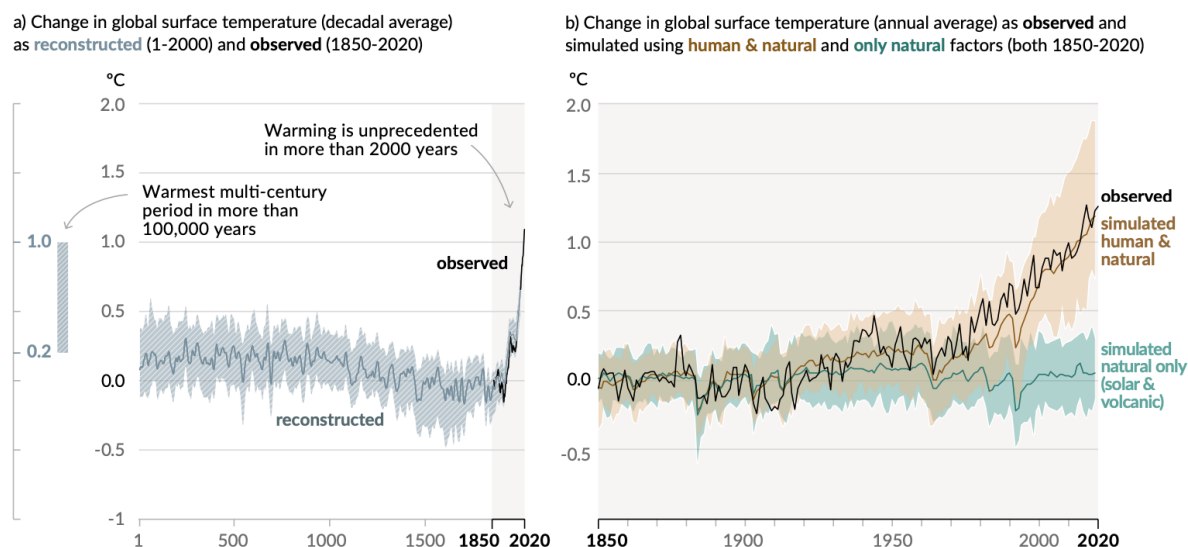
Due to the upward trend of global temperatures, reducing GHG emissions has become an urgent global initiative. In response to this trend, on December 12, 2015, the Paris Climate Change Agreement was adopted by 196 countries with the effort to stop “the increase in global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change” (UNFCCC, 2015, p. 3). In analyzing major contributors to GHG emissions, the IPCC identified the energy supply sector (i.e., energy extraction, conversion, storage, transmission, distribution) as a key factor (Bruckner et al., 2014). According to the AR5 report published by the IPCC, “the energy supply sector is the largest contributor to global GHG emissions (*robust evidence, high agreement*). In 2010, the

energy supply sector was responsible for approximately 35% of total anthropogenic GHG emissions” (Bruckner et al., 2014, p. 516). As the global population continues to increase, and the energy demand upsurges, this has impacted annual GHG emission growth over the past decade. For instance, it is expected that “direct [carbon dioxide] CO₂ emissions of the energy supply sector increase from 14.4GtCO₂/yr in 2010 to 24-33 GtCO₂/yr in 2050 (25-75th percentile; full range 15-42 GtCO₂/yr)” (Bruckner et al., 2014, p. 516). This emphasizes the importance of reducing the GHG emissions sourced from the energy supply sector, which will contribute towards meeting global climate policy agreements.

Since the publication of IPCC’s AR5, the Working Group I to the Sixth Assessment Report (AR6) was released in August 2021. Since this report is still in the final editing phase, not all the information presented can be cited, or summarized in this research. However, the approved version states that based on GHG concentration observations, “it is unequivocal that human influence has warmed the atmosphere, ocean and land” (IPCC, 2021, p. SPM-5). Figure 1 illustrates the IPCC’s observations between human and natural causes during a lengthy period, which shows the observed changes are more extreme than the simulated natural activity.

Figure 1 : IPCC Observations - Changes in Global Surface Temperature

Changes in global surface temperature relative to 1850-1900



Note. (IPCC, 2021)

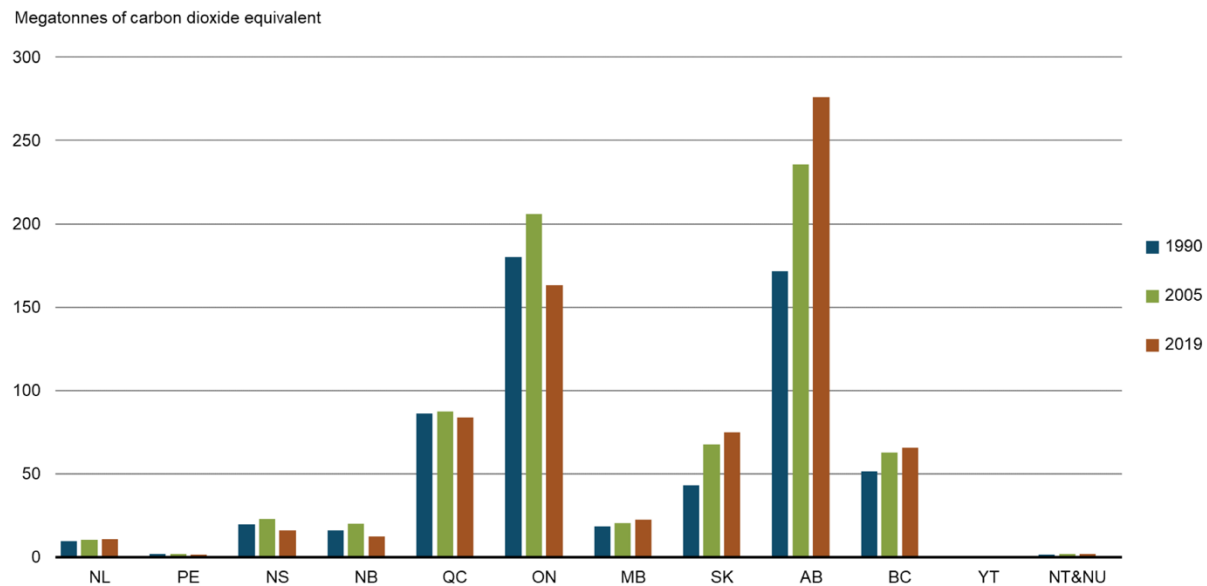
As a result, these projected changes will undoubtedly influence and contribute to increased frequencies and intensities of disasters in the future. This could include variable or extreme heavy precipitation, heatwaves, flooding, and drought, amongst others. This emphasizes the importance of adopting climate change adaptation measures into emergency management with the support of thorough disaster risk assessments to increase community resiliency in the future.

3.3 Canadian Energy Sector

After Canada signed the Paris Agreement, the Pan-Canadian Framework on Clean Growth and Climate Change was implemented to guide federal, provincial, and territorial governments towards reaching national climate goals (Environment and Climate Change Canada (ECCC), 2021b). Based on Canada's current 2030 climate goal progress, "GHG emissions are projected to be 588 megatonnes of carbon dioxide equivalent (Mt CO₂ eq) under Canada's climate plan or 227 Mt CO₂ eq lower than the 815 Mt CO₂ eq projected before the adoption of the Pan-Canadian Framework" (ECCC, 2021b, p. 5). Some examples of Canada's commitment towards achieving a low carbon future include the Carbon Pollution Pricing system and the phase out of coal-fired electricity generation (Natural Resources Canada, 2020b). However, there is evidence that shows Canada's "energy consumption grew by 30% between 1990 and 2017" (Natural Resources Canada, 2020b, para. 1). Currently, 589 Mt or 81% of Canada's total GHG emissions are sourced from the Canadian energy sector, which highlights the need to reduce these adverse impacts (Natural Resources Canada, 2020b; ECCC, 2019a).

In reviewing Canada's GHG emissions between the 1990 and 2019 period, there was a 21.4% increase in emissions. "This was mostly due to a 87% (89 Mt CO₂ eq) increase in emissions in the oil and gas sector and a 54% (65 Mt CO₂ eq) increase in the transport sector" (ECCC, 2021a, p. 7). Currently, Alberta is the top emitting province in Canada, followed by Ontario (Figure 2).

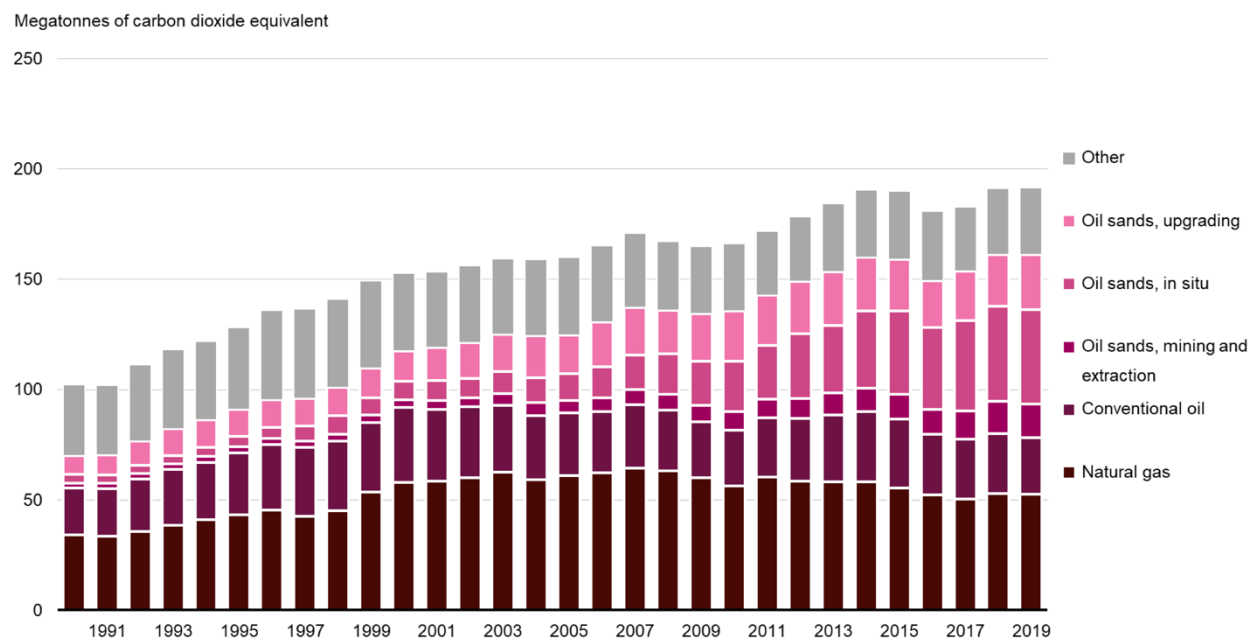
Figure 2 : Overview of GHG Emissions by Province and Territory



Note. (ECCC, 2021a)

The main reason behind Alberta's placement is related to "the increased production of crude oil and the expansion of the oil sands industry" (ECCC, 2021a, p. 8). It was reported in 2019 that most of Canada's emissions were from the oil and gas sector (26%), where 43% of these emissions originated from the oil sands category (ECCC, 2021a). Although there have been technological innovations (e.g., enhanced oil recovery), stringent provincial regulations from the Alberta Energy Regulator, and environmental policies (e.g., Oil Sands Conservation Act, Oil & Gas Conservation Act), which have slowly decreased emission intensity within the oil sands industry, it is clear that the Alberta oil sands requires further attention to reduce emissions.

Figure 3 : GHG Emissions from Oil & Gas Sector



Note. (ECCC, 2021a)

3.4 Alberta Oil Sands Development

The Alberta oil sands are located near the Cold Lake, Peace River and Athabasca areas. These regions are near Fort Chipewyan, and the community is located downstream from oil sands development (Bakx & Normand, 2018). In addition to contributing GHG emissions, nearby oil sands development in the region has adverse environmental impacts which will be discussed in Chapter 4.

3.5 Diesel Use in Remote Communities

As part of the Pan-Canadian Framework on Clean Growth and Climate Change, one of the main pillars of its framework includes building resiliency. Specifically, this policy document mentions:

Canada is experiencing the impacts of climate change, so there is also a need to adapt and build resilience. This means making sure that our infrastructure and communities are adequately prepared for climate risks like floods, wildfires, droughts, and extreme

weather events, including particularly vulnerable regions like Indigenous, northern, coastal, and remote communities. (Government of Canada, 2016, p. 3)

Fort Chipewyan is a rural⁶ community located in the WBNP. This settlement has a population of approximately 1000 people and the residents primarily rely on diesel to supply their electricity needs (Government of Canada, 2018). Although diesel is easily storable and a reliable source of energy, it is carbon intensive and expensive. Moreover, Fort Chipewyan's diesel can only be transported to the community via ice roads or by barge, depending on the season.

Three Nations Energy GP Inc. (Three Nations Energy) is “an equal partnership of three Fort Chipewyan Nations – the Athabasca Chipewyan First Nation, the Mikisew Cree First Nation, and Fort Chipewyan Métis Association” (Three Nations Energy, 2021a, para. 1). According to Three Nations Energy, some additional environmental concerns with diesel use include tank pollution, wasted energy, and unstable ice roads due to shortening winter seasons (Three Nations Energy, 2021c). Collectively, these environmental, economic and energy security concerns have contributed to the need to explore sustainable energy alternatives.

In November 2020, it was announced that ATCO, a utilities company, and Three Nations Energy, successfully completed Canada's largest off-grid solar project in Fort Chipewyan. “ATCO designed and built the two-phased project which includes a 600 [kilowatt] kW solar farm, owned and operated by ATCO, and a 2,200-kW solar farm owned by all three Indigenous communities and operated by ATCO” (ATCO, 2020, para. 3). This partnership includes ATCO purchasing electricity from the community through power purchase agreements, which will be redistributed to Fort Chipewyan. This solar project not only increases energy security in the community through sustainable and locally produced energy production but is also expected to provide 25% of the community's electricity needs. Moreover, this project should successfully reduce GHG emissions by 2,145 tons of CO₂ per year, which is equivalent to the elimination of 800,000 liters of diesel (ATCO, 2020, para. 5). Based on this information, this research assumes that Fort Chipewyan initially required 3,200,000 liters of diesel to supply its annual electricity needs, which is now reduced to approximately 2,400,000 liters of diesel per year as shown in Table 1. Moreover, Table 2 indicates that the assumed revised total of diesel used to supply

⁶ As well as an isolated community that can only be accessed by plane/boat during the summer and ice roads during the winter.

electricity within the community is approximately 6,435 tons of CO₂ per year. This is comparatively lower to Canada's reported total GHG emissions of 730 Mt CO₂ eq⁷ in 2019.

Table 1 : Approximate Annual Liters of Diesel Consumed for Electricity in Fort Chipewyan

	Liters of Diesel per Year	Percentage
Elimination	800,000	25%
Initial Total*	3,200,000	100%
New Total*	2,400,000	
<i>Note.</i> * Approximate		

Note. (Author, 2021)

Table 2 : Elimination & Total Tons of CO₂ per Year in Fort Chipewyan

	Liters of Diesel per Year	Tons CO ₂ per Year
Elimination	800,000	2,145
Initial Total*	3,200,000	8,580
New Total*	2,400,000	6,435
<i>Note.</i> * Approximate		

Note. (Author, 2021)

In comparing Fort Chipewyan to Canada, the GHGs emitted within the northeastern Alberta settlement are minimal. However, if Canada is to successfully meet its climate policy goals and commitments, there needs to be a multilateral approach to reducing the consumption of carbon intensive energy. This includes providing the capacity and resources (e.g., finances, technology) to remote, rural, and northern communities for the energy transition to increase their overall energy security, promote environmental preservation, and economic well-being, especially since remote communities are vulnerable. Overall, ATCO's partnership with Three Nations Energy demonstrates the importance of working and collaborating alongside rural, and

⁷ This project recognizes that Mt CO₂ eq includes additional GHG emissions other than CO₂. However, the purpose of this comparison is to demonstrate that Fort Chipewyan's use of diesel is not a major contributor to national GHG emissions.

Indigenous communities as there is continuous need to build resilient communities through climate change adaptation.

Chapter Four: **Hazards**

4.0 Purpose

“The Earth’s climate has always changed throughout humanity’s and the planet’s history, including long-term trends, shifts in the state and baseline, variabilities, and cycles” (Kelman, 2015, p.118-119). Undoubtedly, this has impacted environmental hazards and risks in multiple areas over time. However, the additional impacts of human and industrial-related activity have contributed towards environmental stressors alongside the existing impacts of climate change. Since climate change can influence weather-related disasters (e.g., wildfires, floods, droughts) it is important to assess “interactions between climate change and specific hazards in specific locations” (Kelman, 2015, p. 119). In summary, it is imperative to understand the environmental hazards from both local anthropogenic developments as well as any adverse impacts possibly attributed to climate change. This would ensure that communities can strengthen their resilience, by reducing poverty while improving sustainable development through adaptation measures.

4.1 Wood Buffalo National Park

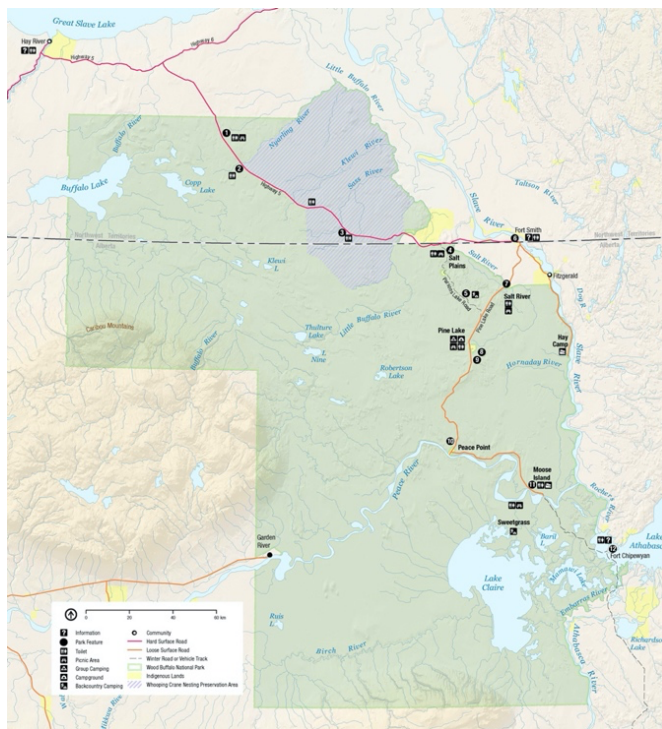
Fort Chipewyan, named after the Chipewyan people, was “established as a trading post in 1788 by the Northwest Trading Company” (RMWB, n.d.b, para. 2). Fort Chipewyan’s geographical location is particularly relevant when assessing its surrounding environmental, technological, and man-made hazards. Fort Chipewyan is the oldest settlement in Alberta, is adjacent to the WBNP and located at the southern part of Lake Athabasca. Fort Chipewyan is surrounded by a vast ecosystem – an area that is vulnerable. According to the first Reactive Monitoring Mission Report conducted by the World Heritage Centre and International Union for Conservation of Nature (IUCN) through the United Nations Educational, Scientific and Cultural Organization (UNESCO) (2017):

Industrial development along the critically important Peace and Athabasca Rivers has led the majority of local First Nations and Métis communities, scientists, Parks Canada (PCA) staff, conservations [non-governmental organizations] NGOs and others to conclude that the integrity of the PAD and WBNP has continuously and increasingly been affected over the past decades. (p. 7)

Considering the findings listed in this report, there needs to be a comprehensive analysis of the current ongoing concerns in the WBNP and the PAD to determine what potential risks they pose to the Fort Chipewyan community.

The WBNP was officially established in 1922 but has been a part of the “traditional territory of Indigenous peoples long before European arrival and continues to be to this day” (UNESCO, 2017, p. 1). Located within the Treaty 8 territory and Métis⁸ Nation Region 1 and 6, the WBNP is 44,807 square kilometres and extends between northern Alberta and the southern part of the Northwest Territories as shown in Figure 4. It is Canada’s largest national park containing boreal forests, plains, and wildlife. Notably, the WBNP is recognized by the UNESCO as a World Heritage site and is home to the “world’s largest herd of free-ranging Wood Bison (*Bison bison athabasca*) and the breeding ground for the only wild, self-sustaining migratory flock of Whooping Cranes (*Grus americana*)” (UNESCO, 2017, p. 1).

Figure 4 : Map of Wood Buffalo National Park



Note. (Parks Canada, 2021)

⁸ Métis people have Aboriginal rights (legal terminology) under Section 35(1) of the *Constitution Act, 1982*.

In 1983, the WBNP was listed as a World Heritage site⁹ based on three specific criteria:

Criterion (vii): The great concentrations of migratory wildlife are of world importance and the rare and superlative natural phenomena include a large inland delta, salt plains and gypsum karst that are equally internationally significant.

Criterion (ix): Wood Buffalo is the most ecologically complete and largest example of the entire Great Plains-Boreal grassland ecosystem of North America, the only place where the predator-prey relationship between wolves and wood bison has continued, unbroken, over time.

Criterion (x): Wood Buffalo contains the only breeding habitat in the world for the whooping crane, an endangered species brought back from the brink of extinction through careful management of the small number of breeding pairs in the park. The park's size (4.5 million ha), complete ecosystems and protection are essential for in-situ conservation of the whooping crane. (Government of Canada, 2020e, para. 1-3)

In 2014, the Mikisew Cree First Nation submitted a petition to the World Heritage Committee citing concerns regarding the overall conservation and threats to the WBNP (UNESCO, 2017). Consequently, the World Heritage Centre began its first Reactive Monitoring mission in 2016 to assess the Outstanding Universal Value (OUV)¹⁰ of the WBNP (UNESCO, 2017).

The conservation and overall condition of the PAD is particularly critical since it is the largest freshwater inland delta in North America (Three Nations Energy, n.d.). Over 80% of the PAD is located within the WBNP, where the Peace River, Athabasca River¹¹ and Birch River join at the western end of Lake Athabasca, near Fort Chipewyan (Figure 5). The main point of the conservation assessment was to evaluate the environmental impacts of the Alberta oil sands, hydroelectric dams, and open-pit mining, including the Teck Frontier oil sands mine project¹², on the PAD. The Terms of Reference outlined in the 2016 Reactive Monitoring Mission Report

⁹ “Several First Nations representatives expressed dissatisfaction with WBNP’s World Heritage status; a national and intergovernmental decision they say they never had any part in” (UNESCO, 2017, p. 11).

¹⁰ The definition for OUV is “cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity” (UNESCO, 2008, p. 4).

¹¹ The Athabasca River flows from Fort McMurray into the PAD and into Lake Athabasca.

¹² This project was terminated on February 25, 2020, at the request of the proponent.

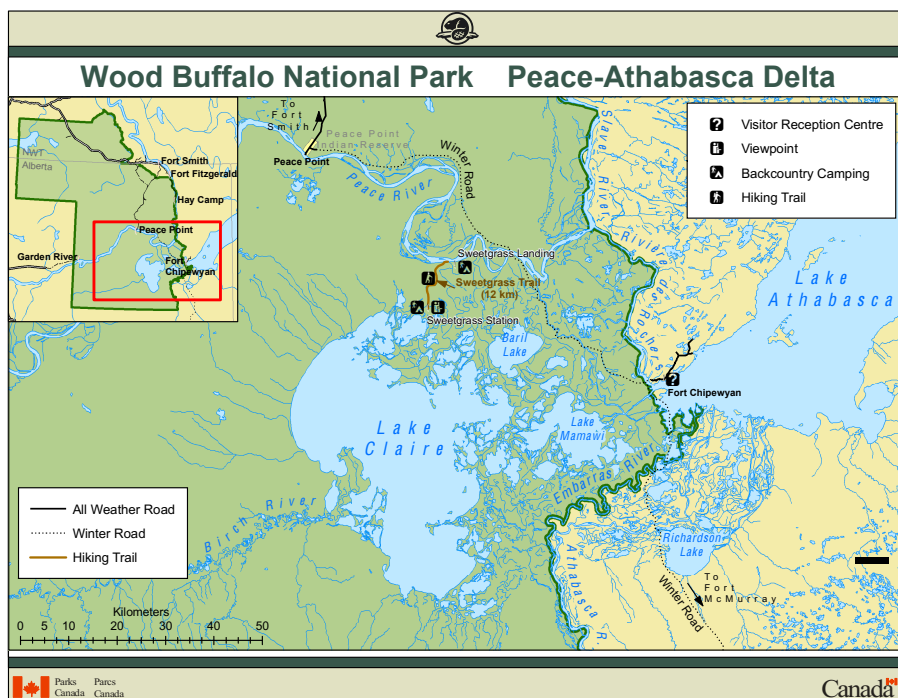
described four key points that the World Heritage Committee set out to understand. According to the UNESCO (2017), these included reviewing:

1. The current effects of Peace River flow regulation activities associated with operation of the W.A.C. Bennett Dam¹³ and Peace Canyon Dam, on the OUV of the property;
2. The potential (cumulative) impacts of the planned Site C Hydroelectric Dam on the hydrological regime of the PAD that could impact the OUV of the property, and the ecological processes as they relate to the OUV of the property, also taking into account the effects of climate change;
3. The impacts of existing and planned oil sands projects in the Athabasca oil sands region, as well as their associated tailings ponds, on the OUV of the property, including the impact on movement of migratory birds, and discuss the development and implementation of monitoring programs with the relevant authorities and stakeholders;
4. The above-mentioned developments on the ecosystems that support some of the traditional ways of life of indigenous communities. (UNESCO, 2017, p. 54)

At the end of the mission, there were 17 detailed recommendations made to address the issues surrounding the WBNP and the PAD at the end of the Reactive Monitoring mission. However, the WBNP's status may be included on the List of World Heritage in Danger following inadequate progress from UNESCO's first Reactive Monitoring Mission Report in 2016.

¹³ The W.A.C. Bennett Dam has resulted in many studies focused on PAD and Fort Chipewyan.

Figure 5 : Map of the Peace-Athabasca Delta in Wood Buffalo National Park



Note. (Parks Canada, n.d.)

A recent report from the UNESCO World Heritage Committee was released in June 2021 citing the significance of carrying out a second World Heritage Centre/IUCN Reactive Monitoring mission in the WBNP to assess the current state of conservation. Furthermore, while there was some recognition to the progress made in the past five years, there was an emphasis to realize all recommendations from the previous Reactive Monitoring Mission Report. These would contribute to solving some of the ongoing concerns that were previously identified, which include:

1. Road construction (issue resolved),
2. Renewable Energy Facilities,
3. Oil and gas (Alberta oil sands mining),
4. Climate Change,
5. Lack of adequate and comprehensive environmental monitoring,
6. Governance (lack of effective engagement with First Nations and Métis in monitoring activities and insufficient consideration of local and indigenous knowledge),

7. Groundwater and air pollution,
8. Cumulative impacts (sufficiently understood cumulative impacts of multiple development pressures). (UNESCO, 2021, p. 188)

Overall, the findings published in the 2016 Reactive Monitoring Mission Report reflect the existing environmental and governance concerns in the WBNP. It should be noted that the World Heritage Centre/IUCN actively engaged with First Nations, the Métis Nation, and community members during their mission. As specified in the 2016 Reactive Monitoring Mission Report, “some 120 community members attended a Community Supper in Fort Chipewyan on October 01, 2016 (no formal attendance was taken)” (UNESCO, 2017, p. 65). Some Indigenous members included the Athabasca Chipewyan First Nation, the Mikisew Cree First Nation, and the Fort Chipewyan Métis Local #125, who were previously identified as residents in the Fort Chipewyan community.

Additionally, while referring to Fort Chipewyan’s Community Emergency Management Plan (CEMP), there were three community-specific risks or hazard events identified based on the 2020 Disaster Matrix (RMWB, 2021a). The risks, or hazard events, included wildfires, community access-winter roads, and critical infrastructure failure. Based on the scope of this project, there will be further analysis conducted on the following: wildfires, flooding and ice jams, hydroelectric dams, uranium mining, the Alberta oil sands¹⁴, as well as community access and critical infrastructure all while including the role of climate change on these risks/hazards.

4.2 Environmental Hazards¹⁵

4.2.1 Wildfires

Climate change has been shown to lead to increased forest fire activity due to higher temperatures and drier climates (Three Nations Energy, n.d.). “It is *virtually* certain that hot extremes (including heatwaves) have become more frequent and more intense across most land

¹⁴ This study recognizes that there are additional industrial developments such as, agriculture, mining, forestry, and the pulp and paper facilities, that may contribute significant risks/hazards as well as GHG emissions. However, the scope of this project focuses mainly on oil sands developments since the Government of Canada identified this industry as one of the key sources for GHG emissions and was an area of concern in the 2016 UNESCO report.

¹⁵ Defined as “a process in the environment either occurring naturally, like earthquakes, typhoons, or man-made, like endocrine disruptors, and pollution, that may cause loss of life, injury [...], property damage, loss of livelihoods and services, social and economic disruption, or environmental damage” (UNISDR, 2015b, p. 17).

regions since the 1950s [...] with *high* confidence that human-induced climate change is the main driver” (IPCC, 2021, p. 41). This increases the likelihood and frequency of compound extreme events. For example, wildfires could have multiple drivers, such as a combination of hot temperatures, dry conditions, less precipitation, strong winds, and shorter winters. Regardless of whether a fire is ignited naturally (e.g., lightning), or is human-caused, wildfires can negatively impact communities.

In the summer of 2021, Canada began experiencing record temperatures, the highest in Lytton, British Columbia, at 48.6 °C. On June 30, 2021, Fort Chipewyan experienced a high of 39.3°C. While British Columbia and Alberta were experiencing this heatwave, wildfires began to threaten communities, and on June 30, 2021, a wildfire destroyed most of the village of Lytton and left residents with just minutes to evacuate. Additionally, it has been recorded that since March 1, 2021, there have been a total of 100 wildfires in the Fort McMurray Forest Area, which emphasizes the need to ensure that Fort Chipewyan has the appropriate wildfire preparedness and response measures in place. This not only includes ensuring emergency plans are refined, and strengthened, but also enhancing awareness and educating community members on how to prepare and evacuate during a wildfire incident. Increased preparedness can help reduce the likelihood of critical infrastructure failure, reduce loss of life, and reduce economic losses.

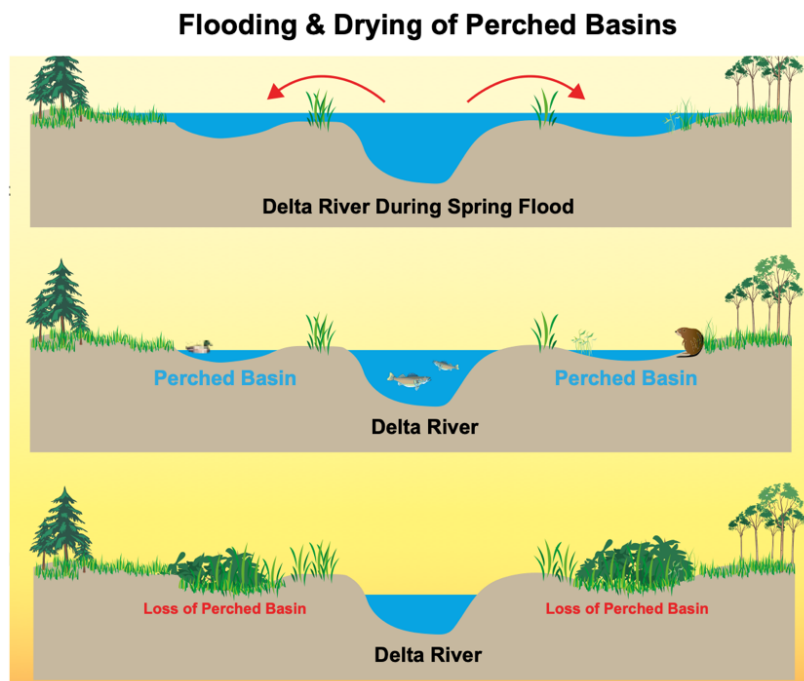
4.2.2 Flooding & Ice-Jams

In April 2020, an article published by Desmarais for CBC News highlighted concerns of flooding in Fort Chipewyan. At the time, the rising water levels had forced residents in Fort McMurray to evacuate, which could possibly have moved downstream. Additionally, there were concerns of ice-jams heading towards Fort Chipewyan from Fort Vermillion due to the Peace River Basin (Desmarais, 2020b). Although the CEMP for Fort Chipewyan does not include ice-jam flooding as one of their top three risks, or hazard events, it is worth addressing in further detail.

It has become common knowledge that ice-jam flooding in the Peace River is important since it can hydrate the PAD. This is usual during the spring season when an ice-jam is created from increased river flows, resulting in flooding of the delta and perched basins (UNESCO, 2017). However, due to the existing hydropower dams, such as the WAC Bennett Dam, the

winter energy demand has increased water discharges and freezing stages in the Peace River. This form of river regulation has reduced the likelihood of ice-jam flooding of the PAD, in addition to the potential effects of climate change. As climatic drying trends (e.g., reduced glacier melting, changes in river flow) continue and there is reduced flooding during the spring, this will affect wildlife habitat, the perched basins, and the traditional way of life for the Cree, Chipewyan, and Métis citizens in the area (Three Nations Energy, n.d.). This would include hunting, trapping, water use (e.g., drinking water, transportation, and provides resources), and shelter.

Figure 6 : Perched Basins



Note. (Three Nations Energy, n.d.)

Based on the recent reports of ice-jam flooding reductions due to river regulation and climate change, it suggests that flooding is not an urgent environmental hazard to Fort Chipewyan. However, this could change in the future due to variable climatic trends (e.g., heavy precipitation). Therefore, it is worth monitoring in the long-term to ensure it does not pose a threat to the community.

4.3 Technological & Man-Made Hazards¹⁶

4.3.1 Hydroelectric Dams

“Hydropower development is [...] partially justified on the grounds of claimed environmental friendliness. This ‘clean energy’ claim neglects that the scientific and technical discussion of hydropower development and its multiple environmental impacts today is much more nuanced” (UNESCO, 2017, p. 16). In the 1968 and 1980, the WAC Bennett Dam (2,730 megawatts (MW)) and the Peace Canyon Hydroelectric Dam (694 MW) were completed, respectively. These dams were constructed in northeastern British Columbia, located on the Peace River, as part of their Two Rivers Policy to maximize hydropower in the area. Unfortunately, research suggests that because of these hydropower projects, the environmental impacts to the PAD include restriction of movement and migration of fish, frequency of downstream flood events, reduction of flow peaks, and a decrease in the number of ice-jam flood incidents (UNESCO, 2017). Even considering this information, the Strategic Environmental Assessment for Wood Buffalo National Park (2018) mentions that additional hydropower projects are in development, which include the Dunvegan Hydroelectric Project, the Amisk Hydroelectric Project, and the Site C Project by BC Hydro (Parks Canada, 2018). Interestingly, a Joint Review Panel for Site C stated that they did not anticipate any environmental implications on the PAD, which was followed by a petition signed by 370 academic scientists citing their apprehensions (UNESCO, 2017). Given the concerns voiced by Indigenous communities, and scientific research conducted in the PAD, the fact that industries continue to underestimate the negative impacts of these projects is alarming.

4.3.2 Uranium Mining

Uranium City, Saskatchewan is located near the northern shores of Lake Athabasca. In 1952, radioactive materials were discovered in the area, which propelled the city into the uranium mining industry. After the mines were closed (between the 1960s and 1980s), there were tailings left containing radioactive uranium, radium, polonium, and heavy metals (Timoney, 2013).

¹⁶ Defined as “a hazard originating from technological or industrial conditions, including accidents, dangerous procedures, infrastructure failures or specific human activities” (UNISDR, 2015b, p. 30). This is also considered as a man-made hazard.

Currently, there are uncertainties whether “Lake Athabasca pollution associated with uranium mining extends to the delta through food chain effects and fish movements” (Timoney, 2013, p. 387). Although this industrial development is not included within the scope of this project, consideration must be given to the fact that there may be environmental and health impacts affecting the Fort Chipewyan community.

4.3.3 Alberta Oil Sands

The Alberta oil sands are the third largest oil reserves in the world with approximately \$23.7 billions of capital investment in 2018 (Government of Alberta, n.d.i). Canada’s oil sands cover approximately 142,200 km² in three regions: Athabasca, Cold Lake and Peace River, mainly near Fort McMurray. Oil sands are a mixture of sand, water, clay, and bitumen that needs to be extracted through in situ (~80%) or surface mining oil recovery methods. Figure 7 showcases a map of where active oil sands extractions are taking place within Alberta’s boreal forest, which is an area that Fort Chipewyan is nearby in northern Alberta (Alberta Energy Regulator, n.d.a).

Figure 7 : Oil Sands Extraction in Alberta



Note. (Alberta Energy Regulator, n.d.a)

Although there are extensive regulations and legislations (e.g., Oil Sands Conservation Act, Environmental Protection and Enhancement Act, Water Act) that the industry must adhere to, there are environmental implications. Specifically, there has been research and discussions surrounding the fact that oil sands developments have adverse impacts on air (e.g., methane emissions), water, and land (e.g., forest clearing) (Mackenzie River Basin Board, 2012). For the purposes of this project, there will be a focus on water impacts since the 2016 Reactive Monitoring Mission emphasized environmental concerns on the PAD, which is connected to the Athabasca River, right near oil sands facilities.

4.3.3.1 In Situ Extraction

This process requires underground extraction methods used for deposits that are buried over 75 meters beneath the surface. Currently, the most common in situ technique implemented

is steam-assisted gravity drainage (SAGD). The steam is required to heat and extract the bitumen in oil sand deposits by allowing the oil sands to move similarly as conventional oil. It is then pumped to the surface alongside the recovered water. This technology has reduced overall water consumption in comparison to surface mining. Approximately 0.5 barrels of water are required to produce one barrel of synthetic crude oil (Government of Alberta, n.d.h). Furthermore, standard in situ facilities reduce water extraction by recycling approximately 90% of the treated water consumed during the process. Overall, this process only requires 10% of freshwater that is supplied by groundwater aquifers and can send a portion of its wastewater for disposal. However, facilities occasionally source saline groundwater to preserve freshwater resources and groundwater tables. This could pose a vital solution for one of the world's most valuable resources.

4.3.3.2 Surface Mining

Surface mining technology sources bitumen deposits that lie less than 75 meters of the surface. Once the ground has been dug (i.e., land disturbance), the oil sands are mixed with water to create a slurry that can be pumped, and gravity separated throughout the process plant. The water used during this process is a combination of freshwater extracted from rivers, such as the Athabasca River, and reclaimed water from tailing pond storage facilities¹⁷. Specifically, this accounts for the 80% reclaimed water and 20% freshwater mixture that is consumed within the facility. Typically, surface mining is water intensive in comparison to in situ extraction where one barrel of synthetic crude oil produced requires two to four barrels of water (Government of Alberta, n.d.h). This extraction could be of concern since “water withdrawals by oil sands operators from the Athabasca River may be affecting in-stream flows towards the PAD” (UNESCO, 2017, p. 22). Moreover, climate change is expected to impact the Athabasca River flow, especially during the winter, when there are below-average flows (Jordaan, 2012).

¹⁷ It is reported that water extraction from rivers in Alberta for the oil sands industry totals 7-8%. Specifically, 3% of water from the Athabasca River is used for oil sands mining (Oil Sands Magazine, 2021b).

4.3.3.2.1 Tailings Ponds

Tailings are produced from surface mining, which contain sand, silt, clay, residual bitumen, and water. To reclaim this water, tailings ponds are formed for the solids to settle at the bottom. The process-affected water, that is separated at the top, is then extracted to be recycled back into the process. This water formation accounts for the 80% of reclaimed water used for surface mining. This water cannot be released back into the environment due to the varying amounts of hydrocarbons and additional toxins (e.g., ammonia, mercury, naphthenic acids). Overall, “tailings pose a significant problem to the environment and public safety” (Alberta Energy Regulator, n.d.b). Especially if the tailings ponds are not sealed properly, there could be groundwater contamination. This would pose a major threat to both wildlife and humans. “Tailings water ponds and contaminants causing risks of direct exposure to fish and wildlife, both leaks and spills convey contaminants into rivers that can affect aquatic organisms and be transported downstream towards the PAD” (UNESCO, 2017, p. 22).

4.3.3.3 Human Health Implications

Concerns from residents about nearby oil sands development must be taken into consideration. For example, “the Mikisew Cree First Nation and Athabasca Chipewyan First Nation, both based in Fort Chipewyan, Alberta, have advocated against oil sands development, arguing it infringes upon Aboriginal rights and damages the environment” (Ridington, 2015, para. 33). Unfortunately, potential adverse impacts include human health. In 2006, Dr. John O’Connor, a physician in Fort Chipewyan, reported alarming rates of cancer cases in the community (Malbeuf, 2021b). In response, there has been some research focused on assessing the role of oil sands on health in Fort Chipewyan and in general. Moreover, the Alberta Cancer Board confirmed that the cancer rates in Fort Chipewyan were “higher than expected for all cancers combined and for specific types of cancers” (Alberta Cancer Board, 2009, p. 44). Although there is still uncertainty surrounding long-term effects from oil sands exposure, potential short-term effects could include headaches and nausea (Finkel, 2018). In the future, Dr. John O’Connor has advocated for an independent study to assess the downstream influences of this industrial development (Malbeuf, 2021b). Ideally, this study would include a thorough analysis with a comprehensive conclusion of the role of oil sands development on human health.

4.3.3.4 Summary

The World Heritage Centre/IUCN recommended the State Party of Canada to “conduct a systematic risk assessment of the tailings ponds of the Alberta Oil Sands region with a focus on risks to the Peace-Athabasca Delta” (UNESCO, 2017, p. 24). This is especially important since there continues to be proposed project developments in the area. This would be informative and valuable to the Fort Chipewyan community as they continue to implement their community-based emergency preparedness. However, it is important that future research not only includes scientific knowledge, but Indigenous knowledge as well. This would ensure that Indigenous communities are consulted, accommodated, and engaged throughout the entire process by incorporating their knowledge (e.g., traditional, cultural) and experiences. Otherwise, research would be inconclusive since there would be a lack of understanding of the widespread oil sands impacts.

Figure 8 : Birds Eye View of Oil Sands Development in Alberta (2016)



Note. (NASA Earth Observatory, n.d.)

4.3.4 Critical Infrastructure and Community Access

Fort Chipewyan is a rural¹⁸ community located in the Subarctic region of Canada. Due to their isolated geographical location, rural communities are heavily reliant on local natural resources to sustain their livelihoods (Vodden & Cunsolo, 2021). Consequently, rural communities are known to experience greater impacts from climate change or industrial activities in comparison to urban centers due to minimal access to resources and capacities (e.g., financials, institutions, physical infrastructure, supplies). In Fort Chipewyan's CEMP, critical infrastructure failure was classified with a low likelihood (i.e., has occurred in the past 10 years and may occur in the future) and minor severity (i.e., low possibility of fatalities with possible displacement) (RMWB, 2021a). However, to ensure the community is resilient, the prevention and reduction of critical infrastructure failure is important. Therefore, this hazard should be analyzed in further detail. According to Public Safety Canada (2017), critical infrastructure:

Refers to processes, systems, facilities, technologies, networks, assets and services essential to the health, safety, security or economic well-being of Canadians and the effective functioning of government. Critical infrastructure can be stand-alone or interconnected and interdependent within and across provinces, territories, and national borders. Disruptions of critical infrastructure could result in catastrophic loss of life, adverse economic effects, and significant harm to public confidence. (p. 21)

It is known that the increase in likelihood of extreme weather events, including wildfires, have the potential of disrupting critical infrastructures. However, Fort Chipewyan's CEMP specifies that the likelihood of this risk (i.e., critical infrastructure failure) increasing due to climate change is non-applicable. Nonetheless, there are concerns related to transportation, particularly winter road access, that directly impact the community's critical infrastructure. During the winter months, the only way to access Fort Chipewyan is by ice roads. In January 2021, it was reported that the RMWB sent out a specialized contractor to repair the ice road to Fort Chipewyan due to mild weather (Malbeuf, 2021a). This news article stated that this road is usually frequented by residents for personal errands (e.g., groceries, medical appointments). However, one of the most pressing concerns for rural or remote communities is having undisrupted access to fuel supply.

¹⁸ A rural community is defined as having less than 50% of residents commuting to urban centres for work (Vodden & Cunsolo, 2021).

Periodically, there is diesel fuel transported to these communities to ensure they have access to a reliable energy source to supply their heat, power, and cars (Government of Canada, 2020d; Malbeuf, 2021a). Although Fort Chipewyan had approximately four to six weeks of fuel supply at the time, community leadership was aware of the potential risks associated with transportation and service disruption (Malbeuf, 2021a).

Existing literature states that the Arctic and Subarctic regions in Canada are experiencing significant impacts of climate change in comparison to the rest of Canada (Bush & Lemmen, 2019). As winter seasons are projected to shorten, this would ultimately affect ice road transportation. Although January is typically a cold month in this area, the possible rising and variable temperatures may lead to limited ice road formation in Fort Chipewyan. This not only affects ice-based travel safety but could interfere with the livelihoods of residents (e.g., mental health, food security, hunting) (Derksen et al., 2019). Moreover, since ice roads are partly formed over lakes and rivers, it would be beneficial to assess changes in lake and river ice. However, “changes in lake ice are difficult to project because lake models are not embedded within global climate models and individual lakes are not spatially resolved” (Derksen et al., 2019, p. 232). Overall, the Insurance Bureau of Canada (2020) shows that any damage to infrastructure, including roads, would require the most investment, which could be exacerbated with climate risks. For example, it was reported that climate change adaptation costs (e.g., permafrost, erosion, flooding) could result in some of the highest costs (Vodden & Cunsolo, 2021; Insurance Bureau of Canada, 2020). This emphasizes the importance of incorporating the impacts of climate change into community-based emergency management programming, some of which could include alternative transportation options (e.g., all season roads), technology to assess climate change risks, consistent environmental monitoring, as well as incorporating local and Indigenous Knowledge in emergency management and climate change adaptation (Vodden & Cunsolo, 2021).

Chapter Five: **Policy**

5.0 United Nations Sendai Framework for Disaster Risk Reduction

The United Nations Sendai Framework was adopted in March 2015 as the successor to the Hyogo Framework for Action (2005-2015). In comparison to its predecessor, the Sendai Framework emphasizes the importance of local actions, preventing new risks, and strengthening resilience. Furthermore, the Sendai Framework focuses on disaster risk management, rather than disaster management, and expands on what constitutes risk. Specifically, “the scope of disaster risk reduction has been broadened significantly to focus on both natural and man-made hazards and related environmental, technological and biological hazards and risks” (UNISDR, 2015c, p. 5). Additionally, the Sendai Framework was built to include the Paris Climate Change Agreement and the SDGs to coordinate efforts related to climate change adaptation (Public Safety Canada, 2018). This is crucial since there is evidence that shows climate change impacts are increasing the likelihood of disasters (i.e., frequency, intensity), which can result in extreme economic, health, environmental, social, and cultural losses (Public Safety Canada, 2018; UNISDR, 2015c). In other words, disaster can hinder any progress towards sustainable development initiatives.

The Sendai Framework was built to include seven global targets, four priorities for action, and 13 guiding principles. To assess international progress and achieve goals, the seven global targets include:

1. Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015;
2. Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020-2030 compared to the period 2005-2015;
3. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
4. Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;

5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;
7. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030. (UNISDR, 2015c, p.12)

In summary, these seven global targets are aiming to reduce mortality, the number of affected people, economic losses, and damage to critical infrastructure; while improving disaster strategies, international cooperation, and access/communication to risk information (UNISDR, 2015c; Public Safety Canada, 2018).

To guide local, regional, and national areas in the implementation of disaster risk management measures, four priorities for action were created. These are specified as (1) understanding disaster risk, (2) strengthening disaster risk governance to manage disaster risk, (3) investing in disaster risk reduction for resilience, and (4) enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation, and reconstruction (UNISDR, 2015c). Each priority for action is divided into national and local levels; as well as global and regional levels to describe multiple points that need to be achieved if the respective priority is to be attained. The priorities of action can be summarized as follows:

Priority Action 1: Understanding disaster risk includes using baselines, having access to reliable and updated data, incorporating traditional, Indigenous, and local knowledge, developing location-based disaster risk information, strengthening scientific and technological capacities, and increasing collaboration within communities (UNISDR, 2015c). There are additional components that are included within this priority to ensure that guidance is provided to emergency management leaders as they continue to increase their knowledge on the subject. This is crucial since emergency management officials implementing policies, strategies, or practices should have a thorough understanding of disaster risk, as these principles are commonly used throughout the emergency management continuum (UNISDR, 2015c).

Priority Action 2: This priority aims to strengthen disaster risk governance through defined coordination and plans, development of relevant regulations and policies, and well-defined roles and responsibilities (UNISDR, 2015c). Furthermore, this priority includes working alongside community representatives to “encourage the establishment of necessary mechanisms and incentives to ensure high levels of compliance with the existing safety-enhancing provisions of sectoral laws and regulations, including [...] environmental and resource management” (UNISDR, 2015c, p. 17). Overall, this priority for action is important since effective disaster risk governance should enable emergency management officials to strengthen prevention, mitigation, preparedness, response, recovery, and rehabilitation measures (UNISDR, 2015c).

Priority Action 3: Investing in disaster risk governance should provide communities with the appropriate resources (e.g., finances) required to implement disaster risk management (e.g., strategies, plans, policies). This priority of action could improve critical facilities (e.g., schools, hospitals, infrastructures) as well as “support the protection of cultural and collecting institutions and other sites of historical, cultural heritage” (UNISDR, 2015c, p. 19). Overall, it is stated that during 2005-2015, global disasters have impacted over 1.5 billion people, with total economic losses of approximately \$1.3 trillion (UNISDR, 2015c). This emphasizes the importance of investing in disaster risk governance to minimize potential losses while strengthening community resilience and protecting people.

Priority Action 4: As exposures to disasters increase, communities/people are becoming vulnerable to existing and new risks. Considering this information, “disasters have demonstrated that recovery, rehabilitation, and reconstruction phase, which needs to be prepared ahead of time, is a critical opportunity to ‘Build Back Better’¹⁹, including through integrating disaster risk reduction into development measures” (UNISDR, 2015c, p. 21). This priority for action highlights the importance of updating disaster risk preparedness plans and policies, training employees and volunteers in disaster response, increasing cooperation of multiple authorities and stakeholders, and ensuring that mental health services are provided to people (UNISDR, 2015c). It is also stated that communities should have access to the appropriate capacities for effective

¹⁹ This concept is defined as the “recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of [...] communities through integrating disaster risk reduction into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment” (UNISDR, n.d.a).

response, and recovery and the ability to learn from previous disasters to strengthen the “Build Back Better” model (UNISDR, 2015).

Canada was a signatory for the global Sendai Framework and it has been integrated into Public Safety Canada’s Emergency Management Strategy for Canada: Toward a Resilient 2030. This will be explored in further detail in the Section 5.2.2.

5.1 Challenges Implementing the Sendai Framework for Disaster Risk Reduction

The Sendai Framework was formed with the intention to strengthen community resilience through the implementation of disaster risk reduction measures. However, the Sendai Framework cannot predict all potential resistance factors communities will face as they consider incorporating the guiding principles into their emergency management. Below is a summary of some of the challenges select countries have faced while referring to the Sendai Framework.

5.1.1 Poland Case Study

A peer-reviewed article written by Goniewicz & Burkle (2019) mentions that some major potential risks to Poland include climate change and infrastructure losses, emphasizing the importance of strengthening their emergency management. “Research supports that if root causes related to prevention and preparedness are not immediately addressed, there will be a predictable exponential rise in all health-related consequences even if the strength of weather-related disasters remain the same” (Goniewicz & Burkle, 2019, p. 2). The authors proceed to state that Poland does not have a comprehensive understanding of the natural hazards (e.g., heavy rain, storms, hailstorms) that may be a threat to their country, nor has there been an attempt to incorporate a strategy to address these risks at the time of publication (Goniewicz & Burkle, 2019). There were currently seven projects in Poland being implemented for natural disaster risk management, or crisis management projects. Some of which include the Agricultural Drought Monitoring System, and IT System of the Country’s Protection against Extreme Hazards.

Overall, the authors found that Poland focuses on the emergency response phase and there needs to be a national disaster risk management plan (Goniewicz & Burkle, 2019). Moreover, they found that there needs to be (1) an increase in public awareness and education, (2) systematic data collection, and (3) ad hoc reports that outline losses from natural disasters.

This case study shows the importance of understanding disaster risks to effectively strengthen disaster risk management measures, while preventing or decreasing, disaster risks. This would protect people and reduce any threats to communities.

5.1.2 Cameroon Case Study

All 55 African countries signed the Sendai Framework, including Cameroon. A peer-reviewed article titled Disaster Risk Reduction in Cameroon: Are Contemporary Disaster Management Frameworks Accommodating the Sendai Framework Agenda 2030? (Bang et al., 2019) describes some of the major resistance factors Cameroon has experienced implementing the Sendai Framework. This article cited previous challenges with disaster management frameworks in Africa. For example, there are existing “gaps in the relationship between climate change induced hazards and urban risk-reduction measures in many African countries – including capacity and resources challenges that many DM [disaster management] and authorities face” (Bang et al., 2019, p. 465).

Cameroon is exposed to many hazards (e.g., natural, technological, anthropogenic, social) unique to its geographical location, which contribute to the need towards strengthening its resiliency. However, research conducted for this article shows that there are a few resistance factors posing some challenges to strengthening their disaster risk management. Bang et al. (2019) found that these resistance factors include: communication deficiency, decision making, coordination of disaster risk reduction and disaster management activities, provision of resources, international assistance, formulating disaster risk reduction plans and policies, and mainstreaming disaster risk reduction into sustainable development. Bang et al. (2019) were able to conclude that these resistance factors are common in other African countries, due to their political, economic, and sociocultural environments, and were able to provide potential recommendations on how to address these resistance factors. Overall, the authors acknowledge that disaster risk management measures to increase community resilience include political commitment, public awareness, and the incorporation of disaster risk reduction in emergency management. However, these are long-term goals that require cooperation from all levels of government, community members, and relevant stakeholders. As stated by Bang et al. (2019):

There is a long road ahead if Cameroon is to substantially enhance the resilience of its DM [disaster management] and DRR [disaster risk reduction] frameworks when there is probably a rather short time before the country will inevitably experience another major disaster. (p. 476)

This case study highlights how outward resistance factors can present complex challenges to emergency management practices. However, in referring to the Sendai Framework, this reinforces the importance of a whole-of-society, or inclusive, approach to disaster risk management.

5.2 Federal Emergency Management Policies

5.2.1 An Emergency Management Framework for Canada, Third Edition

In 2017, an updated version of Canada's Emergency Management Framework was published. This framework acknowledges the importance of adopting an all-hazard approach, which includes natural and human-induced hazards and disasters (Public Safety Canada, 2017). This is important while assessing risks, including environmental, technological, and man-made risks, since "natural and human-induced hazards and disasters have become more prevalent in urban and rural communities" (Public Safety Canada, 2017, p. 4). Notably, this framework also recognizes how climate change has contributed to the frequency and intensity of weather-related disasters, which highlights the urgency to include adaptation measures while implementing or strengthening emergency management measures.

Previously Canada's emergency management focused on preparedness and response; however, this framework looks at (1) prevention and mitigation, (2) preparedness, (3) response, and (4) recovery components. This adjustment was made since recovery enables communities to strengthen their resilience by pursuing a comprehensive approach to emergency management. For example, "greater attention or investment in prevention and mitigation can prevent disasters or significantly reduce the social, economic, cultural, and environmental costs and damages when events occur" (Public Safety Canada, 2017, p. 8).

Moreover, this policy highlights that municipalities or communities often manage their own emergency management since emergencies regularly occur at a local level (Public Safety Canada, 2017). When a municipality or community's capacity to respond is overwhelmed, or the

disaster crosses jurisdictional boundaries, provinces or territories will provide response assistance. As stated by Public Safety Canada (2017):

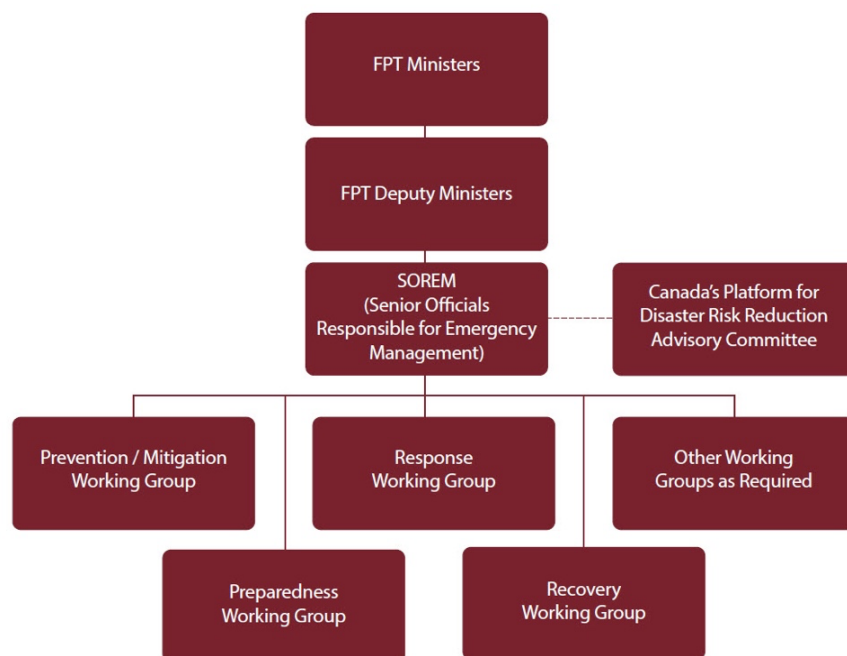
Emergency management responsibilities in Canada are shared by FPT [federal, provincial, territorial] governments and their partners, including Indigenous peoples, municipalities/communities and individual citizens who have a responsibility to be prepared for disasters and contribute to community resiliency. Provincial and territorial governments have responsibility for emergency management within their respective jurisdictions. The federal government exercises leadership at the national and international levels relating to emergency management responsibilities in its exclusive fields of jurisdictions and on lands and properties under federal responsibility. (p. 9)

In reference to emergency management governance, there are four tiers as shown in Figure 9.

The top tier is comprised of federal, provincial, and territorial Ministers. The second tier is composed of the federal, provincial, and territorial Deputy Ministers, followed by the third tier of Senior Officials Responsible for Emergency Management. It is important to note that although the working group, Canada's Platform for Disaster Risk Reduction Advisory Committee²⁰, is not a part of the third tier, they work together with the third-tier officials (Public Safety Canada, 2017). Lastly, the fourth tier has five working groups which are overseen by the third tier.

²⁰ The Sendai Framework is a part of Canada's Platform for Disaster Risk Reduction.

Figure 9 : Federal, Provincial, Territory Governance Structure



Note. (Public Safety Canada, 2017)

5.2.2 Emergency Management Strategy for Canada: Toward a Resilient 2030

In 2019, the Emergency Management Strategy for Canada: Toward a Resilient 2030 policy was released to “fulfill the Government of Canada’s commitment under the Sendai Framework for a pan-Canadian DRR [Disaster Risk Reduction] Strategy and aligns with the Sendai Framework’s 2030 timeline” (Public Safety Canada, 2019, p. 4). It is stated that the purpose of this framework is to build off the existing Emergency Management Framework for Canada, Third Edition with the goal of strengthening community resilience²¹ (Public Safety Canada, 2019). This is especially important now, since the impacts of climate change are increasing the likelihood of hazards (e.g., unstable seasonal ice roads), which pose a threat to communities, including Indigenous communities. This is worth mentioning since “many Indigenous communities are among the most vulnerable to climate change due to their remote

²¹ Public Safety Canada (2019) defines community resilience as “describing the ability of its members to draw upon their own inherent strengths and capabilities to absorb the impact of a disruption, to reorganize, change, and learn from the disruption and to adapt to emergency shocks” (p. 6).

[...] locations, lack of access to Emergency Management (EM) services, and reliance on natural ecosystems” (Public Safety Canada, 2019, p. 1-2).

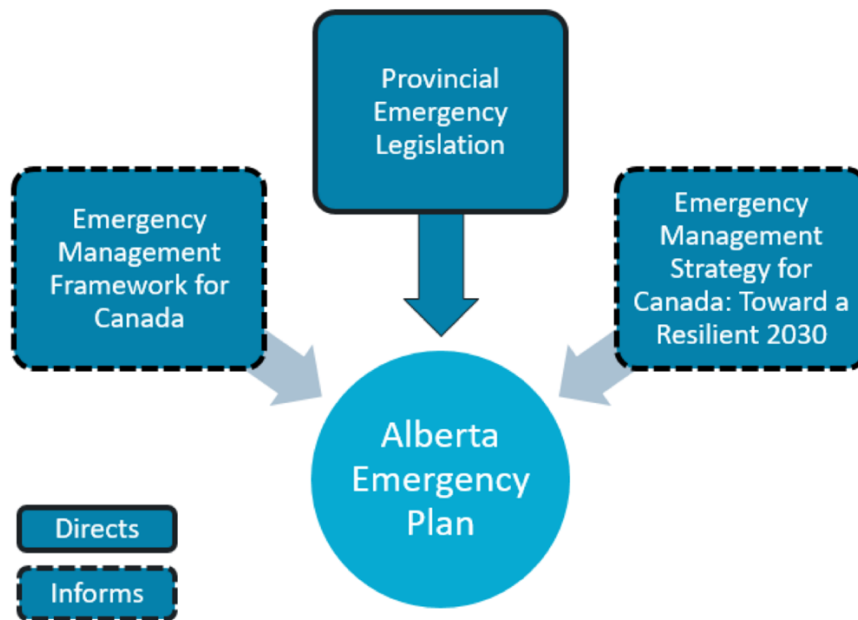
The Emergency Management Strategy for Canada: Toward a Resilient 2030 document proceeds to define five priority areas of activity as follows:

1. Enhance whole-of-society collaboration and governance to strengthen resilience;
2. Improve understanding of disaster risks in all sectors of society;
3. Increase focus on whole-of-society disaster prevention and mitigation activities;
4. Enhance disaster response capacity and coordination and foster the development of new capabilities; and
5. Strengthen recovery efforts by building back better to minimize the impacts of future disasters. (Public Safety Canada, 2019, p. 9)

Although these are not the same priorities for action outlined in the Sendai Framework, there are clearly similarities between both frameworks, which shows that the foundational principles have been integrated within Canada’s emergency management policies. Notably, Québec and British Columbia were mentioned in this document for implementing global frameworks for disaster risk reduction within their emergency management systems. In 2013, Québec adopted the 2014-2024 Québec Emergency Management Policy based on the Hyogo Framework for Action.

Additionally, in 2018, British Columbia became the first province in Canada to officially adopt the Sendai Framework into their emergency management system. The province is currently in the process of modernizing their emergency management legislation to implement the Sendai Framework, which is expected to be introduced in Spring 2022 (Government of British Columbia, 2021). Although there is no specific document that acknowledges the Sendai Framework being incorporated within Alberta’s emergency management program, the foundational principles have been referred to based on federal policies, such as the Emergency Management Strategy for Canada: Toward a Resilient 2030 document. Even though each province is responsible and has jurisdiction for their own respective emergency management, the previously mentioned document “seeks out to guide FPT [federal, provincial, territorial] governments, and their respective EM partners, in carrying out priorities aimed at strengthening Canada’s ability to assess risks and to prevent/mitigate, prepare for, respond to, and recover from disasters” (Public Safety Canada, 2019, p. 5).

Figure 10 : Federal and Provincial Influences on the Alberta Emergency Plan



Note. (Government of Alberta, 2021a)

5.3 Alberta Emergency Management Agency

The Alberta Emergency Management Agency (AEMA) operates under Alberta Municipal Affairs and is responsible for emergency management disaster mitigation, prevention, preparedness, response, and recovery (Government of Alberta, n.d,a.). Recently, a working document for the 2021 Alberta Emergency Plan was released, which was revised by AEMA alongside other departments, and partners (Government of Alberta, 2021a). This document outlines Alberta’s current emergency management system, which is used to strengthen provincial disaster risk management. Additionally, as part of its operations, AEMA functions under the Emergency Management Act legislation, followed by three regulations: (1) Government Emergency Management Regulation, (2) Disaster Recovery Regulation, and the (3) Local Authority Emergency Management Regulation. “In Alberta, organizations are typically assigned emergency management roles, responsibilities, and authorities through legislation, regulation, policy, or an emergency plan” (Government of Alberta, 2021a, p. 21). The aforementioned key legislative and regulation frameworks outline the roles and responsibilities for both local and

provincial emergency management, which is referred to by the RMWB's jurisdictional responsibilities and power of authority.

5.4 Alberta Legislation and Regulations

5.4.1 Emergency Management Act

The Emergency Management Act outlines and coordinates emergency management and disaster risk reduction measures that includes prevention, preparedness, response, and recovery emergency measures in emergencies and disasters (Government of Alberta, n.d.a, para. 1). It is important to note that in May 2020, there were additional amendments made to the Emergency Management Act through the Emergency Management Amendment Act (Bill 13). One of the main purposes of amending this act was to assist Alberta in responding to the COVID-19 pandemic, but these amendments can also be applied to additional emergency situations, including those that involve weather-related disasters, such as wildfires or floods. Previously, any provincial State of Emergency would proceed a State of Local Emergency, providing power of authority to the provincial government. Now, both the provincial State of Emergency and State of Local Emergency can occur simultaneously to ensure that municipalities have authority of their emergency responses²² (Government of Alberta, n.d.c). It is worth emphasizing that local authorities remain responsible for local emergency responses, including in a provincial State of Emergency, unless otherwise specified (Government of Alberta, n.d.c).

5.4.2 Government Emergency Management Regulation

This regulation defines emergency management “responsibilities of AEMA, government departments, and department deputy heads. The GEMR [Government Emergency Management Regulation] assigns responsibility for these three categories of organizations and individuals respecting the preparation or implementation of plans, arrangements, or training to deal with emergencies” (Province of Alberta, 2018, p. 21).

²² The Government of Alberta still can control emergency situations in instances when conflicts exist with local authorities, or whenever necessary.

5.4.3 Disaster Recovery Regulation

This regulation mainly provides financial assistance to damages or losses caused by disasters (Province of Alberta, 2021a). Moreover, it outlines the appeals process and eligibility requirements for disaster programs. Lastly, it “provides authority for the Minister of Municipal Affairs to establish the Alberta Disaster Assistance Guidelines and the Alberta Guidelines for Municipal Wildfire Assistance Program” (Province of Alberta, 2021a, p. 21).

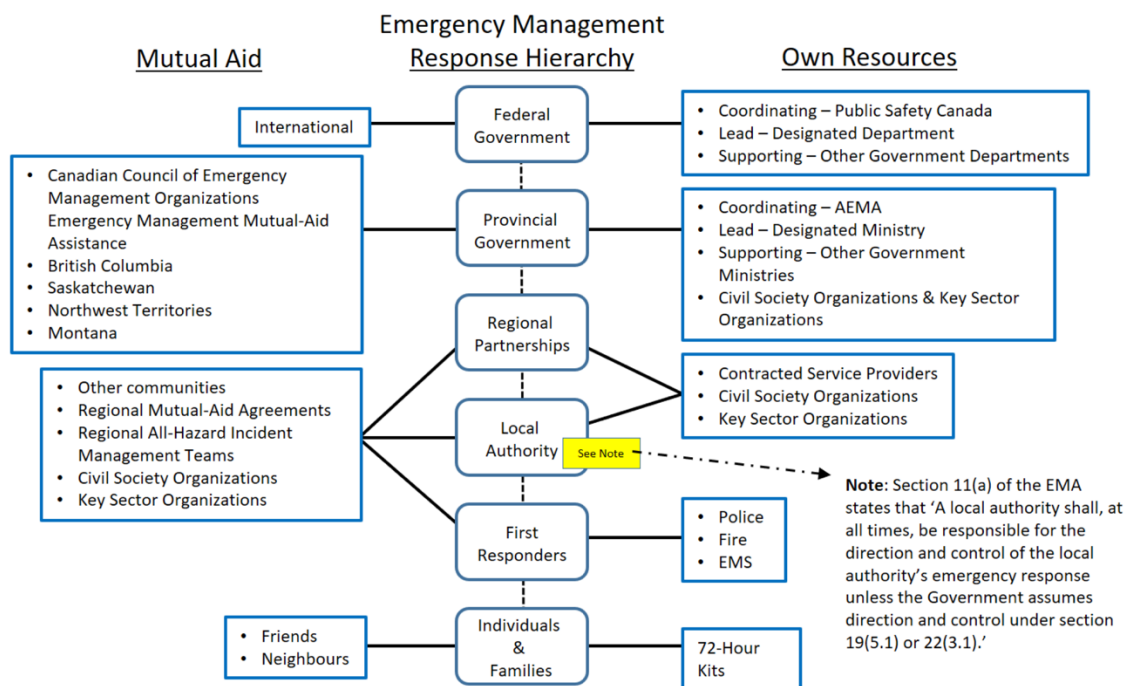
5.4.4 Local Authority Emergency Management Regulation

The Local Authority Emergency Management Regulation “provides direction on emergency management roles and responsibilities. Also, the requirements of municipalities to plan and prepare for the safety of their community” (Government of Alberta, 2018., para. 1). This includes appointing emergency advisory committees, and an emergency management agency through bylaws.

5.5 Alberta Governance Structure

In alignment with the Sendai Framework’s whole-of-society approach, it is stated that Alberta’s emergency management system is a part of a shared governance structure. As shown in Figure 11, there is a clear illustration of Canada’s emergency management tiered response (Government of Alberta, 2021a, p. 20). Here it is shown that responsibilities are shared amongst stakeholders (e.g., Government of Canada, Government of Alberta, Regional Emergency Management Collaboration, Local Authorities) and rightsholders (e.g., First Nations). This hierarchy is critical while assessing Fort Chipewyan’s emergency management, since it is shown that they do not directly respond to AEMA, but rather the RMWB (the “Regional Partnerships” box). However, since the provincial legislative and regulation frameworks are referred to by Regional Emergency Management Plans (REMP), as well as CEMP, it is worth summarizing before narrowing the scope to Fort Chipewyan.

Figure 11 : Shared Governance Structure

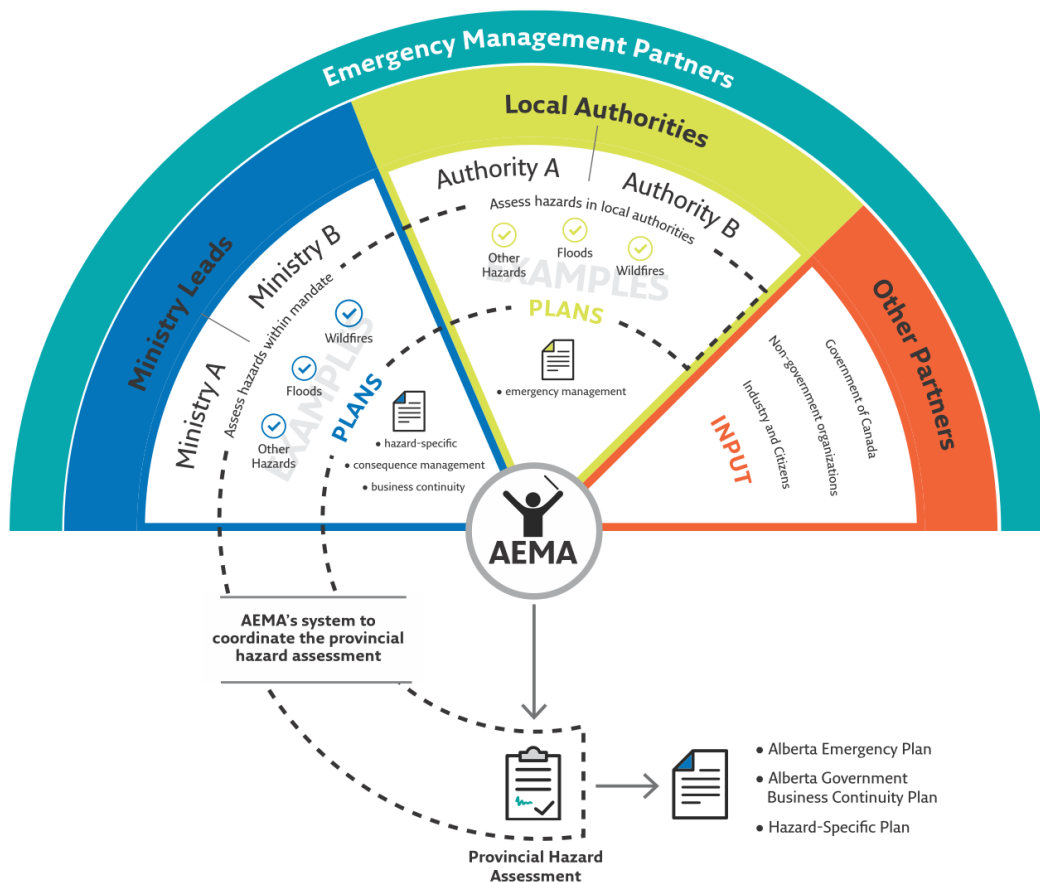


Note. (Government of Alberta, 2021a)

5.6 Provincial Hazard Assessment for Emergency Management

In 2020, the Provincial Hazard Assessment for Emergency Management Report was conducted to determine if AEMA had an effective provincial hazard assessment. This Assessment Report recognized that disasters are becoming more frequent and intense with accompanying high costs. To help the Government of Alberta respond to disasters that local authorities may not have the resources and capacities to, there needs to be a thorough provincial hazard assessment to provide a better understanding of the disaster risks.

Figure 12 : AEMA's Role in the Provincial Hazard Assessment



Note. (Auditor General of Alberta, 2020).

This would be beneficial in instances where jurisdictional responsibilities are assumed by the provincial government as mentioned in the statement:

Local authorities, including municipalities, Métis and First Nation settlements, have the primary responsibility to plan for and control the community's emergency response. If an emergency is too big for a local authority to handle or if additional resources are required, the response will escalate to an appropriate next level, such as the Government of Alberta. In turn, the Government of Alberta may call upon the Government of Canada for additional resources if required²³. (Auditor General of Alberta, 2020, p. 3)

²³ This is applicable to Fort Chipewyan.

This is also important to note because, although local authorities are responsible for developing and implementing emergency management plans, they do not inherit all financial burdens due to provincial and federal disaster programs, such as the Disaster Recovery Regulation (Auditor General of Alberta, 2020). Furthermore, it is mentioned that hazard assessments provided to local authorities lack essential steps, their reviews are not standardized, and “23% of local authorities do not have a hazard assessment” (Auditor General of Alberta, 2020, p.16).

Consequently, the Provincial Hazard Assessment for Emergency Management Report proceeded to propose that AEMA should look at developing an integrated provincial, ministry and local authority hazard assessment (Auditor General of Alberta, 2020). Overall, the report found the following issues:

1. AEMA drafted a preliminary provincial hazard assessment in collaboration with various ministries in 2014 & 2015
2. The provincial hazard assessment was not completed & was stalled from 2016 to 2019
3. In September 2019, AEMA restarted the provincial hazard assessment by drafting a framework & implementation plan
4. Since 2011, post-incident disaster reviews have included several recommendations to AEMA regarding the hazard assessment system; AEMA has not implemented fully the hazard assessment recommendations & it has weaknesses in its systems for monitoring the status of outstanding recommendations. (Auditor General of Alberta, 2020, p.9)

These findings emphasize the importance of developing a provincial hazard assessment so that the Government of Alberta, and local authorities, are provided the necessary information to strengthen community resilience while reducing any relevant risks. Moreover, this information is valuable and could be used to inform emergency management policies in the future (Auditor General of Alberta, 2020).

5.7 Regional Municipality of Wood Buffalo Emergency Management Plan

The RMWB includes Fort Chipewyan alongside eight additional rural communities, and the urban centre of Fort McMurray (RMWB, 2018). The purpose of the REMP is to recognize natural and human-induced hazards (i.e., hazard risk assessments) to strengthen resiliency in communities through effective emergency preparedness (RMWB, 2018). Since disasters are

local in nature, it is important to include community-based emergency preparedness. The REMP “includes the creation and maintenance of customized local emergency response plans that are reflective of the explicit needs of each community. Hazard risk assessments will be conducted focusing on the uniqueness of the community’s specific area and demographics” (RMWB, 2018, p. i). Overall, this policy has the intention to support emergency management officials²⁴ by outlining local authority roles and responsibilities, guidance on training and exercises, regional evacuation plan and operational centres while increasing information transparency to address hazards, risks, and vulnerabilities (RMWB, 2018).

5.7.1 Governance

The RMWB operates mainly under the Alberta Emergency Management Act, the Emergency Management Bylaw (Bylaw No. 18/006), and the Emergency Management Program (Administrative Procedure ADM-240). As previously mentioned, the Alberta Emergency Management Act “establishes the powers and responsibilities of provincial and municipal governments and their emergency management agencies” (RMWB, 2018, p. 6). The Emergency Management Bylaw states that the RMWB is not only responsible for the municipality’s response to an emergency, but also is to provide and approve emergency plans and programs (RMWB, 2018). Notably, the Emergency Management Bylaw was created after the 2016 Horse River wildfire, which shows how the RMWB has attempted to strengthen their emergency management. It is stated that:

- (d) This bylaw responds to one aspect of the Lessons Learned Report recommendations²⁵ – review of Emergency Management governing documentation – and also serves as enabling legislation for establishment of a new framework and structure for Emergency Management in the Municipality.
- (e) The Council may from time to time adopt policies and programs not inconsistent with this bylaw or the Act for the purpose of ensuring that the Municipality maintains an Emergency Management organization and a level of Emergency preparedness appropriate to meet the needs of the residents of the Municipality, or for the purpose of

²⁴ The REMP is not a substitute for a training manual.

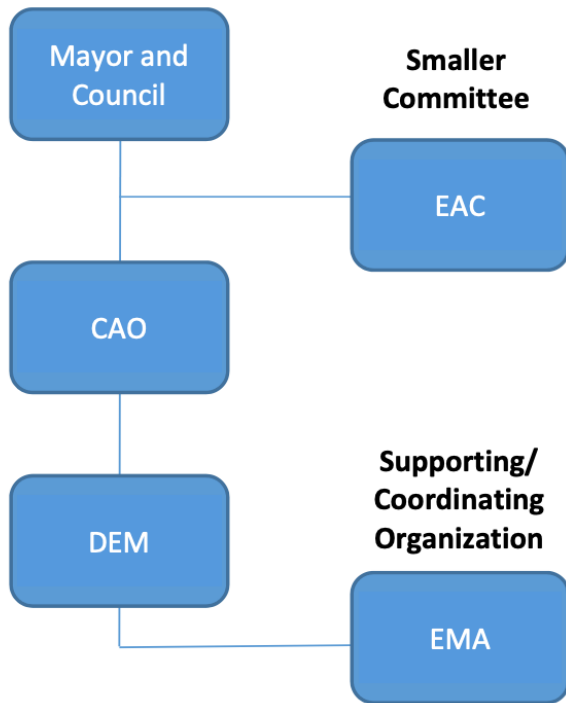
²⁵ This is in reference to the 2016 Horse River wildfire.

further delineating the role of the Council itself in the Municipality's Emergency Management organization. (RMWB, n.d.a, p. 1-2)

This not only sets out the purpose of the Emergency Management Bylaw, but also goes on to describe the methods of declaring a state of local emergency, exercise of extraordinary powers as well as roles and responsibilities of the Emergency Management Agency, which will be discussed in further detail.

There are five main roles and responsibilities described in the Emergency Management Bylaw. First, the Mayor and Council, otherwise known as the local authority, are “at all times, [...] responsible for the direction and control of the local authority's emergency response unless the Government assumes direction and control” (Province of Alberta, 2021b, p. 9). This is in addition to approving emergency plans and programs for the municipality. Second, the local authority needs to appoint an emergency advisory committee (EAC), as mentioned under section 11.1(1) of the Alberta Emergency Management Act. The EAC in RMWB consists of the Mayor (Chair), the Deputy Mayor (Vice Chair) and the Acting Mayor. The EAC can invite Indigenous leaders to attend committee meetings as well as establish sub-committees, or working groups, to consult Indigenous and rural communities as well as the oil sands industry with topics related to emergency management in the RMWB (RMWB, 2018). Third, in accordance with section 11.2(1) of the Alberta Emergency Management Act, local authority needs to establish an emergency management agency (EMA) that is comprised of a Director, Deputy Director, Regional Fire Chief, Officer-in-Charge of the Wood Buffalo Royal Canadian Mounted Police detachment, and representatives of senior leadership within the municipality chosen by the Chief Administrative Officer (RMWB, 2018). Fourth, a Chief Administrative Officer (CAO) must be appointed, who then chooses a Director of Emergency Management (DEM). The governance structure for the RMWB is shown in Figure 13. This is worth mentioning since clear governance structures can strengthen emergency management preparedness, and response through defined roles and responsibilities within the municipality.

Figure 13 : Governance Structure in Regional Municipality of Wood Buffalo



Note. (REMP, 2018)

5.8 Fort Chipewyan

Fort Chipewyan is located near the Dog Head Reserve (No. 218) and the Allison Bay Reserve (No. 219). However, according to a CBC news article published in 2018:

The RMWB voted to write a letter to the federal government, asking for the approval of the creation of a reserve within the hamlet of Fort Chipewyan. This would accommodate the treaty rights of Athabasca Chipewyan First Nation members, whose own reserve was rendered uninhabitable in the mid-1970s. (Thurton, 2018, para. 2)

Based on this information, Indigenous Services Canada is not responsible for emergency management funding within Fort Chipewyan. Therefore, Fort Chipewyan would fall under the RMWB bylaws as well as provincial legislation and regulations. For example, if Fort Chipewyan requires financial assistance after a disaster occurs, the community would need to refer to Alberta's Disaster Recovery Regulation.

Fort Chipewyan's emergency management program is an essential aspect to strengthen its community resiliency. This program should emphasize the importance of community-based emergency management responses through municipalities. As stated by KPMG (2017) in the Lessons Learned and Recommendations from the 2016 Horse River Wildfire:

Municipal governments play a critical role in emergency management. Municipal staff are often the first to respond to emergencies—which means that they require plans and resources in place to respond effectively to emergencies within their communities. While the federal and provincial governments are involved in emergency planning, the operational activities that address emergencies and the impacts that they create are addressed locally. (p. 1)

One way Fort Chipewyan has prepared its community for an emergency, is through the development of a CEMP as part of an extension from the REMP. Fort Chipewyan's CEMP outlines (1) a disaster risk matrix, (2) languages spoken by residents, (3) main sources of emergency communication to residents (e.g., social media, apps, website, Alberta Emergency Alert, Door-to-Door contact), (4) emergency procedures and (5) the muster point. Moreover, it outlines both airplane and boat evacuation plans, including accommodation facilities and registration centres that can be shown on a map.

Fort Chipewyan also has a comprehensive Community Emergency Guide (CEG) for residents that shares information on how they can prepare, prevent, and react during an emergency. This CEG is divided into sections (e.g., wildfire, air contamination, flooding, winter storm) to demonstrate what actions need to be taken in the likelihood of an emergency event. Additionally, Fort Chipewyan's CEG covers how to be "FireSmart²⁶", community/regional/provincial/national emergency contact information, and checklists (e.g., emergency car kit, evacuation procedures, how to plan).

²⁶ This is a fire mitigation program that is standardized across Canada.

Chapter Six: **Lessons Learned from 2016 Horse River Wildfire**

6.0 Purpose

This section summarizes the Lessons Learned and Recommendations from the 2016 Horse River Wildfire (KPMG, 2017) and A Review of the 2016 Horse River Wildfire (MNP, 2017). These reports are based on a large wildfire incident that occurred in northern Alberta within the vicinity of Fort Chipewyan. The Lessons Learned and Recommendations from the 2016 Horse River Wildfire report was conducted after Canada signed the Sendai Framework, which ended up being incorporated within the scope of review in the report conducted by KPMG (2017). Moreover, this aforementioned report mentions that conversations with the Athabasca Chipewyan First Nation, and Fort Chipewyan Métis Local 125 were held during the development of this report (KPMG, 2017). By referring to the lessons learned and recommendations in this case study, this will provide information as to the potential gaps in emergency response measures against the Sendai Framework, which will contribute to the Findings and Analysis chapter.

6.1 2016 Horse River Wildfire Overview

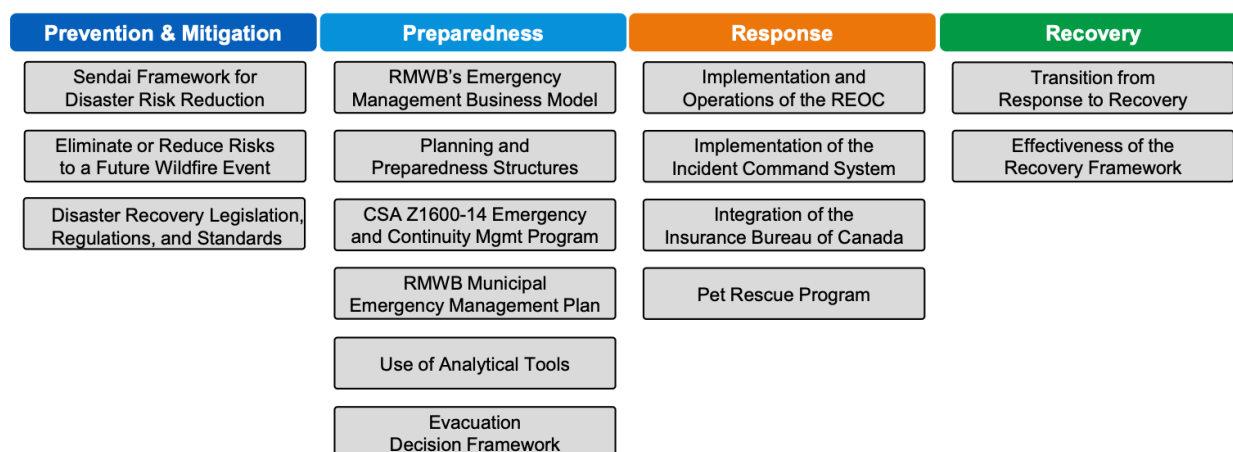
On May 1, 2016, a wildfire was identified 7 kilometers from the urban centre of Fort McMurray, which ended up spreading towards the RMWB on May 3 due to shifting winds. At the time, wildfires were identified as a potential hazard due to low moisture content during the winter, alongside warm and dry conditions the following spring season (KPMG, 2017; MNP, 2017). Studies show that most wildfires in Alberta occur during the spring season, which is expected to continue as climate change contributes to increased frequencies and intensities of weather-related disasters²⁷ (MNP, 2017). Overall, “the wildfire grew rapidly from 101,000 hectares on May 5 to over 589,000 hectares by June 10” (KPMG, 2017, p.11). The aftermath saw the destruction of 1,595 buildings, 88,000 people evacuated and cost a total of approximately \$8.9 billion.

²⁷ It is important to note that wildfires can be caused by a multitude of reasons, including lightning and human-induced. However, as the climate in northern Alberta becomes increasingly variable, any stressor can result in major disasters.

6.2 Sendai Framework for Disaster Risk Reduction and Lessons Learned

The Lessons Learned and Recommendations from the 2016 Horse River Wildfire report identified the Sendai Framework as an important process in the prevention and mitigation phase in order to reduce and prevent new disaster risks in the RMWB. This can be shown in Figure 14 alongside the importance of identifying legislation, regulations, and standards used to strengthen emergency management response.

Figure 14 : KPMG Scope of Review



Note. (KPMG, 2017)

6.3 Priorities for Action Recommendations

In the Lessons Learned and Recommendations from the 2016 Horse River Wildfire report, there was an analysis on future steps local governments could take to satisfy all four priorities for action listed in the Sendai Framework. It is important to note that this does not represent all considerations and information included in the 2016 Horse River Wildfire report, but rather a select portion of it, to provide the reader a broad understanding of some of the necessary steps that could strengthen disaster risk management. This report is beneficial in assessing the Sendai Framework in relation to Alberta, and Fort Chipewyan since it provides valuable insights as to the necessary actions that need to be undertaken to improve provincial and community emergency management.

Table 3 : Summary of Priority of Actions & Recommendation Examples from KPMG (2017)

Priority for Action	Examples
Priority 1: Understanding Disaster Risk	• Collect, analyze, and use data and other sources of information to understand disaster risks • Communicate information regarding disaster risks to the public • Develop and implement policies which support the reduction of disaster risks
Priority 2: Strengthening Disaster Risk Governance to Manage Disaster Risk	• Develop and implement strategies and plans that reduce disaster risk and create resiliency • Monitor compliance with mechanisms and incentives of safety-enhancing bylaws and policies
Priority 3: Investing in Disaster Risk Reduction for Resilience	• Allocate the necessary resources to implement disaster risk strategies and plans • Implement sustainable and risk reducing land use and development policies
Priority 4: Enhancing Disaster Preparedness for Effective Response and to “Build Back Better” in Recovery, Rehabilitation and Reconstruction:	• Develop recovery plans with a build back better philosophy • Promote regular emergency exercises and preparedness internally and externally

Note. (KPMG, 2017). This has been adapted from KPMG (2017).

6.4 List of Recommendations

The following 15 recommendations were made in the Lessons Learned and Recommendations from the 2016 Horse River Wildfire report. The recommendation that applies to the prevention and mitigation phase, is to focus on the improvement of disaster risk management.

1. Enhance disaster risk management
2. Review RMWB’s emergency management governance model and documentation
3. Enhance the RMWB’s Municipal Emergency Management Plan and refresh it annually
4. Enhance and update existing Business Continuity Plans

5. Enhance support for disaster risk management
6. Request to realign forest area boundaries with the RMWB's boundaries
7. Enhance emergency management training and exercise requirements
8. Enhance use of the Incident Command System during Response to support the implementation of appropriate emergency management protocols
9. Formalize existing Business Continuity Plans as part of the standard operating procedure during emergencies and disasters
10. Develop a Recovery Plan as a component of the Municipal Emergency Management Plan
11. Begin recovery planning and activities as early as possible following a disaster
12. Assess and account for trade-offs associated with different recovery governance and organization structures
13. Develop a community resilience strategy
14. Enhance the RMWB Evacuation Plan
15. Formalize the Pet Rescue Program. (KPMG, 2017, p. 5-9).

Chapter Seven: **Findings and Analysis**

The purpose of this research is not to provide recommendations regarding community-specific measures to Fort Chipewyan, but rather to assess the role of the Sendai Framework in emergency management, which may be useful or of interest to the community. Based on the extensive literature review discussed in the previous chapters, this chapter now discusses the Sendai Framework and its applicability to Fort Chipewyan in this chapter.

According to the peer-reviewed article, *Assessing Canada's disaster baselines and projections under the Sendai Framework for Disaster Risk Reduction: a modeling tool to track progress* (Godsoe et al., 2019), Canada has some major goals to attain if the nation is to meet its Sendai Framework commitments by 2030. Based on the Sendai Framework baseline data and Canada's forecasted data, the authors determined that:

Canada will need to prevent 88 hazard events from becoming disasters; keep the disaster fatalities rate near zero; avoid 4712 disaster-related injuries; prevent 555,826 people from being evacuated; avoid \$92.1 billion in disaster losses; and presumably protect significant sources of critical infrastructure and essential services from disruption. (Godsoe et al., 2019, p. 314)

The findings outlined in the previously mentioned article contributes towards the importance of implementing disaster risk reduction measures within national, provincial, and local emergency management programs. However, since disasters are local in nature, community-based disaster risk management is fundamental to ensuring rural and northern communities can prevent or reduce the likelihood of new and existing disasters. It should be noted that effective disaster risk management should make the effort to understand all risks posed to a community with the effort to avoid any relevant risks and strengthen community resilience (RMWB, 2018). As mentioned in the Sendai Framework, this includes looking at the “vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment” (UNISDR, 2015c, p. 14).

Like many other communities, Fort Chipewyan has a unique disaster risk profile. Although potential risks and hazard events are not solely based on the environment, this project focused on environmental, technological, and man-made hazards. Most importantly, scientific evidence supports the fact that climate change will exacerbate these risks through increased frequency and intensity in the near future (IPCC, 2021). Whether it is wildfires, flooding,

impacts from the oil sands industry, or unstable ice roads, it is important for the Fort Chipewyan community to implement preventative measures, including climate change adaptation measures, to reduce their vulnerability.

To achieve emergency management goals, policies and strategies can play a major role in strengthening community resilience to manage, prevent, and reduce risks and avoid any catastrophic damages (e.g., economic loss, death, critical infrastructure failure). This is where the Sendai Framework could be consulted to influence future emergency management policies, plans, and strategies to increase preparedness for response and recovery. Specifically, in relation to the Albertan and Fort Chipewyan context, the Sendai Framework can identify potential gaps and barriers in current disaster risk management identification, governance, investments, and preparedness. Of course, it is also important to note that policies, plans and strategies would adhere to the terms and conditions laid out in applicable legislation, regulations, and bylaws. That being said, legislation, regulations, bylaws, and policies need to be continuously updated, to ensure that any new challenges, needs, risks, and climate change adaptation is incorporated into emergency management measures. As previously discussed, the unprecedented 2016 Horse River wildfire was not only the costliest disaster in Canada, but also negatively impacted the environment, and livelihood of the affected residents. It is through these disastrous events that governments, emergency management leaders, and community members can refer to the experience to strengthen their emergency management preparedness, coordination, and response.

Another part of the Sendai Framework mentions that traditional, Indigenous, and local knowledge should be incorporated into disaster risk assessments, in addition to policies, strategies, and plans. This is relevant to the Fort Chipewyan community since many of the residents are Indigenous, and have Traditional Knowledge and observations of the land, which is valuable for disaster risk reduction and management. However, since engagement with the community was not completed during this project, it would be inappropriate to determine whether Indigenous residents in Fort Chipewyan have been engaged and consulted in the development of national, provincial, regional, and municipal emergency management.

In reference to the 2020 Provincial Hazard Assessment for Emergency Management report, it was determined that AEMA “did not have an effective system to coordinate the provincial hazard assessment” (Auditor General of Alberta, 2020, p. 9). Therefore, it could not

carry out the appropriate risk identification, analysis, evaluation, and treatment of risks in the province. This is directly applicable to the Sendai Framework's Priority for Action #1 – Understanding disaster risk, which outlines the importance of gathering relevant data to assess disaster risks.

The independent review conducted by KPMG (2017), Lessons Learned and Recommendations from the 2016 Horse River Wildfire, incorporated the Sendai Framework within their assessment to critically analyze existing prevention and mitigation measures. It was through cross-referencing the Sendai Framework with emergency measures in place, that the report was able to suggest recommendations for future improvement based on identified gaps in emergency management. This demonstrates the value of using the Sendai Framework as a guide to assess current disaster risk governance, data collection, policies, resources, and capacities as well as progress towards a whole-of-society approach. Furthermore, this independent review is aligned with Priority for Action #1, which aims “to build the knowledge of government officials at all levels, [...], communities [...] through shared experiences, lessons learned, good practices [...] on disaster risk reduction” (UNISDR, 2015c, p. 15). Moving forward, the guiding principles, priorities for action, and global targets outlined in the Sendai Framework could be used as a blueprint as the REMP and CEMP are updated.

7.0 Analysis

Based on hazards that were identified in Chapter 4, current emergency management policy, legislation, and regulations described in Chapter 5, and the 2016 Horse River wildfire summarized in Chapter 6, this research aims to determine the potential benefits the Sendai Framework can contribute to Alberta and Fort Chipewyan's emergency management. To conduct this analysis, the priorities for action listed in the Sendai Framework will be referred to, since each one lists key activities that are recommended for implementation.

7.1 Benefits & Challenges Implementing the Sendai Framework for Disaster Risk Reduction

A whole-of-society, or inclusive, approach to disaster risk management demonstrates best practices in emergency management. This would include engagement with government,

stakeholders, rightsholders, volunteers, and communities (UNISDR, 2015c, p. 10). However, for this to be achieved, there needs to be a strong partnership from all levels of government, local authorities, community members, and any other relevant emergency management officials to ensure that effective emergency coordination can be achieved.

In referring to Fort Chipewyan, there is a possibility that there may be some challenges to attaining this approach. As a result of systemic discrimination, there is still progress to be made with building trust and relationships with Indigenous communities. Moreover, rural communities tend to have limited access to resources and capacities, which includes communication and engagement with emergency management officials outside of their community. If an all-of-society engagement and partnership is to be achieved with Fort Chipewyan, there needs to be (1) assurance that Indigenous knowledge, culture, and values are integrated within emergency management policies, plans, and strategies; (2) complete transparency and sharing information with communities to prevent and reduce risks, (3) inclusion of community leaders in disaster risk management discussions to ensure that community concerns and views are acknowledged and understood, and (4) time spent in the community, not only to engage with Indigenous peoples, but to have an understanding of the risks posed to the community (Pan American Health Organization, n.d., p. 19). As the Sendai Framework states, disasters are local in nature, which means that the Fort Chipewyan community needs to have an informed understanding of the disaster risks in their area. However, to strengthen community resiliency and reduce vulnerability by empowering local authorities and Indigenous community leaders, it would be beneficial to strengthen partnership and emergency management coordination amongst federal, provincial, local, and Indigenous leaders.

Another potential challenge with implementing the Sendai Framework in an Alberta, or Fort Chipewyan context is based on disaster risk governance. Although there are policies, legislation and regulations in effect that aim to outline the roles and responsibilities of emergency management leaders, there could still be obstacles, especially apparent in the event of an emergency. Disasters have no jurisdictional boundary, which means that multi levels of government, and community are involved. Sometimes in the event of an emergency, this can likely lead to uncertainties. As mentioned in the Lessons Learned and Recommendations from the 2016 Horse River Wildfire (KPMG, 2017), some recommendations were based on revising

RMWB's disaster governance. The Sendai Framework points out the importance of "clear vision plans, competence, guidance, and coordination within and across sectors" (UNISDR, 2015c, p. 17).

Currently, local authorities, municipalities and Métis and First Nation settlements have the responsibility of planning and controlling the community's response. This is aligned with the Sendai Framework's mention of assigning "clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks" (UNISDR, 2015c, p. 17). Additionally, there are governance structures outlined in municipal, provincial, and federal frameworks to clarify disaster risk governance structures and protocols. The purpose of this is not to criticize current emergency policies, legislation and regulations that are applicable to Fort Chipewyan. However, by cross referencing the key activities listed in the Sendai Framework, it can be beneficial for policymakers, governments, and stakeholders to ensure that there is a:

Strong foundation in national institutional frameworks with clearly assigned responsibilities and authority to, inter alia, identify sectoral and multisectoral disaster risk, build awareness and knowledge of disaster risk through sharing and dissemination of non-sensitive disaster risk information and data, contribute to and coordinate reports on local and national disaster risk, coordinate public awareness campaigns on disaster risk, facilitate and support local multisectoral cooperation (e.g., among local governments) and contribute to the determination of and reporting on national and local disaster risk management plans and all policies relevant for disaster risk management. These responsibilities should be established through laws, regulations, standards and procedures. (UNISDR, 2015c, p. 17)

The Sendai Framework continues to describe the importance of investing in disaster risk reduction in Priority for Action #3. "Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment" (UNISDR, 2015c, p. 18). This was acknowledged in the federal Emergency Management Strategy for Canada: Toward a Resilient 2030 document, which states "the return-on-investment for these [prevention and mitigation] activities, while dependent on hazard type

and location, would generate savings of \$6 for every \$1 invested in prevention” (Public Safety Canada, 2019, p. 17). Furthermore, the abovementioned document has been used to inform the Alberta Emergency Plan. Currently, this project cannot determine the specific financial resources and relevant capacities available to Fort Chipewyan to support its emergency management practices. However, the Sendai Framework can guide provincial, and local levels towards allocating the necessary resources to communities to strengthen their resiliency. This would include providing access to health services (with special consideration given to members with life-threatening illness or reduced mobility), ensuring food security, rural development planning, and the revision of policies and regulations. It should be mentioned that policy, regulatory, or legislation revisions or creations are time consuming since a lot of considerations and stakeholders are involved in the process. To ease the overall process, this could be related back to the importance of a whole-of-society approach, where an inclusive and engaging coordination of emergency management from all levels and rightsholders are realized. In reference to the last priority, Priority Action #4, the Sendai Framework states:

The steady growth of disaster risk, including the increase of people and assets exposure, combined with lessons learned from past disasters, indicates the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels. (UNISDR, 2015c, p. 21)

This is applicable to Fort Chipewyan since there needs to be constant revision and updates to disaster preparedness policies and plans as disaster risks continue to increase, or emerge. Notably, the CEMP of Fort Chipewyan was recently updated in March 2021, but the REMP for RMWB has not been updated since 2018. This is not aligned with one of the recommendations from the Lessons Learned and Recommendations from the 2016 Horse River Wildfire, which suggested the REMP be updated on an annual basis. If communities are to prepare for disasters, there needs to be updates made to ensure it reflects the disaster risks relevant at the time.

Additionally, the Sendai Framework suggests that there is a need for constant disaster training and exercises to ensure effective response to disasters. This is beneficial to Fort Chipewyan since preparedness can decrease its vulnerability in the future. One effective example is the Fort Chipewyan CEG released in 2019, which works to promote home and personal

emergency preparedness. This form of public awareness increases community member knowledge of the hazards that may directly or indirectly implicate them and guidance on how to effectively respond.

7.2 Limitations of the Sendai Framework for Disaster Risk Reduction

7.2.1 General Guide

One major limitation to the Sendai Framework is that it is a general guide²⁸. Although the foundational principles can be beneficial to strengthening disaster risk management, there have been challenges implementing the Sendai Framework in different areas. This reinforces the fact that frameworks are limited and need to be adapted to each community. Thus, the Sendai Framework is not without its restrictions, but it is still worth applying its key activities to communities to critically analyze how to strengthen community resilience. As previously summarized, Poland and Cameroon have had some obstacles due to weak emergency management systems, and outward resistance factors, respectively.

In reference to the Poland case study, literature suggests that there is a lack of understanding of disaster risk (Priority for Action #1) and a lack of disaster risk governance coordination between all sectors (Priority for Action #2). This relates to one of the guiding principles that states that disaster risk reduction requires engagement from all of society, if signatory countries are to attain their goals (UNISDR, 2015). As climate change continues to influence natural hazards, countries or communities facing similar obstacles to Poland will need to address these immediately to prevent new or existing risks in addition to attaining resilient and sustainable communities.

Moreover, the Sendai Framework recognizes that additional support needs to be provided to developing countries through their guiding principles. This may be applicable to Cameroon since “developing countries [...] African countries [...] need adequate, sustainable and timely provision support, including through finance, technology transfer and capacity-building from developed countries and partners tailored to their needs and priorities, as identified by them” (UNISDR, 2015c, p. 14). Since literature suggests that there are many resistance factors

²⁸ This project recognizes that it is likely that the Sendai Framework was established as a guide, so that disaster risk management practices could be tailored to each community, depending on their needs.

inhibiting Cameroon's transition towards establishing a sustainable disaster management and disaster risk reduction framework, this guiding principle should encourage global partnerships to aid, as required and requested, the community. Although Canada is classified as a developed nation, the previously mentioned guiding principle may be applicable to Fort Chipewyan. This is in consideration of the fact that remote, rural, and northern communities do not have access to the same resources and capacities in comparison to urban centers. This directly relates to the terms outlined in Priority for Action #2, which aims to strengthen disaster risk governance across all sectors of emergency management. Ultimately, this could empower local communities and local authorities to reduce disaster risk, if they are provided continuous support and access to resources and capacities, as determined by the community.

7.2.2 Legislation and Regulations

Consideration needs to be given to the fact that the Sendai Framework must conform to current legislations, and regulations. This is crucial while critically analyzing the Sendai Framework's role in emergency management because there is a difference between "what should be done" versus "what can be done within domestic laws and regulations". Even though Fort Chipewyan's CEMP was tailored to preventing existing or new disasters within the community, its emergency management is an extension of the RMWB and the province of Alberta. Therefore, its emergency management would have to operate under the previously identified provincial and municipal laws and regulations. However, policies and strategies are continuously updated to ensure that they promote best practices as a way strengthen community resilience by preserving the environment, people and to sustain the economy.

Chapter Eight: **Conclusions**

8.0 Conclusion

As climate change continues to increase the likelihood of hazards across the globe, disaster prevention and emergency management preparedness are increasingly important. However, not all hazardous events are weather-related disasters. Instead, a hazard is a broad term that is meant to include environmental, technological, and man-made disasters as well, many of which can be exacerbated by climate change. In response, the Sendai Framework has placed an emphasis on the reduction and prevention of existing and new risks to minimize the impacts of disasters on communities. Since disasters are local in nature, local authorities, or communities, need to be provided the essential resources and capacities to ensure that they can protect community members, preserve cultural heritage, reduce economic losses, and preserve the surrounding ecosystem (UNISDR, 2015c). Like many other communities, Fort Chipewyan is unique in nature due to its geographical location in northeastern Alberta. In addition to being within the boreal forest, it is connected to the PAD, beside the WBNP, and near oil sands development. Through identifying risks and embracing climate change adaptation measures, this will reduce the community's vulnerability. Overall, the Sendai Framework is an effective tool that can help communities increase their resilience and meet their sustainability goals.

The Sendai Framework supports the fact that disaster risk management requires a whole-of-society approach to ensure that there is a strong partnership between stakeholders and rightsholders. This approach can help reduce the vulnerability of rural, northern, and Indigenous communities by empowering members through increased decision-making capacities and clear policies, legislation, and regulations. Furthermore, there should be shared government responsibilities, use of location-based data, the incorporation of Traditional Knowledge, and support to increase education and public awareness around disaster risk management principles.

Although the Sendai Framework has its limitations, it outlines fundamental principles that emergency management officials can cross-reference while revising their policies, strategies, and plans.

8.1 Limitations

As previously mentioned, the major limitation of this study was the lack of community engagement due to time restrictions. Therefore, it is difficult to assess the potential gaps and barriers in current emergency management policies, legislation, and regulations. Moreover, there is no available published or reliable literature that provides knowledge on whether the Fort Chipewyan community has access to the required resources and capacities to strengthen its emergency management measures. Consequently, this research could not definitively determine the answer to this research question but makes the generalized assumption that it is possible it does not based on published research.

8.2 Future Research

Potential future community-based research involves working alongside the community to develop a research question based on a topic that is of interest to its members. This would support the idea of engaging and working with community members throughout the entire planning, development, and conclusion of the project. This would include allowing community members to determine how data is shared and collected, as well as provide direction on the project.

British Columbia is exposed to many hazards, including wildfires during the summer. If British Columbia successfully incorporates the Sendai Framework into their emergency management legislation in the spring of 2022, it would be valuable to assess if it can effectively strengthen community resilience.

8.3 Best Practices for Community Engagement

Before conducting community-based research, it is ideal to work alongside the selected community. Community-led research is important because it encourages community members to be a part of the entire research process and allow them to have complete sovereignty of the project. This means that community members would have authority over data and information that is shared, or collected, as well as have their input incorporated throughout all stages of the

project. If researchers are interested in working alongside Indigenous communities, it is important to refer to some best practices to effectively engage with them.

1. Determine if the university/institution/corporation has an Indigenous Research Support Team, Advisory Committee(s) (e.g., research, ethics, community engagement), or designated research department(s) or liaisons in the community. It is recommended that the researcher consult with these identified entities to learn about the selected community, which includes practices, and protocols.
2. Create an outreach plan with someone who is a part of the community or has a good relationship with the community. This will require time and effort before a meeting can be confirmed.
3. Determine who needs to be involved in the meeting. This could include university/institution/corporate representatives, and appropriate community members. It would be considerate to reach out to the community representative and clarify the preferred methods for engaging with members. This could include schedules, meeting delivery, and cultural practices/traditions.
4. Be willing to get to know the community members. This is important during the engagement session for relationship and trust building.
5. During the meeting, provide visuals, background information, breaks, food, and opportunities for participation. It is important to note that these meetings cannot be rushed and should be scheduled with plenty of time.
6. Do not dominate the conversation. It is important that the community is heard and considered throughout the process.
7. Honour the community's cultural protocols. This includes honorarium and gifting protocols to Elders and Knowledge Holders.
8. Be realistic, and flexible about the project and plan accordingly. This process could take minimum of two years but can vary depending on numerous factors. Overall, priority should be placed on building a relationship, not on the timeline. (Nishnawbe Aski Development Fund, 2017)

These are some important considerations and first steps to consider as graduate students begin to pursue community-based research.

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