Climate Change adaptation policies and Northern development; Continuity or changes between Harper's and Trudeau's government?

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Major Research Paper submitted in partial fulfillment of the requirements for the Master's in International Development and Global Studies

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Abstract

Biophysical changes associated with climatic variation in the Canadian Arctic have created various challenges (such as transportation, housing, infrastructure reliance, and security of the Northern national border) and opportunities (natural resources extraction and the development of tourism, among others). In response, the federal government has become more involved in the development of Canada's North over the last decade. By analyzing Canada's Northern Strategy (2009) and the Federal Adaptation Framework (2011), this research critically analyzes the successive governments' progress in developing adaptation strategies and policies to mitigate such impact and risk. This research finds that while important steps have made in addressing the problem of adaptation in the North since 2009, and funding has been allocated to several projects to improve climate resilience, Northern populations that are disproportionally affected by climate change and majority Indigenous have been ignored in the process.

Keywords: Canadian Arctic, Climate change, Climate adaptation, Vulnerability, Indigenous, Northern Strategy, Adaptation Framework

Contents

Introduction

The North represents for most Canadians an outer frontier. It is a vast, barren land, snow covered for most of the year, a territory depicted in Farley Mowat's novels, Louis-Émond Hamelin's study of *Canadian Nordicity* and broadcast documentaries produced by the National Film Board, National Geographic, the BBC, and others. While Canadian identity has been shaped by our image as a northern country, only a small proportion of the population has actually stepped foot on the tundra.

Nonetheless, there is an increased attention given to the Arctic in the light of ongoing environmental change driven by global climate change, the main socio-environmental challenge of our times. The Canadian Arctic is experiencing the fastest and most dramatic changes associated with climatic variation at the national level (Bush et al., 2014). Biophysical change associated with climatic variation is now opening the Arctic to an increased level of human activity: melting sea ice has opened new sea routes, while longer and milder summers have increased the accessibility of natural resources. Changes in the Arctic have come to symbolize the deterioration of the Earth's habitat due to human action.

Canada has the biggest national territory comprised in the Arctic[1], making up 40% of Canada's landmass (Global Affair Canada, 2016) and the longest Arctic coastline, representing close to 75% of Canada's total shoreline (Neilson Bonikowsky, 2012). As such, Canada has high stakes in mitigating potential risks created by climate change, but also in the potential development that is projected to occur in the region. The country must also cope with a growing international interest in the region for resources, transport and tourism (Higginbotham and Spence, 2016).

This conjuncture of environmental changes and development have boosted the Canadian government's focus toward its Arctic territory. Under the most recent Conservative government led by Stephen Harper (2006-2015), the Arctic became both a national and foreign priority (Charron, Plouffe and Roussel, 2012; Dolata 2015). Over their nine years in office, the Conservative rhetoric was about Northern development and national security but little to no attention was given to the risks and consequences inherited from climatic variation. Climate change was only addressed as a background issue. The

[1] Canada has 16% of the Arctic ecosystem (Environment Canada and Climate change, 2016)

election of the Trudeau Liberals in 2015 signaled a new direction. The Liberal government sought to distance itself from its Conservative predecessor by promoting Canada as a leading country in climate policy and strategy. In the Arctic, the Liberal government also shows a shift in focus and an effort to bring different objectives by addressing more in depth the reality of climate change. Nevertheless, the Northern Strategy developed by the Conservatives in 2009 – which sets out the federal government's guidelines for domestic and foreign Northern affairs – still applies as of today and all ministries involved in the North abide by it. In short, as this paper aims to show, there is therefore much more continuity between both governments than change.

Through the analysis of the relevant governmental documents based upon the concepts of adaptation, resilience and vulnerability, this research aims to understand how adaptation strategies address the socio-ecological changes induced by climatic variation in the Canadian Arctic. To do so, my first objective is to explore how Northern communities are exposed to climate change. I am particularly interested in the impact of climate change on communities living in precarious socio-economic conditions, emphasizing the need for inclusion of environmental justice when analyzing the adaptation processes. Secondly, by understanding the role of the Federal government in minimizing the impacts of climate change in its Arctic territory, this research seeks to outline the current state of climate adaptation in Canada's North. My third objective consists in building a critical analysis of adaptation strategies and policies displayed in response to climate change in the Canadian Arctic. In the light of these objectives, the following is my main research question: *How are the Federal adaptation strategies and Northern development policies addressing the socio-environmental changes and vulnerability in the Canadian Arctic?* Following this research question, I am interested in knowing how Canada's Arctic governance engages with different values and understanding of fairness and justice in their adaptation policies and strategies in Canada's North.

This paper is organized as follows. The first chapter describes how climate change is impacting the Arctic environment and address the socio-economic reality in the region. The second chapter develops the core concepts that are used throughout the research. The third chapter analyzes the two main governmental documents framing northern

development and climate adaptation followed by the analysis of the adaptation funding allocated in the region over the last years. Ultimately, the research highlights the need for improvement in regard to adaptation policies by including structured guidelines, less driven by political agendas, and more focused on the concepts of fairness and justice.

1.1 Climate Change in the Arctic

There exists a vast and growing literature on climate change in the Arctic. The region has been widely studied to address the degree of ongoing biophysical changes. Researchers sometimes compare the Arctic to "the canary in the mine" (Berkes and Jolly, 2002) or "the global ecological barometer" (Borgerson, 2008; Shadian, 2006). As acknowledged by many scientific reports (ACIA, 2004; AMAP, 2012, 2017b; IPCC, 2014), the Arctic has recorded the world's fastest warming rates with an increase in its average temperature climbing twice as fast as the rest of the world in recent decades. This difference highlights one of the ways that climate change is felt asymmetrically throughout the world.

The physics behind global warming is now well-established in the literature. Correlated to the increased in Green House Gasses (GHG) concentration, this rapid warming is mainly associated with the feedback loop between the atmosphere and the diminution of the cryosphere (all the frozen water parts) (AMAP, 2012; IPCC, 2014). As such, strong indicators of a warming climate are observed all over the Arctic: a decrease of snow cover, a reduction of the extent and the thickness of the sea ice, thawing of permafrost, increased liquid precipitation and a rise in sea levels (ACIA, 2004; IPCC, 2014). Furthermore, the accelerated melting of the Arctic snow and ice cover since the late 1970s reduces the *albedo* (the reflection of the solar energy) since ice and snow are more reflective than open water and tundra. As water and land absorb more solar energy than ice and snow, it accelerates the melting of the adjacent pack ice (Dufour, 2010; IPCC, 2014). This phenomenon is referred to as Arctic amplification (Pendakur, 2017). This faster rate of warming is leading more and more scientists to believe that the Arctic environment will be substantially different in the near-future from that of today (AMAP, 2017b).

Impacts of a disturbed climate are now happening throughout the Arctic at different scales and in various sectors. Climate change experts recognize two general trends of climate change impacts in the Arctic: biophysical impacts and socio-economic impacts (A

Northern Vision, 2011; NRTEE, 2009). Biophysical impacts incorporate the physical changes experienced by northern landscapes and ecosystems, while socio-economic impacts are the sum of biophysical impacts that affect the health, safety, and lifestyle of Northerners (A Northern Vision, 2011). The complex interaction of biophysical and socio-economic climate impacts increases stress on the ecosystems, infrastructure, economies, and cultures of the North (AMAP, 2017; A Northern Vision, 2011).

1.1.1 Climate Change Impacts in the Canadian Arctic

Numerous biophysical changes correlated to climate change were recorded in Canada's northern territories over the last decades. The most dramatic impacts in the Canadian Arctic are now associated with changes in the cryosphere and *albedo* loss (Pendakur, 2017). This is further evidenced by changes in average conditions as well as by changes in climate variability and extreme climate events (Lemmen, Warren & Lacroix, 2008). Ongoing variation in the average temperature, increased precipitation, sea-ice loss, sea level rise, coastal erosion and changes in the permafrost dynamic all have dramatic consequences for northern communities, negatively impacting their traditional ways of life. The following sections summarize respectively the natural and human consequences of climate change on Canada's Arctic region: warming temperature, increased precipitation, sea ice loss, sea level rise, and changing permafrost, all of which have had an impact on traditional ways of life of the region's Indigenous population.

Warming Temperature

In Canada, climate change is felt asymmetrically throughout its territory. The annual average temperature over the Canadian landmass has increased by 1.5ºC over the 1950-2010 period (Bush et al., 2014). For the same period, most of the above normal were experienced in the north, with temperatures sometimes reaching more than 3.5°C above normal (Richter-Menge and Jefferies, 2011). Projections suggest that warming in the North will continue to increase at a higher rate than in the rest of Canada with the greatest warming occurring in fall and winter (Bush et al., 2014). Those projections are highly dependent on the level of global GHG emissions. Under a high-emission scenario, winter warming could rise by more than 10^{o} C in winter for large areas of the North by the end of the century, while under a low-emission scenario the winter average would still increase

by more than 5ºC (Pendakur, 2017). In northern Canada, climate warming presents an additional challenge for infrastructure design and development (IPCC, 2014).

Increased Precipitation

All regions of Canada's North have registered increases in precipitation with high variability and disparities from one year to another (Prowse et al. 2009). This higher precipitation ratio coupled with an increased warm air advection in the winter months (due to the amplified variability of the jet stream) have brought more freezing rain, fog and melt events (Pendakur, 2017). The latest projections predict that by 2050 for some parts of the eastern and central Arctic, precipitation will increase over 25% (Bush et al., 2014). In Yukon, the projection suggests an increase from 10% to 20% over the next 50 years (Streicker, 2016). This increase in precipitation will inevitably cause more unusual meteorological events, which have important implications for the transportation sector that is already subject to adverse conditions. For many fly-in communities across the Canadian Arctic, aerial transportation represents the main, if not the only, access to supplies and medical facilities. Increased precipitation also creates further risk for reaching the hunting and fishing ground upon which many communities depend.

Sea ice loss

According to new projections, the Arctic Ocean could be largely free of sea ice in summer as early as late 2030 (AMAP, 2017b). There is already a decrease of sea ice thickness observed throughout the Canadian Arctic with a diminution of the multi-year sea ice (resulting in thinner and younger ice) (Fisheries and Oceans Canada, 2013; Inuit Tapiirit Kanatami, 2016). Such decrease in the extent of sea ice means that fetch (the distance over which the wind can blow without being interrupted) is increasing in many coastal regions. It is worth mentioning that the minimum sea-ice cover and therefore the greatest fetch is observed in September-October, which is also the stormiest period of the year (Ford, Bell & Couture, 2016). Rising fetch results in larger and more powerful waves hitting the coast, creating more hazardous water transportation conditions, coastal erosion and damage to infrastructure. Increased coastal erosion will necessitate more frequent and costly maintenance of infrastructure (Pendakur, 2017). Such scenario could have important implications for Canada's Arctic Archipelago, a territory in the high Arctic which represents 94 major islands (greater than 130 km^2) and 36,469 minor islands covering a

total of 1.4 million km^2 (Dunbar & Adams, 2006). Furthermore, for communities along the Arctic coast, supplies are transported on ice roads that connect a web of communities during the winter months. For the most remote communities, ice roads serve as a critical lifeline and their melting further increases the risk of isolating these communities (Feltmate and Thistlethwaite, 2012).

While changing temperature and sea ice loss, have affected the length of winter road seasons, there are also new shipping alternatives to reach some remote communities (Pendakur, 2017). The open-water season will continue to lengthen, bringing new commercial opportunities as more ships will transit through the Canadian Arctic Archipelago enhancing the potential for resource development, tourism, commercial fisheries, etc. (Ford, Bell and Couture, 2016; Prowse et al. 2009).

Sea level rise

Contrarily to the common belief, the loss of sea ice is not the responsible driver for sea level rise as the sea ice is formed at the water surface and is therefore compiled in the total water volume. Nonetheless, the melting of land mass ice such as glaciers and ice caps, the increased precipitation, and the thawing of permafrost all contribute to the sea-level rise. Sea level rise (taken in conjuncture to sea ice loss) is the driving factor for increasing shore erosion, augmented wave heights and increased corrosion of infrastructure designed to withstand specific sea level and sea state conditions (Pendakur, 2017). This has already resulted and will continue to necessitate more frequent and costly maintenance and replacement of coastal infrastructure and shoreline protection facilities (Ford, Bell and Couture, 2016).

Changing permafrost

Changes in permafrost dynamics, such as thawing, affect the integrity of buildings, roads, airport runways, and other types of infrastructure (A Northern Vision, 2011). This situation has increased the maintenance and construction cost across the North since infrastructure will need to be redesigned to fit within the new climatic conditions (Coates and Poelzer, 2010).

Traditional ways of life

As noted by many authors, changing weather patterns in Canada's North have already adversely affected the northern culture and the traditional ways of life (Abele, 2016; Feltmate and Thistlethwaite, 2012; Lemmen, Warren & Lacroix, 2008; Tsosie, 2007). Indeed, sea ice is an integral part of the Northern way of life and culture (Inuit Tapiriit Kanatami, 2016; Tsosie, 2007; Watt-Cloutier, 2015; Warren and Lemmen, 2014). Many traditional ways of life for Indigenous populations (e.g., hunting, fishing, trapping) require the possibility of moving across the land, including accessible routes across snow and ice (Pendakur, 2017). As Inuit author Sheila Watt-Cloutier put it: "the land that is such an important part of our spirit, our culture, and our physical and economic well-being is becoming an often unpredictable and precarious place for us" (2015, p. ix). Notwithstanding, the Arctic's climate can be considered as "dangerous" climate change by aggregating the ongoing (and projected) impacts, risks and vulnerabilities (Ford, 2009).

Maintaining some aspects of traditional and subsistence ways of life in many Northern Indigenous communities will increasingly become more difficult in a changing Arctic (Lemmen, Warren, Lacroix, 2008). Climate change has and will further result in shifts in animal species availability, accessibility and quality with consequences for both the biodiversity and the human populations relying on these resources (Lemmen, Warren, Lacroix, 2008). This will require travelling further distances to hunt animals due to their changing migratory pattern or increase the dependency on purchasing processed food, which comes at a high cost (Pendakur, 2017). These changes further exacerbate the vulnerability of northern systems and populations to the impacts of climate change (Lemmen, Warren, Lacroix, 2008).

1.2 Arctic Challenges posed by economic globalization

Just as changes to the region represent challenges ahead, they also represent great opportunities and wealth for those prepared to seize them; hence, the Arctic has become a place of increasing commercial interest (Vermulen, 2014). The current literature suggests that 'globalization' is within the main causes of these emerging Arctic challenges (Keskitalo, 2007; Murray, 2012). As a contradictory phenomenon, globalization creates both challenges and opportunities. Indeed, the second volume of the *Arctic Human Development Report* (2015) stated that the "impacts of globalization vary across a range of

factors: in some cases globalization represents an intensification of processes with which Arctic communities have a long history of involvement, while in others, globalization brings new benefits and new challenges" (Larsen et al., 2015, p. 401). Regarding its geopolitical importance, climate change has put the Arctic in a new strategic position as the diminishing of ice and snow coverage is transforming the region. In the past, the Arctic attracted interest for primarily scientific reasons; now, it is attracting the interest of developers due to its growing commercial potential (Ebinger and Zambetakis, 2009). The reduction of ice and snow coverage could lead to a race for natural resources (especially oil and gas), facilitate commercial shipping through shorter routes, increase commercial fisheries, and lead to a boom in tourism (Ebinger and Zambertkis, 2009; Lasserre and Roussel, 2007; Young, 2009).

Economic globalization has also led to a more integrated world, expanding the numbers of actors who consider themselves as Arctic stakeholders (Young, 2010). The Arctic Council—the main inter-government forum for discussing issues related to the North—recognizes 8 Arctic Nations: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, the United States. Six Indigenous organizations also hold permanent status: Arctic Athabaskan Council, Aleut International Association, Gwich'in Council International, Inuit Circumpolar Council, Russian Association of Indigenous Peoples of the North, and the Saami Council (Spence, 2015). Also, there is a growing interest from non-Arctic states to participate in Arctic-related discussions. Twelve non-Arctic states are currently granted an observer status at the Council: China, France, Germany, India, Italy, Japan, the Netherlands, Poland, Singapore, South Korea, Spain, and the United Kingdom (Vermeulen, 2014). States such as China, Japan, and South Korea have also shown their interest and increased their capacity to operate in the region by constructing ice-strengthened ships for sale as well as for use in the context of export-import oriented activities (Dodds, 2010; Vermeulen, 2014). This increasing interest from non-Arctic states in the Arctic-Council augment the pressure on Arctic nations to retain control of their Arctic agenda—especially as applications to the Arctic Council come from influential nations with which the Arctic Nations are economically and diplomatically engaged (Vermeulen, 2014). The Arctic is increasingly becoming a governance barometer regarding

socio-economic and geopolitical forces which set the tone of a presaging "new" Arctic (Young, 2010).

These global dynamics will influence the Canadian government responses in the management of climate change in its Arctic territory and the implementation of adaptation strategies. As the Arctic Monitoring and Assessment Program (AMAP, 2017) stipulates, climate change is not the only driver of change in the region. There are cumulative impacts of weather and other socio-economic drivers that need to be addressed to build flexibility and adjust to increasing variability and cope with new extremes (AMAP, 2017).

1.3 Defining Canada's North

1.3.1 Canada's Northern territories

While there are some Canadian provinces whose northern part of their land is part of the "North", this research will focus on the three Canadian territories: Yukon, Northwest Territories and Nunavut (Appendix 1). Those three territories share important similarities such as a cold climate, vulnerability to climate change, sparse populations and a predominantly resource-based economy (Abele, 2016; Pendakur, 2017). Unlike the provinces, the territories are under the Federal government governance and exercise delegated powers under the authority of Ottawa (e.g. natural resource management) (Steinveg, 2015). This means that the bulk of the territories' revenues is coming from Federal grants (Standing Senate Committee on Energy, the Environment and Natural Resources, 2009). Until the territories have sustained and large-scale resource development, they will remain highly dependent on federal funding (Coates and Poelzer, 2014).

The Canadian territories have a small population spread across a vast territory. Together, those three territories represent 39.3% of Canada's total surface (Statistics Canada, 2005). In 2016, the combined population of northern territories was 119 100 (0.1% of Canada's total population), amongst which the majority is Indigenous (Statistics Canada, 2016). More precisely, according to the 2011 census, 17% of the Yukon population, 52% of the Northwest Territories and 86% of Nunavut identified as Indigenous (Pendakur, 2017). Most of the Indigenous population live in the many smaller communities while non-Indigenous residents are concentrated in the larger centers (Abele, 2016). The

capitals of the three territories represent just under 44% of the territory's population (Whitehorse: 25 085; Yellowknife: 19 569; Iqaluit 7 740) (Statistics Canada, 2017). The rest of the population is spread across the remaining communities[2] whose populations are in the few hundreds only.

Canada's north is marked by the high cost of infrastructure, which contributes to the high cost of living. There are vast differences in terms of the provision of infrastructure between the three territories. In general, the western Arctic is better provisioned than the east. Indeed, "in Yukon, all but one community are accessible by road. More than half of the communities in NWT are only accessible by air, water or ice roads, while in Nunavut, no all-season roads connect communities to each other, or to the rest of Canada" (Abele, 2016, p. 6). This isolation present challenges for transportation infrastructure but also for broader economic and social development (Pendakur, 2017), while also increasing the potential vulnerability of isolated communities to climate shocks (NRTEE, 2009). For this matter, "the three territorial governments have a common interest in reducing the risks posed by climate change to Northern infrastructure, economies, human health and safety, ecosystems, and traditional cultures" (A Northern Vision, 2011, p. 9).

1.3.2 Socio-economic reality in Canada's North

The Canadian North is often depicted as a pristine, untouched and almost inhabited land (Stuhl, 2016). The common image of climate change impacts in the Arctic is the emblematic polar bear setting adrift on a small piece of sea ice melting in the ocean (Tsosie, 2007; Watt-Cloutier, 2015). However, the human implication of climate change, while often forgotten, is likely the most significant problem that needs to be addressed.

To begin, northern communities are disproportionally affected by the effects of climate change. Indeed, they bear the most burden and consequences of climate change while they are not the ones producing greenhouse gas emissions. This inequality highlights the imbalance of responsibility (Crump, 2008) and the notion of injustice in the distribution of the consequences (Jenkins et al., 2016). Nonetheless, this notion of equity is not only

[2] Excluding the territorial capitals, 18 communities live in Yukon; 32 in Northwest Territories and 24 in Nunavut (Pendakur, 2017, p.30).

involved in the distribution of the effect of climate change but also on how responses and solutions are developed (Crump, 2008).

Canada's Northern populations not only have the lowest socio-economic indicators in the country but are also facing continuous degradation of their communities' infrastructure due to climate change (Feltmate and Thistlethwaite, 2012; Ford, Bell and Couture, 2016). Northern residents of Canada, especially the Indigenous population, are challenged with food insecurity, crowded and poor-quality housing, limited access to health services, high unemployment, and socio-economic development levels far below the national average (Ford et al., 2010; McGregor, 2016; Riddell-Dixon, 2012). These northern socio-economic and demographic characteristics often mirror those of developing countries while also predisposing communities to be adversely affected by climate change (Coates and Poelzer, 2010; Fort et al., 2010). Climate change adaptation is also jeopardized by the lack of access to basic services such as health care, education, and housing (Ford et al., 2010; McGregor, 2016; Northern Public Affairs, 2017). As McGregor (2016) suggests, adaptation is only achievable when the basic socio-economic needs are met.

As previously mentioned, there is still a major gap to overcome between the living conditions in the North compared to the opportunities and quality of life experienced by the southerners (Steinveg, 2014). In terms of health indicators, Northerners are facing lower life expectancy, higher child mortality, and increased incidence of health problems related to drinking, smoking and obesity (Coates and Poelzer, 2010). These health problems are exacerbated by the fact that Northern population have limited access to health professionals and facilities as "on average 84.6 per cent of Canadians have access to a regular doctor compared to 77.8 per cent in the Yukon, 38.7 per cent in NWT and 11.8 per cent in Nunavut" (Coates and Poelzer, 2010, p. 4).

Furthermore, northern culture and livelihood depends on the surrounding environment. Taking the Inuit as an example, subsistence culture is central to their identity and has been damaged by climate change (Ford et al., 2009; Watt-Cloutier, 2015). This resource dependence highlights the need for the recognition of the ongoing injustice of climate change in the region (Jenkins et al., 2016). Similarly, it needs to be acknowledged that Northern safety, security, and environmental integrity depend upon transportation

infrastructure which is currently inadequate to respond to the current environmental threats (NRTEE, 2009). Many of these challenges still reflect sociocultural challenges inherited from the colonial relationship that the Canadian state has had with the Indigenous populations (Ford et al., 2010). Indeed, Canada was developed upon the exploitation of its natural resources, and today many Canadians see the North as the last frontier to access natural resources (Standing Senate Committee on Energy, the Environment and Natural Resources, 2009). Nevertheless, "when we include the voices of indigenous peoples, we are made aware of the human dimension of climate change. The Arctic is more than a map of potential resources; it is someone's home" (Smith, 2010, p. 942).

In the current adaptation strategies implemented by the Canadian government it seems that those particular socio-economic situations of the Indigenous peoples of the Canadian Arctic are not properly acknowledged and included: "As the weather is juggled because of activities outside of the Arctic, the peoples of the north become the equivalent of the canaries in the global environmental coalmine and their leaders have called for inclusion in ongoing state-based discussions about the future of the Arctic" (Smith, 2010, p. 940). As many researchers have highlighted, there is a greater need for inclusion of the Northern population if climate justice is ever to be achieved.

1.4 Project direction

1.4.1 Problem statement and research objectives

It is necessary to better understand where Canada currently stands in the implementation of policies and measures to deal with the current and upcoming implications of climate change in the Arctic. The federal government plays a leading role in ensuring that the proper resources are provided both in terms of mitigation and adaptation in order to address the impacts of global warming (Government of Canada, 2011). The federal government also plays a critical role in shaping the strategies to minimize the harmful effects of climatic variation through adaptive planning (NRTEE, 2009), especially where impacts are already observed or are predictable in the short-term.

1.5 Methodology

This research is based upon a qualitative analysis using a content analysis of the literature about adaptation to climate change in the Canadian Arctic. Primary and secondary sources

were critically analyzed and compared to reach a holistic understanding of the topic of climate adaptation policies in Canada's North.

Primary sources consist of official documents from the Government of Canada and associated agencies. The research is primarily based on the analysis of the *Northern Strategy: Our North, Our Heritage, Our Future* (2009) and the *Federal Adaptation Policy Framework* (2011). These two documents frame Canada's priorities regarding Northern development, national sovereignty and climate change adaptation.

Other official documents from the Government of Canada and associated agencies have been mobilized to strengthen the analysis. I searched the relevant documents in the nine federal departments and agencies delivering adaptation programs[3]. I ensured the inclusion of relevant documents by using specific keywords for this research in the advanced search engine of the nine federal departments and agencies. Those keywords were *Climate Change*, *Adaptation*, *adaptive capacity*, *Arctic/North*, *Vulnerability*, *Aboriginal/Indigenous.* Different documents have been retained to understand how the issue of adaptation to climate change is framed, addressed and tackled by the different levels of government. By using official documents, I seek to highlight the adaptation policies and strategies, the northern development focus and initiatives, and the associated funding invested in the Canadian Arctic. Furthermore, I read and analyzed all the annual federal budgets published under the previous conservative government and the three-federal budget of the current Liberal government. Overviewing the different budgets help assess how many resources have been invested in northern development and climate change adaptation.

I also used secondary sources to establish the context, variables, and considerations in regard to climate change in the Canadian Arctic. The literature review will refer to academic papers focusing on Canada's Arctic priorities and emphasis in the climate change sphere. For this purpose, I also mobilized official reports from diverse non-governmental organizations engaged in Arctic related topics. These documents provide complementary

[3] Aboriginal Affairs and Northern Development (now Indigenous Affairs and Northern Development); Environment Canada (now environment Canada and climate change); Fisheries and Ocean; Health Canada; Industry Canada; Natural Resources Canada; Parks Canada; Public Health Agency; Transport Canada (Eyzaguirre and Warren, 2014).

insights by giving a state of key aspects of adaptation strategies and policies. Furthermore, being independent from direct political intervention they bring interesting perspectives and a more critical analysis to the research. I also used reports published by the Arctic Council agencies such as the Arctic Monitoring and Assessment Programme (AMAP) and the Arctic Climate Impacts Assessment (ACIA). Those reports bring the latest scientific data, climatic assessments and projections of changes in the Arctic.

The goal of this research project consists in analyzing the priorities that stand out in terms of adaptation and northern development by first addressing the socio-economic variables of Canada's North. Preliminary analysis of such variables shows how the vulnerability stands mainly at the social level rather than the technological level, therefore fostering the need for enhanced *adaptive capacity* (Nelson, Adger and Brown, 2007). Furthermore, by understanding the paradigm that frames the implementation of adaptation strategies in Canada's North, my analysis undertakes a critical review of relevant government documents to assess whether elements of justice and fairness are included. Then, supported by the scientific literature, it will be possible to make comparisons between the findings and recommendations from the governmental reports, on the one hand, and the scientific papers and non-governmental reports, on the other.

Chapter 2: Climate Change adaptation in the Canadian Arctic

This section will overview the conceptual background; define the core concepts of adaptation, resilience, vulnerability and environmental justice and explain how they will be applied to this research. It is important to fully understand these concepts to strengthen the analysis in order to assess how they are applied in the context of Canada's Northern governance strategy.

2.1 Conceptual background

The core concepts of adaptation, resilience and vulnerability have been widely used in the recent climate change literature. They help address the impacts, the risks, the processes and the outcomes, the priorities and the strategies that are associated with the analysis of the consequences of climatic variation. Those concepts are now ubiquitous in the analysis of the social dimensions of climate change.

2.1.1 Defining adaptation

Throughout the climate change literature, the concept of adaptation has been widely referred to as the amalgam of activities that are implemented to reduce the negative impacts of climate change and/or take advantage of the beneficial opportunities (IPCC, 2014; Lemmen, Warren & Lacroix, 2008). Adaptation represents a process of adjustment to actual or expected climate and its effects (IPCC, 2014). The goal is to increase the capability of a system (natural and human) to adapt effectively to changes generated from an environmental change and/or risk (Dufour, 2010; Magnan, 2009).

Adaptation is an essential complement to mitigation strategies (Warren & Lemmen, 2014). Mitigation strategies are defined as the actions framed toward limiting the greenhouse gas emissions and therefore the correlated magnitude of climate change, while adaptation addresses the consequences of climate change, especially in places where the impacts are already observed at high intensity such as the Arctic (Lemmen, Warren & Lacroix, 2008; Warren & Lemmen, 2014). Adaptation is a flexible concept which depends on the characteristics of the system of interest (Smith et al. 2000). It should be understood as multi-scalar, dynamic and context-dependent (Ader et al., 2009).

As illustrated in the graph developed by Lemmen, Warren & Lacroix (2008) (Appendix 2), various types of adaptation processes exist. The two main categories are

reactive adaptation and anticipatory (proactive) adaptation. In the former case, measures are implemented after specific climatic events that require an immediate response, while in the latter case, structures are developed to prevent or at least limit the future impacts that climate change can cause (Füssel, 2007; Godard, 2010). Both reactive and proactive adaptation can be planned while reactive adaptation can also be spontaneous (Lemmen, Warren & Lacroix, 2008). Planning generally involves deliberate policy decisions, defined operating structures and some financial resources to work with (Ford et al., 2010; Lemmen, Warren & Lacroix, 2008). Furthermore, *learning* has a central role in building effective adaptation (Armitage et al., 2011). Indeed, adaptation strategies that prioritize social learning and learning loops tend to be more effective and to boost the capability of a given group to face changes in the socio-ecological dynamics (Armitage et al., 2011). It will help the long-term planning of adaptation strategies.

Adaptation in Canada is an emerging topic that has received increased attention over the last decade. The Canadian Arctic particularly became a major focus of adaptation research (Eyzaguirre and Warren, 2014). The topic has been studied upon different thematic such as transportation (Pendakur, 2017); infrastructure (NRTEE, 2009); adaptation policies (AMAP, 2017b, A Northern Vision, 2011; Ford et al. 2010); Indigenous vulnerability (Cameron, 2012; Kirmayer et al., 2011; Ford and Smith, 2004); knowledge co-production and traditional knowledge (Armitage et al., 2011); health issues (Austin et al., 2015; Ford, Smith and Berrang-Ford, 2011), etc. However, the political agenda on adaptation remains nascent with limited progress beyond statements of general principles (Ford et al., 2010). Indeed, Ford et al. (2010) have identified an "adaptation deficit" between the level of policy and research needed to develop and support adaptation and what is currently being done and the resources available.

The concept of *adaptation deficit* describes very well the discrepancy between the effect of climate change and capacity to respond that Northern communities must cope with. The adaptation deficit implies that a "gap [exist] between the current state of a system and a state that minimizes adverse impacts from existing climate conditions and variability" (IPCC, 2014, p. 118). This problem is corroborated by Warren & Lemmen (2014) who highlight how adaptation in Canada is still at an early stage with limited

documentation or examples of implementation of different strategies and their outcomes. This gap is further acknowledged by Eyzaguirre and Warren (2014) who highlight the early stages of adaptation in Canada with "relatively few examples of implementation of specific changes to reduce vulnerability to future climate change, or take advantage of potential opportunities" (p. 255). In the Arctic, adaptation is arguably the most important policy response to reduce the negative effects of climate change (Ford et al. 2010).

In the Canadian North, the goal should be to improve the current socio-economic situation to foster the adaptive capacity. Ensuring that Northern inhabitants' basic needs are met in the first place would make it easier to put in place structures that help anticipating and react to new dynamics. Ultimately, adaptation is a process involving the ability to consider and compare the different adaptation options and their associated consequences (Armitage et al., 2011).

2.1.2 Defining resilience

The concept of resilience is originally a biological (physical) concept that has been adapted to the analysis of the socio-ecological system. The concept of socio-ecological system recognizes that human actions and societal structures are intertwined with the biophysical world, both being a source of mutual influence. For that matter, the concept of resilience, even more so than adaptation, is used with varied meanings because of its widespread application and its uses in a variety of academic fields (biology, engineering, psychology, natural disaster, etc.) (Baggio, Brown & Hellebrandr, 2015).

According to the IPCC (2014), resilience is defined as "the capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation" (IPCC, 2014, p. 127). Resilience is therefore seen as the number of perturbations that a system can absorb before being radically different (Adger, 2006) and the system capacity to learn from and adapt to changing conditions (Arctic Council, 2016).

The *Resilience Report* published by the Arctic Council (2016) argues that resilience can be cultivated and strengthened by understanding the key variables of resilience: natural capital, social capital, human capital, infrastructure, financial capital, knowledge assets,

and cultural capital (p.xv). These variables are interlinked and interact amongst one another in different combinations depending on the context (Arctic Council, 2016). For this reason, learning capacity of the communities and the sharing of knowledge represents a crucial component of resilience (Adger et al., 2009; Arctic Council, 2016; Armitage et al., 2011). Similarly, Nelson, Adger & Brown (2007) in developing their resilience framework highlight the crucial role of learning as socio-ecological systems are constantly subject to transformation. Resilience is intrinsically related to adaptive capacity.

In the Arctic context, resilience must encompass the unique characteristics of both social and ecological components that are more than ever dynamic. For Northern populations, especially Indigenous communities, resilience is for the most part cultural. Resilience builds on the extensive experience and knowledge of the peoples in the adjacent environment in which they live in and rely on (Ford & Smit, 2004). However, vulnerability could be argued to have been inherited from the colonial heritage and the ongoing political structures of the Federal government and its control over its territories.

2.1.3 Defining vulnerability

Vulnerability is a multidisciplinary concept that has been used in various fields of study (economics, anthropology, psychology, engineering, etc.). The concept is defined by the IPCC as "the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC, 2014, p. 128). The literature offers two main perspectives: biophysical vulnerability and social vulnerability (Ford and Smit, 2004). In a socio-ecological system, there is a mutual influence between the biophysical components and the social structures (as for resilience) (Adger, 2006). For example, the various environmental changes and impacts currently happening in Canada's North have been increasing the vulnerability of many communities. Nonetheless, the real vulnerability comes from conditions established *a priori* according to political and socio-economic factors (Füssel and Klein, 2006). Vulnerability in a socio-ecological context is therefore a socially-constructed phenomenon, influenced by institutional and economic dynamics (Adger et al., 2003) while also being context-specific (Magnan, 2009). Indeed, the distribution of risks and the sensitivity to climate change is highly variable amongst sectors and between different groups within societies (Adger et al. 2003; Adger 2006). In the

Canadian Arctic context, this concept highlights the importance to incorporate the non-climatic factors (e.g. economic resources, information, technology, infrastructure, institutions, etc.) in the vulnerability analysis (Ford et al., 2010). Similarly, Ford, Bell and Couture (2016) have highlighted how the different challenges posed by climate change can exacerbate existing vulnerabilities such as food and housing insecurity, poverty and marginalization.

Feltmate and Thistlethwaite (2012) argued that Indigenous vulnerability is defined by three major factors: geography, connectedness to the land, and poverty. Poverty can increase the vulnerability of households to climatic stress by forcing people to engage in dangerous practices (e.g. hunting in difficult conditions) or by limiting the capability of some households to overcome climatic hazards (Ford et al. 2010). The geographical isolation, especially for communities where all supply and access to medical facilities depend on access to a plane and good enough conditions to fly are increasingly vulnerable. Therefore, adaptation in the North should start first by seeking to understand the complex web of factors that shape vulnerability (Ford et al., 2010).

2.2 Environmental justice framework

To fully seize the complex socio-ecological dynamics at play in the Canadian Arctic, I will also integrate an environmental justice framework. Environmental justice is a theoretical lens which is "focused on fairness in the distribution of environmental benefits and burdens, and in the processes, that determine those distributions" (Scott, 2014, p. 3). The concepts of fairness and justice consist in the core precepts of the environmental justice movement (Stillings, 2013). The idea of 'environmental justice' first developed in the context of social movements that emerged to resist the siting of toxic waste dumps in predominantly African-American communities in the United States (Sze and London, 2008). It was a grassroots response that highlighted evidence that low-income communities, communities of colour and Indigenous groups were disproportionately affected in their health, well-being, and livelihood compared to other groups (Tsosie, 2007). The concept of environmental justice challenged the notion of some abstract notion of the '*environment'*, which was often narrowly defined as the wilderness or areas apart from where people live (Cox, 2006), by expanding the notion to include the environmental

conditions in which people are immersed in their everyday life (Scholsberg, 2013; Scott, 2014). The concept broadened the understanding of social justice along with environmental disadvantages (Schlosberg, 2013) while making 'environmentalism' a more inclusive concept and effective movement.

From the early days of this movement, Indigenous populations have played a central role in promoting ideas about environmental justice and helping to conceptualize what it means. Indeed, environmental justice emerging from Indigenous communities "tends to emphasize the interconnectedness of people and their environments, and the narrowness and short-sightedness of the approach that would separate the well-being of ecosystems from those who depend on them" (Scott, 2014, p. 6). However, while the early environmental justice movement focused on the environmental ills at the local level, the discourse has been broadened to acknowledge the plurality of injustice experiences and to address environmental harms emanating from a global scale such as climate change (Scholsberg, 2013; Scott 2014). Indeed, climate justice brought a global scope to the issue of responsibility and burden of climate change impacts. Again, the most marginalized peoples and the impoverished countries bear the biggest burden of climate change while being the least responsible for the greenhouse gases emissions (Scott, 2014). Therefore, climate justice became a key discourse in the climatic debate, especially with a shift of concern from mitigation towards adaptation, and a focus on the increasing vulnerability of some communities. This discourse overlaps and expands the more traditional environmental justice scope (Scholsberg, 2013). Both the environmental and climate justice are complementary in understanding, at different scales, the relationship between the environmental conditions and individual and communities' needs (Scholsberg, 2013). Addressing the Arctic climate issues will require adaptation at the local scale while mitigation efforts will be needed at the regional and national levels (Trainor et al., 2007).

Environmental justice represents a great analytical scope to address how Northern communities are facing disproportionate impacts associated with climate change (e.g. the loss of sea ice affecting the Northern way of life) (Tsosie, 2007). More precisely, climate change in the Arctic raise two interrelated aspects of environmental injustice. First, Northern inhabitants, especially those still living a more traditional lifestyle with their

livelihood closely tied up with the land, are disproportionately impacted. Second, the Northern population are often poorly positioned within the governmental apparatus to influence changes in the policy developed in the "South" (Trainor et al., 2007).

Through the document analysis, I seek to understand how (if) Canadian Arctic governance engage with different values and understanding of fairness and justice in their adaptation policies and strategies in Canada's North. To facilitate such analysis, I will use the Energy Justice framework developed by Jenkins et al. (2016) (Appendix 3). According to this framework, injustice can be divided in three main categories: distributional justice (where are the injustices?); recognizing justice (who is ignored or excluded?); and procedural justice (is there a fair process?) (Jenkins et al., 2016, p. 175). Social justice represents the overarching goal of environmental justice (Kuehn, 2000).

By integrating the environmental justice theoretical lenses to help understand of the concept of adaptation, I seek to develop a critical analysis of the processes and outcomes of adaptation towards climate change in the Canadian Arctic. Concepts and frameworks of *adaptation*, *resilience* and *vulnerability* too often address the issue of climate change with an approach based on economic (cost-benefit analysis), technological, and system-oriented variables. As they stand, vulnerability, resilience and adaptation frameworks are limited in the extent in which northern perspectives, concerns and critiques can be effective as they are built on pre-existing historical terms and political-economic relations (Cameron, 2012). Integrating a notion and understanding of environmental justice in the analysis of adaptation puts forward a more human-oriented approach to climate change issues, especially when such issues are observed disproportionally in a precarious socio-economic context such as Canada's North.

It appears that the incidence of vulnerability and exposure to risk is of limited importance to decision-making and adaptive action: "As a result, adaptive actions often reduce the vulnerability of those best placed to take advantage of governance institutions, rather than reduce the vulnerability of the marginalized or the undervalued parts of the social-ecological system" (Melson, Adger & Brown, 2007). Such statement pinpoints the issue of mutual injustice, both from the perspective of recognition (who is ignored or excluded), and throughout the procedural structure (is there a fair process) (Jenkins et al.

2016). Therefore, it highlights the ever-increasing need for adaptation strategies to pay attention to equity and encourage participation in decision-making processes for environmental justice to be achieved. While environmental justice highlights the urge for a fair process, the concept of adaptation reinforces the need for structural changes to cope with the risks. Taken together, it clarifies the fact that adaptation can only be achieved if the injustice is first tackled, therefore building on the need of recognizing justice (Jenkins et al. 2016). But as many critical researchers have noted in other contexts (e.g. Crump, 2008), I seek to demonstrate in the analysis below of Canada's climate adaptation program in the Arctic, that environmental justice remains an elusive goal.

2.3 Climate adaptation program in Canada's North

In Canada, adaptation initiatives have increased significantly since 2008 (Eyzaguirre and Warren, 2014). However, before 2011, there was no clear federal adaptation plan and policies, resulting in a lack of central direction to prioritize and coordinate efforts from the various departments and agencies in regard to climate adaptation (Office of the Auditors General of Canada, 2017). The Federal Adaptation Policy Framework was adopted in 2011 by the Conservative government of Stephen Harper to guide future adaptation priorities (Government of Canada, 2011). The Canadian government plays a central role by delivering scientific information on climate change impacts and by mainstreaming adaptation guidelines (Eyzaguirre and Warren, 2014). Nevertheless, given Canada's political structure based on multiple levels of government, adaptation may be described as a multi-level mosaic loosely connecting and emerging "spontaneously" (Austin et al., 2015).

Chapter 3: document analysis

Given this previous overview of the literature on adaptation in the Canadian Arctic, it seems that the current Federal Arctic strategy and the adaptation planning and strategies implemented are not prioritizing adaptation at a rate needed to address the rapid changes taking place in the Arctic region. The key reason is most likely that the two main documents guiding Canada's Northern development and adaptation strategy—*Canada's Northern Strategy: Our North, Our Heritage, Our Future* (2009) and the *Federal Adaptation Policy Framework* (2011)—have been criticized for not being proper guidelines with concrete and encompassing sets of actions for the actors engaging in the Arctic. This section seeks to overview both documents and analyze why these strategies lack the structures to effectively reduce the vulnerability and increase the resilience of northern communities to climate change.

3.1 Overview of Canada's Northern Strategy*: Our North, Our Heritage, Our Future*

The Government of Canada first introduced Canada's Northern Strategy in 2007 as a statement of their increased commitment towards Canada's North and officially published *Canada's Northern Strategy: Our North, Our Heritage, Our Future* in 2009 (Aboriginal Affairs and Northern Development Canada, 2011). This new socioeconomic development strategy for Northern Canada presents an overarching vision for the North and describes the Government's significant activities and signature investments in the region (Affairs and Northern Development Canada, 2011; Medalye and Foster, 2012). Canada's Northern Strategy (2009) outlines the Government's vision and priorities towards the Canadian Arctic (Steinveg, 2014). The strategy is based on four equally and mutually reinforcing priority areas:

- Exercising Canada's Arctic sovereignty
- Promoting social and economic development
- Protecting Canada's environmental heritage
- Improving and devolving Northern governance (Government of Canada, 2009, p. 2).

These priorities intend to ensure that Canada is in good position to take advantage of the changes that are happening in the North. As mentioned in the Strategy, "few countries are more directly affected by changes in the Arctic climate – or have as much at stake – as Canada. We have an important role to play in the ongoing stewardship of the Canadian

Arctic, its vast resources and its potential" (Government of Canada, 2009, p. 8). The Strategy is also promoted by Global Affairs Canada through its *Statement on Canada's Arctic Foreign Policy*: *Exercising Sovereignty and Promoting Canada's Northern Strategy Abroad* (Global Affairs Canada, 2010). The international counterpart of the Strategy ensures the same objectives are promoted by Canada's diplomats at the international level.

First, the strategy's objective was to strengthen the Federal Government's presence in the North to protect Canada's Arctic sovereignty:

> the Government of Canada is firmly asserting its presence in the North, ensuring we have the capability and capacity to protect and patrol the land, sea and sky in our sovereign Arctic territory. We are putting more boots on the Arctic tundra, more ships in the icy water and a better eye-in-the-sky (Government of Canada, 2009, p. 9).

Such discourse seems to underlie a sentiment of urgency for action in the North, or perhaps an imminent threat to overcome. This is corroborated by the massive investments committed to the Northern Military budget (Appendix 4) to assert Canada's Northern presence.

Second, the strategy promotes the social and economic development in ways that untap the potential of the region "sustainably." Interestingly, the discourse focuses on the *potential* of the North. However, this potential is highly dependent on the exploitation of non-renewable, extractive resources. As the report notes, "the large-scale projects already underway barely scratch the surface of the North's immense store of mineral, petroleum, hydro and ocean resources" while "the full extent of the natural resources potential in the Arctic is still unknown" (Government of Canada, 2009, p. 16). To achieve this goal, the government has injected important funds in geo-mapping and strategic investments to attract private investment (Appendix 5).

Third, the strategy seeks to protect Canada's Northern heritage by positioning Canada as a global leader in Arctic science and by protecting Northern lands and waters. The strategy states that "science and technology form an important foundation for Canada's Northern Strategy priorities and provide the knowledge necessary for sound policy and decision-making" (Government of Canada, 2009, p. 24). Science and technology represent imperative means to ensure that the strategy is deployed at its full potential. Indeed, the Government of Canada announced a significant geo-mapping effort to improve the

understanding of the geology of Canada's North: "The results of this work will highlight areas of mineral and petroleum potential, lead to more effective private sector exploration investment and create employment opportunities in the North" (Government of Canada, 2009, p. 16). For that matter, the Geological Survey of Canada, Canada's oldest scientific agency and a Natural Resources Canada body, has been deploying its expertise and resources for the Geo-Mapping for Energy and Minerals (Appendix 5). Many projects have been conducted, between 2009 and 2010 to determine the Northern resource potential.

Fourth, the strategy aims to improve Northern governance and devolve it to the people of the North. This priority seeks to boost the territorial governments' authority over ongoing community development and economic planning (Steinveg, 2014). The Strategy wants to increase the devolution of power to the Territories (through land and self-government agreement) and develop "made-in-the-North policies and strategies to address their unique economic and social challenges and opportunities" (Government of Canada, 2009, p. 30).

3.1.1 Discussion

The Northern Strategy (2009) has created a clear precedent for the ways the Arctic environment has been prioritized at the Federal level by the Conservative government. The emphasis is built on a double discourse that highlights the high economic potential but also the need for asserting national sovereignty. As such, the Conservative militaristic approach seeks to protect the growing economic potential as "Canada's Arctic warrior rhetoric is not simply motivated by future unseen threats but also by future opportunities" (Smith, 2010, p. 935). Such governmental preoccupation towards the exploitation of natural resources, combined with its state-centric and militaristic approach to sovereignty has raised serious criticism from various authors (Riddell-Dixon, 2012; Smith, 2010; Amend and Barney 2016; Vermeulen, 2014). Those priorities could be seen as the two faces of a same coin: sovereignty is a prerequisite for realizing the full potential of the exploitation of Arctic resources (Riddell-Dixon, 2012). Indeed, two mottos repeated by Prime Minister Stephen Harper—such as "Use it or lose it" and "True North Strong and Free" (Charron, Plouffe and Roussel, 2012; SSCEEN, 2009)—highlight precisely the Conservatives' objective towards Canada's Arctic sovereignty and resource development. While the strategy includes broad and ambitious principles to guide northern development, it is missing a true

partnership with Northern communities (Coates and Poelzer, 2010). Furthermore, the need to 'use' the Arctic to assert sovereignty is highly ironic—if not offensive—for those who live in the Arctic, and whose ancestors have been 'using' the Arctic for millennia (Simon, 2009).

The Conservative government has constructed the Arctic discourse with a relative marginalization of climate change and minimized the depth and breadth of associated impacts (Smith, 2010). Climate change instigated a *snow ball effect* regarding ongoing and expected resource development, commercial shipping, sovereignty claims, etc. Nonetheless, as there is a recognition of melting sea ice amongst other dynamics, it quickly became the stepping stone for discussions of new transportation routes, better access to resources, the enhance need for sovereignty and border protection, etc. (Smith, 2010). Climate change was only considered as "a systemic dysfunction to be addressed through strict mechanisms of control and stewardship in order to preserve the status quo in terms of regional governance" (Covino, 2018, p. 98). The sense of urgency regarding Arctic climate change by the Conservatives paid little attention to the implication for Northerners; resulting in a quasi-absence of adaptation measures being suggested. It fails to recognize that the environmental nuisances experienced in Canada's north constitute a burden for a population who has already faced other forms of injustice (Whyte, 2016) – leading to a lack or recognition of this distributional injustice.

With regard to the Harper government's claims that Canada must position itself as a global leader in Arctic science, many authors have criticized the diminution of Arctic research and the muzzling of Canadian scientists leading to a knowledge gap in climate data and science during the three Conservative mandates (Amend and Barney 2016; Vermeulen, 2014). It appears that science under the Conservatives was driven by natural resource development imperatives rather than preservation impetus. As *Canada's Northern Strategy-News Release* (2013) (Appendix 6) has highlighted, northern science is, first and foremost, framed toward economic development as "investments in science are helping exploration companies discover important natural resource deposits" (Government of Canada, 2013). According to Medalye and Foster (2012) this central role of science in the *Northern Strategy* aims to remove barriers to multinational resource development as they

currently represent the primary driver of Northern development. For these authors, this development rhetoric may serve the purpose of dispossessing Northern communities from their claims to natural resources, sea resources and their traditional ways of life (Medalye and Foster, 2012).

At the same time that the Harper government claimed to be promoting science-based policy, the administration simultaneously cut the funding to the National Round Table on the Environment and the Economy through the implementation of Bill C-38 (Winfield, 2015). The National Round Table on the Environment and Economy was an independent Canadian advisory agency developed under the government of Brian Mulroney in 1988 to seek analysis to grow the economy in a sustainable way (The Canadian Press, 2012). The Conservatives also cut off the funding of the Polar Environment Atmospheric Research Laboratory (PEARL) in Eureka (Nunavut) in 2012, a High Arctic latitude research centre tracking atmospheric data (Murray, 2017). In turn, the Conservative government did claim that it was committed towards Arctic science by investing in the construction of Canadian High Arctic Research Station (CHARS) – a world-class hub for science and technology based in Cambridge Bay in Nunavut (Lackenbauer and Dean, 2016). However, according to David Scott, current president of Polar Knowledge Canada, "under the Harper government, the priority was to study the environment in order to support the development of natural resources" (Danzon-Chambaud, 2016). Now, with the creation of Polar Knowledge under the current Liberal government to managed CHARS, the focus has apparently shifted towards studying the effect of climate change (Danzon-Chambaud, 2016).

The strategy focusses on seizing the unprecedented opportunities that are unfolding in the Arctic (Government of Canada, 2009, p. 5). Such focus on 'opportunities' does not address the current vulnerability of northern communities to climate change, nor does it recognize how such development—particularly in the oil and gas sector—will further exacerbate climate change. It appears that this increased vulnerability and exposure to risk remain of limited importance to the decision-making and opportunities focus of the strategy. While the extractive economy would provide some employment opportunities, the boom and bust cycle of natural resources extraction limit the positive effects that such

development could have on the revenue stream and employment opportunities for local communities. Furthermore, many of the employment possibilities would benefit qualified workers coming for the most part from Southern Canada on a fly-in, fly-out basis (Prno, Bradshaw, and Lapierre, 2010).

The goal of governance devolution to the Northern population could help foster development and adaptation in line with Northern communities' priorities. Nevertheless, as highlighted by Medalye and Foster (2012), "within the Northern Strategy itself lies a major contradiction between its focus on asserting federal property rights over land and seabed resources and its supposed commitment to further devolution of governance to Northern peoples" (p. 102). The recognition of the Northern Indigenous population is done in ways that legitimate the colonial relationship between the Government of Canada and Indigenous peoples: "Canada's Arctic sovereignty is longstanding, well established and based on historic title, founded in part on the presence of Inuit and other Aboriginal peoples since time immemorial" (Government of Canada, 2009, p. 9). From this continued human presence in the North, the Canadian Government strengthens its territorial claims and sovereignty assertion in the region (Steinveg, 2014). Nonetheless, for many communities, the colonization of the North by the Canadian government (and its associated agencies) are linked to recent traumas (e.g. residential schools, forced relocalisation, the dispossession of Indigenous peoples of vast tracts of traditional territory and the establishment of reservations, and the shooting of sled dogs) that have deeply disrupted the cultural and social spheres of Indigenous peoples in the North (Cameron, 2012; Lavallee and Poole, 2010). To add insult to injury, Indigenous populations have been, and still are, used as a "human flag" to stake Canada's claim to Northern sovereignty. This has led to a continuation of the injustice felt by the Northern Indigenous population as the Northern strategies only offer them a marginal role in Northern affairs. Indeed, any Canadian northern strategy should be built on the twin pillars of "asserting Canada's sovereignty in the Arctic [by] establishing constructive partnerships with Inuit," and "urgent action by our government to get serious on a climate change strategy" (Lackenbauer and Dean, 2016, p.xxxvi). Although the strategy outlines devolution as a goal, the federal government has continued to pursue its active Northern agenda with overarching power (Coates and Poelzer, 2014).

In sum, throughout the document, the government's perceived threat is about making sure Canada has control over its natural resources, while climate change is addressed only as a means to provide new opportunities for economic development. The Northern strategy therefore fails to recognize the negative impacts of climate change on Northern populations. It also fails to recognize the favorable conditions (environmental, sociocultural, and developmental) needed to properly address the degree of ongoing change. As previously noted, recognition is a cornerstone variable for fairness and justice (Jenkins et al., 2016) and for encompassing a broad capabilities approach (Schlosberg, 2012).

More recently, *Canada's Northern Strategy New Release* highlights the different investments being achieved under the *Economic Action Plan 2013: Jobs, Growth, and Long-term Prosperity* to keep the momentum and goal of Canada's Northern Strategy (Government of Canada, 2013). Some investment has been transferred to the three territories representing a form of devolution (Appendix 6). Investment in housing in Nunavut and education to increase employability of Northerners has the potential to help improve the socio-economic level of some communities to some extent. However, according to Jean Crowder, the Aboriginal Affairs critic for the New Democratic Party at the time, $100 million for building 250 social housing falls short of what is required to meet the housing needs in Nunavut (George, 2013). Furthermore, other investments highlighted seems of limited outreach to address adaptation issues and even more so vulnerability.

While some of these investments might help boost *adaptive capacity*, they are directed towards development as a broader focus. For example, the major investment in the road connecting Inuvik to Tuktoyaktuk line up with the development goal as it will lower the cost for exploration and extraction for oil and gas – and facilitate a return of Arctic offshore exploration (Jones, 2014). This road has recently been opened in November 2017 (Canadian Northern Economic Development Agency, 2017). Connecting this remote community with Inuvik year-round has the potential of increasing the employment opportunities for the Inuvialuit (Inuit of the Mackenzie region) with expected increases in tourism (Canadian Northern Economic Development Agency, 2017). However, it may also

exacerbate the loss of traditional culture (Jones, 2014). Regarding many of the adaptation initiatives in the Canadian North, many of the actions undertaken by the federal government could be argued to be more about development than about adaptation. Those initiatives often lack to target the vulnerabilities and were of limited outreach for building resilience of the communities most in need. Indeed, many investments made during the Harper mandate under the Canada's Northern Strategy claimed to constitute adaptation initiatives while dominated by issues of security and resource development (Burn, 2016). As such, the Conservative government has privileged the energy needs and development goals of Southerners over the ecological and human needs of Arctic inhabitants (Ridell-Dixon, 2012). In such, the Harper government was more interested in hard power and traditional security issues aligning its Arctic policy with its Conservative economic ideology (Dolata, 2015).

Today, with the Liberal Party of Canada holding a majority in the House of Commons there is a clear change in terms of discourse and effective priorities in regard to Canada's North. The Arctic focus shifted from a sovereignty and resources development focus under Harper to a more sustainable development-oriented paradigm under Trudeau (Covino, 2018). However, all ministries involved in the North still abide by *Canada's Northern Strategy: Our North, Our Heritage, Our Future*. In such light, it could be argued that the Conservative's legacy is still an integral part of the Northern development, strategy and priorities.

3.2 Overview of The Federal Adaptation Policy Framework

The Federal Adaptation Policy Framework was implemented in 2011 by Environment Canada to guide the Government of Canada's domestic actions on adaptation. The framework identifies the leadership of the Federal Government to advance adaptation efforts across Canada. It is framed to "guide domestic action by the Government of Canada to address adaptation to the impacts of climate variability and change. It sets out a vision of adaptation in Canada, objectives, roles of the federal government, and provides criteria for setting priorities for action" (Government of Canada, 2011, p. 1). Those domestic actions are framed around three roles for the federal government: 1) Generating and sharing knowledge; 2) Building adaptive capacity to respond and helping Canadians take action; 3) Integrating adaptation into federal policy and planning (mainstreaming) (Government

of Canada, 2011, p. 2-3). Those priorities seek to build resilience into federal assets, programs and services as this framework is relevant for all department (Naturals Resources, 2016). The Framework state the following three objectives:

1. Canadians understand the relevance of climate change and associated impacts on their quality of life.
2. Canadians have the necessary tools to adapt to climate change effectively.
3. The federal government, as an institution, is resilient to a changing climate. (Government of Canada, 2011, p. 2).

To achieve those objectives, the Federal government must take action to properly integrate climate change adaptation into its programs, policies and operations with each federal organization being responsible to apply it in their respective field (Office of the Auditor General of Canada, 2017). For this purpose, the Framework contains broad objectives aimed at developing tools, awareness and resilience to increase the adaptive capacity of the government and citizen toward climate change (Office of the Auditor General of Canada, 2017).

3.2.1 Discussion

The Federal Adaptation Policy Framework is a five-page document that aims to outline general objectives and principles but lacks specifics on how these will be accomplished. As Stephanie Austin has argued "this framework is valuable and an important development but [it] does not identify how the federal government will work with other levels of government and does not suggest a direction for Canada as a whole to take in adapting to climate change" (Austin, 2015, p. 624). The finding of the Reports of the Commissioner of the Environment and Sustainable Development, published by the Office of the Auditor General of Canada, goes even further than Austin's critique and suggests that

> the 2011 Federal Adaptation Policy Framework did not have an action plan to guide its implementation across the federal government. […] Departments and agencies lacked central direction on how to prioritize and coordinate their efforts to manage climate change risks and integrate adaptation considerations into ongoing activities. As a result, few have done so (Office of the Auditor General of Canada, 2017, paragraph 2.32)

In fact, only five[4] of the nineteen departments and agencies, examined by the reports, completed comprehensive risk assessments, and moved forward in taking steps in integrating adaptation into their programs and activities (Harris, 2017).

Environment and Climate Change Canada was amongst the federal government departments and agencies that did not fully assess climate change risk in their corporate risk management documents (Office of the Auditor General of Canada, 2017). This is quite surprising coming from the department that was in charge of implementing the 2011 Federal Adaptation Policy Framework and whose responsibility is to oversee the integration of climate change policies and strategies of the federal government. As such, Environment Canada has clearly lacked the leadership and guidance needed to direct other federal organizations to achieve adaptation objectives across the government's different departments and agencies, consisting of little more than a blurry guideline (Office of the Auditor General of Canada, 2017).

Similarly, by 2017 most of the provincial and the territorial governments had not fully assessed the risks of climate change across their jurisdictions using the Federal Adaptation Framework as a benchmark (Office of the Auditor General of Canada, 2018). By lacking a provincial or territorial government-wide assessment, "those government cannot prioritize and assign resources to manage risks efficiently. As a result, auditors found that adaptation actions were often case by case or ad hoc" (Office of the Auditor General of Canada, 2018, p. 17). This statement applies to the three territories who acknowledged the urgency for adaptation measures, but lack guidelines and implementation plans to address such issue.

The Yukon government has yet to complete a comprehensive, territory-wide risk assessment before developing any of its adaptation commitments. The Northwest Territories has no territorial adaptation plan despite overdue commitments to develop one, leading to an absence of comprehensive risk assessment for the territory as it currently stands. Nunavut did identify potential climate risks but did not rank those different risks in

[4] The five Federal department are: Fisheries and Oceans Canada, Health Canada, Indigenous and Northern Affairs Canada, Natural Resources Canada, and Transport Canada (Office of the Auditor General of Canada, 2017, paragraphs 2.57).

terms of impact, likelihood, and priority. The territory lacked measurable commitments, timelines and responsibilities in the absence of an implementation plan (Office of the Auditor General of Canada, 2018).

The Federal Adaptation Framework also does not clarify whether the framework is intended to boost reactive adaptation and/or anticipatory adaptation (Appendix 2). This is a crucial component of the concept of adaptation, as the two factors are quite different while being complimentary. There is both a need for structure to boost adaptation in the future, but also an urgent need of investment to react to the ongoing problems. The monitoring of adaptation in Canada is also limited as "agreed-upon methods to track and measure actions taken to reduce climate change risk and vulnerability do not yet exist, which prevents meaningful comparisons across sectors" (Eyzaguirre and Warren, 2014, p. 258). Furthermore, the federal framework has been criticized for failing to address the effect of climate change at a smaller scale. Indeed, "some climate change effects will be felt in localized areas of Canada, meaning much adaptation will also need to be implemented by municipal governments" (Austin et al., 2015, p.624). This is something to consider in the Arctic as the ongoing structure of a federal framework lacks the structure to address the specificities of the Arctic issues at the community level.

Ultimately, while it is crucial to understand the dynamics at play, it is now becoming even more important to move to the next two steps of the adaptation framework – feasibility analysis and investments – to reach the overarching goals of long-term planning, and durable adaptation. As for now, most adaptation research highlights the impacts of climate change, but little attention has been paid to the structures that need to be implemented and the level of investment that needs to follow. Indeed, looking at the adaptation planning benchmark developed in the Commissioner of the Environment and Sustainable Development Report (Office of the Auditor or Canada, 2017) (Appendix 7), it seems like Canada still stands at the first of the three-step framework. (Office of the Auditor or Canada, 2017, exhibits 2.2). This highlight a recurrent gap between these analyses and the urgency of implementation of these strategies.

3.3 Funding of Climate Change Adaptation Program

In regard to funding, since 2011 the federal government has allocated $538.6 million to climate change adaptation programs through different federal departments and agencies (Office of the Auditor General of Canada, 2017). $148.8 million was granted for the 2011–2016 period, followed by a package of $389.8 million in the 2016, 2017 and the 2018 federal budgets to be spent over the next five years (Government of Canada, 2018 budget; Office of the Auditor General of Canada, 2017). The 2011-2016 period almost entirely falls under the Conservative mandates, while the latest budgets (2016-2017-2018) are associated with the Liberals. Funding for adaptation provided by the federal government was allocated to different departments and agencies with both national policies and programs explicitly dedicated to the Arctic.

3.3.1 2011-2016 Period

The 2011-2016 period the adaptation initiatives were conducted under Clean Air Agenda. The $148.8 million budget was divided between ten programs spread across nine federal departments and agencies as highlighted below:

- $29.84 million for Environment Canada's Climate Change Prediction and Scenarios Program;
- $16.55 million for the Department of Fisheries and Oceans' Aquatic Climate Change Adaptation Services Program;
- $2.41 million for Parks Canada towards Understanding Climate-Driven Ecological Changes in Canada's North;
- $8.5 million for Health Canada's Heat Alert and Response Systems;
- $10 million for Health Canada's Climate Change and Health Adaptation for Northern First Nations and Inuit Communities;
- $12 million to the Public Health Agency of Canada for Preventative Public Health Systems and Adaptation to a Changing Climate;
- $20.02 million for Aboriginal Affairs and Northern Development Canada's Climate Adaptation and Resilience Program for Aboriginals and Northerners;
- $3.5 million for Industry Canada and Aboriginal Affairs and Northern Development Canada, for Integrating Adaptation into Codes and Standards for Northern Infrastructure;
- $35 million for Natural Resources Canada towards Enhancing Competitiveness in a Changing Climate;

- $10.99 million for Transport Canada's Northern Transportation Adaptation Initiative (Environment Canada, 2013, n.p.).

Adaptation themes of the Clean Air Agenda fall under the Federal Adaptation Policy Framework and were coordinated by Environment Canada. The themes were organized into four overarching goals: 1) Enhance the scientific foundation to understand and predict climate and assess climate change impacts; 2) Enhance public health and safety; 3) Build resilience in the North and climate-sensitive Aboriginal communities; 4) Enhance the competitiveness of climate-sensitive economic sectors and systems (Environment Canada and Climate Change, 2017). According to Environment Canada, the "program elements comprising the Adaptation Theme appears to be generally well designed and delivered; however, some areas for improvement related to information sharing, increasing engagement and performance measurement were noted" (Environment Canada and Climate Change, 2018, p. iii). Nonetheless, the proportion of funding that was targeting the North is unclear in the documents and so are the associated outcomes.

The $20.02 million budget for the *Climate Adaptation and Resilience Program for Aboriginals and Northerners* is of particular interest for this research. Indigenous and Northern Affairs Canada shared this budget into two programs to address the need for adaptation in the region: *Climate Change Adaptation Program* and *ecoENERGY for Aboriginal and Northern Communities Program* (Indigenous and Northern Affairs Canada, 2017; Indigenous and Northern Affairs Canada 2017b). *Climate Change Adaptation Program* provided funding to support Indigenous and Northern communities assessing climatic vulnerabilities, create adaptation plans, and develop related information and tools (Indigenous and Northern Affairs Canada, 2016). The main goal of this program is to develop capacity building at the community level and to enhance community resilience. The program helped 21 communities to successfully implement adaptation measures while other communities were also partnering to develop adaptation measures at the regional level (Indigenous and Northern Affairs Canada, 2016). Those northern communities that benefited from the program and the allocated funds can be found in appendix 8-9-10. Unfortunately, it is hard to evaluate if those communities were the one most in need for adaptation measures. As a preliminary evaluation of the Climate Change Adaptation Program conducted by the Ministry of Indians and Northern Affairs concludes:

> [the program] may not have reached communities in greatest need of support or those requiring immediate support. Possible explanations are that communities in need of support may not have the capacity to participate in the Program; without a formal call for proposals, the Program may not have identified communities in greatest need and, finally, given its short duration, the Program targeted communities that were ready to begin working on adaptation projects" (Indian and Northern Affairs, 2011, p.34).

This issue has also been raised by the Inuit rights and interests defence organization Inuit Tapiriit Kanatami. Their report, *Inuit Priorities for Canada's Climate Strategy,* suggests that "[i]n some cases, funding criteria for some government climate change programs have made them relatively inaccessible to Inuit communities" (Inuit Tapiriit Kanatami, 2016, p.33). This highlights a lack of recognition (recognizing justice) of some of the communities most in need.

The second program, *ecoENERGY for Aboriginal and Northern Communities Program* promoted the deployment of clean energy technologies in Aboriginal and Northern communities to reduce GHG emissions (Aboriginal Affairs and Northern Development Canada, 2014). The funding was divided in two streams. Stream A focused on renewable energy projects with a maximum allocation of $250,000 for feasibility stages of "stand-alone" projects that produce energy for a group of buildings or an entire community. Stream B allowed a maximum of $100,000 for implementing a renewable energy project in the current community buildings (Indigenous and Northern Affairs Canada 2017b). Over its five-year implementation, the program has supported 146 renewable energy projects in 136 communities across Canada (Indigenous and Northern Affairs Canada, 2016). Those projects are expected to reduce over 1.5 megatonnes of GHG emissions over their lifespan. While this initiative falls more within the mitigation goal, it also helped some community in regard to energy security which is in line with adaptation measures.

3.3.2 From 2016 onwards

Since they took the power in 2015, the Liberal government of Justin Trudeau has increased the investments assigned to climate change adaptation. In the Arctic, the Liberals have outlined four priorities: economic progress through investment in infrastructure; reconciliation with First Nations, Metis and the Inuit; a commitment to multilateral engagement in foreign policy; and a promise to address climate change (Axworthy, 2016). The Liberals were quick to criticize the geopolitical focus of their Conservative predecessors for failing to include efficient social and sustainability-oriented policies in the

region (Covino, 2018). The Liberals have been investing in programs and research with the goal of understanding environmental changes, biodiversity conservation, and ecological dysfunctions caused by climate change. Proper understanding of theses dynamics is the first step to find potential ways to provide these emergent economic systems with means of adaptation, making them as much resilient as possible to the effects of climate change (Covino, 2018).

Taken together, the federal budgets of 2016, 2017 and 2018 have allowed $389.8 million investments for a five-year period to some federal departments and agencies engaged in adaptation (Office of the Auditors General of Canada, 2017; Department of Finance Canada, 2016; 2017; 2018). This is more than two-and-a-half-times the amount of investments made by the Conservative for preceding five-year period. The adaptation funding is now managed and allocated though *the Pan-Canadian Framework on Clean Growth and Climate Change*. Such framework seeks to mainstream climate change policy by joining mitigation action to adaptation measures (Flanagan, et al., 2017). The framework contained over 50 new climate and clean growth measures deployed at all levels of government highlighting that such commitment for climate action is now a central priority of the government (Flanagan, et al., 2017).

Beside the investment of $389.8 million allocated specifically to adaptation, the federal government has also provided additional funding to support climate-resilient infrastructure at the national, provincial, territorial, and municipal levels, including:

- $460 million in the 2016 federal budget to support green and climate-resilient infrastructure initiatives;
- $40 million over five years in the 2016 budget to integrate climate resilience into building design guides and codes;
- $9.2 billion for the 2017–2028 period to provinces and territories for a variety of related objectives, including helping communities prepare for challenges resulting from climate change; and
- $2 billion over the next 11 years in the Disaster Mitigation and Adaptation Fund to help mitigate natural disasters and extreme weather events and build climate resilience into infrastructure projects.

  (Office of the Auditors General of Canada, 2017, paragraph 2.1)

However, after further analysis of the three Liberal budgets (2016, 2017, 2018), I observed that the $460 million investment to support green and climate-resilient infrastructure initiatives does not apply to the North. The total amount is divided between an investment of $248 million for the Lake Manitoba and Lake St. Martin Outlet Channel Project and a $212 million investment to upgrade the Lions Gate Wastewater Treatment Plant to make it resilient to climate events (Department of Finance Canada, 2016, p. 96). The Disaster Mitigation and Adaptation Fund is scheduled to start in the 2018-2019 period with a $45 million initial investment for that period and $445 million for the five-year period ending in 2021-2022 (Budget 2018, p. 351).

One positive aspect of the adaptation programs developed by the Liberals under the *Pan-Canadian Framework on Clean Growth and Climate Change* is that it emphasizes adaptation programs for Indigenous populations. It also separates the adaptation programs for Indigenous populations on a geographic basis. For example, *First Nation Adapt Program* will target communities and reserves south of the 60th parallel while**,** *Northern Responsible Energy Approach for Community Heat and Electricity program* (*Northern REACHE*) targets the Northern communities. The document also report that adaptation measures should focus on "particularly vulnerable regions like Indigenous, northern, coastal, and remote communities" (Government of Canada, 2017, p.3), a first good step for deploying appropriate measures where it matters the most.

In that regard, Ford, Bell and Couture (2016) argue that adaptation planning in Canada's North is an important step for managing the risk of climate change but also highlight some concerns. Indeed, these authors pinpoint challenges such as the lack of financial and human resources, differences between Indigenous and western philosophies in regards of planning, the lack of usable science and the gaps in understanding, all of which affect the outreach of adaptation planning. Integrating Traditional Environmental Knowledge (TEK) represents a crucial step in understanding the complex web of factors that shape vulnerability and to increase adaptation planning in the North (AMAP, 2017b; Ford et al. 2010). The *Pan-Canadian Framework* seeks "to recognize the importance of Traditional Knowledge in regard to understanding climate impacts and adaptation measures" (Government of Canada, 2017, p. 3). Addressing the need to pay more attention

to the most vulnerable communities and the need to seek their inputs mark a clear distinction from the previous government's official documents associated with the *Clean Air Agenda* (2011-2016). Indeed, "according to Prime Minister Trudeau, the liberal Arctic policies would shift from geopolitically-oriented interpretative paradigms to a more social justice and sustainable development-oriented paradigm" (Covino, 2018, p. 99). However, due to the early stage of the implementation of those initiatives and the limited research yet published on the associated outcomes, it is hard to know how those principles will be implemented.

Additionally, the current government's will to tackle climate change may be put into question as the Liberal government recently delayed the cutting of methane emissions which was supposed to lead to a reduction of 40 to 45 percent below 2012 levels by 2025 (Meyer, 2017). In regard to greenhouse gas emissions in general, a collaborative report from Auditor General of Canada (2018), *Perspective on Climate Change Action in Canada*, concludes that Canada was not on track to meet its target fixed at Copenhagen to reduce emissions by 17% (620 megatonnes) below 2005 levels by 2020. As it currently stands, emissions in 2020 are projected to be 111 megatonnes above the 2020 target (Office of the Auditor General of Canada, 2018, paragraph 1.49). Instead, Environment and Climate Change Canada is now focusing on meeting the new federal commitment made in 2015 in Paris to reduce emissions by 30% (523 megatonnes) below 2005 levels by 2030. While this target is lower than the one fixed for 2020, the fact that the 2020 emissions are projected to reach 111 megatonnes above the target make it difficult to believe the 2030 target can be obtained at the current pace. This discrepancy between the Liberal government's discourse at the international level and the lack of concrete actions to significantly reduce GHG emissions domestically has been apparent since the party won its majority in October 2015. That being said, it is important to remember that actions were taken by the Liberal government in order to scale-up investments in adaptation programs, as outlined above. Programs such as *Climate Change Preparedness in the North Program* and *Northern REACHE program* (Government of Canada, 2017) are promising, but further monitoring and evaluation will be needed to assess the extent to which it makes Northern communities safer and more resilient to the impacts of climate change in the future.

Chapter 4: Conclusion

To this day, the Harper government's Northern Strategy (2009) and the Federal Adaptation Policy Framework (2011) still represent the two-main frameworks managing Canada's Northern priorities and focus. Both frameworks need to be improved by reconsidering some of their priorities to properly address the short and long-term systemic issues arousing from the impacts of climate change in Canada's North. While the present Liberal government, which took office in October 2015, has shown a commitment to address climate change issues in Canada's North, as described in the previous analysis, the framing of adaptation and northern priorities are still guided by the two frameworks adopted by the previous Conservative government (2006-2015).

The Northern Strategy (2009) has created a precedent in the way the Arctic environment has been prioritized at the Federal level. This Strategy was implemented under the Conservative government of Stephen Harper in 2009 and reflects the federal government's overarching vision of the North at the time. A vision which was geopolitically oriented with high focus on securitization and resources development (Covino, 2018). As of today, the Strategy is still in place. In this sense, it could therefore be argued that using the same strategy could lead to a continuity of the Conservatives' legacy in the Canadian Arctic. In turn, the Federal Adaptation Policy Framework (2011), also implemented by the Conservatives, has not set guidelines for actions, but only general principles. Furthermore, Environment Canada did not provide the required leadership to guide the Framework implementation throughout the federal departments and agencies. As a result, a limited amount of adaptation programs has been adopted in comparison to the level of need, and the amplitude of the climate adaptation problem at stake.

The previous Conservative government of Stephen Harper did put the Arctic at the forefront of its government priorities. However, the Conservatives, by minimizing the risks involved with climate change, misunderstood the priorities of the Northerners, especially the Indigenous population. Inuit representatives have criticized that the government's agenda prioritized military investments and resource development at the expense of environmental protection, improved social conditions, and long-term economic benefits in the North; insisting that sovereignty begins by targeting the most urgent challenges faced by those living in the North (domestic human security issues, infrastructure, education, and

health care) (Lackenbauer and Dean, 2016). Climate change in the Arctic was quickly used as a stepping stone for resource development, commercial shipping and sovereignty claims rhetoric. At no moment has the Conservative's government properly acknowledged how challenges posed by climate change could exacerbate existing vulnerabilities, such as food and housing insecurity, poverty and marginalization (Ford, Bell and Couture, 2016). This lack of recognition of the harm caused by climate change combined with the government's focus on resource development only exacerbates the initial cause of climate change (Medalye and Foster, 2012).

The Liberal Party of Canada, led by Prime Minister Justin Trudeau, seems to be changing Canada's Northern focus with the goal to improve Indigenous living conditions overall while considering climate change as the primary driver of vulnerability in the Canadian North (Covino, 2018). On statements at least, the Liberals differentiate themselves from their predecessor by promoting a more inclusive approach to the North and by developing a nation to nation relationship with Indigenous groups. Nevertheless, to achieve such goal in practice, the Liberals would have to move away from the current Northern and Adaptation framework if they truly want to improve the leadership model. The Government will also have to follow up with its commitments, provide the necessary financial resources and engage with the communities throughout the process.

Due to the specificity and the pace of the ongoing changes, there is an urgent need for an *Arctic Adaptation Strategy* that is better suited for framing the uncertainties caused by climate change. The current Federal Adaptation framework is too broad to properly address context-specific issues of climate change in the Arctic while the Northern Strategy minimized those impacts by focusing only on opportunities. As Mary Simons, Indigenous and Northern Affairs special representative on Arctic leadership, addressed in her report, *A New Shared Arctic Leadership Model,* there is an urgent need to develop a new Arctic policy framework focusing on adaptation (Indigenous and Northern Affairs Canada, 2017c). Simons argues that "an adaptation strategy and implementation plan for the Arctic must become a national priority within Canada's climate change commitments" (Indigenous and Northern Affairs Canada, 2017c, n.p.). A *Northern Adaptation Strategy Framework* could be the first step in recognizing the injustice faced by the Northerners and

therefore display adequate resources to minimize climate change-related vulnerability. This starts with the recognition of the ongoing injustice raised by Inuit author Sheila Watt-Cloutier (2015) stating that "we must use a human rights approach in responding to climate change and give those immediately affected active participation in decision-making" (Watt-Cloutier, 2015, p. 325). Political authorities involved in Northern adaptation must also recognize the fact that many projects carried out in Northern communities are shaped by colonization and bear profound consequences in the way the human dimensions of climate change are framed and addressed (Cameron, 2012). For that matter, devolution of Northern governance to the Northerners mentioned in the Northern Strategy (2009) should be carried on in the reality and not only on paper.

As it was addressed throughout the research, the Arctic ecosystems are changing in dramatic ways due to climate change; threatening the integrity of Arctic communities (Arctic Council, 2016). Adaptation should become a central feature of climate change policy for Canada's Northern population as it will have to adapt to some degree of change no matter what the outcomes of mitigation policies are over the next decades. Adaptation mechanisms that will be implemented will need to be flexible as the Arctic will continue changing rapidly and new challenges and opportunities will rise (Covino, 2018). Therefore, there is a need to implement structures that aren't lined up in partisan politics as a change in government could jeopardize the progress being made in terms of adaptation if it leads to any cut in funding. In this sense, most reports and research on adaptation that were read and analyzed as part of this research recommend long-term commitment and investment.

This research focused on the federal government's implication in regard to Northern development and climate change adaptation in the Canadian Arctic. Since only a handful of projects and programs have been carried forward in some communities across the three Canadian territories, further research should analyze on a case study basis the outcomes of these projects and programs. As a desk-based study of available literature, this project was obviously limited since information on the impact of these federal policies on the ground is scant. Research in Canada's North is extremely expensive due to the difficulties related to the lack of infrastructure—especially transportation and housing—as

noted above. Yet further research involving field work in targeted communities, will be necessary to help fill the gaps in our knowledge.

The overview of Canada's Northern frameworks and the document analysis overtaken in this research was therefore limited in being able to explain how adaptation is really being undertaken and applied in those communities. The federal government is monitoring its own programs, but as yet, the information available to the public is limited. As Ford el al. (2010) note, monitoring the progress of these projects would help to mainstream adaptation measures, enhance the adaptive capacity at a broader spectrum and boost our understanding of the most effective ways to reduce vulnerability to climate change. Also, future research would benefit from a comparative analysis of Canada's adaptation frameworks, measures and policies that are applied by other Arctic countries in similar settings, such as the situation of the Saami in Norway. Likewise, further analysis of the international components of climate change adaptation within the Arctic Council countries and Indigenous groups would be interesting as there is room for cooperation at this supra-national/regional level. As mentioned in this research, sharing information and increasing the learning capacity are key elements for reducing the knowledge gaps about the current and future changes in the Arctic while leading to better adaptation practices.

Although it was hard to evaluate the extend of the concept of justice in the documents overviewed throughout this research, it seems that integrating notions of environmental justice to the concept of adaptation is a first step forward for reaching more inclusive and targeted adaptation policies and strategies in Canada's North. By acknowledging when an injustice occurs, the federal government should prioritize addressing this injustice and follow up with means to improve the situation through adaptation strategies. More research using an environmental justice scope is needed to address the established structures that could continue to jeopardize adaptation in Canada's North.

Ultimately, the ongoing changes that are observed in the Canadian Arctic are driven primarily by human-induced climate change and mainly coming from outside the Arctic (Arctic Council, 2016). Beside its commitment to the Arctic's climate adaptation, the Liberal Government should follow up with its commitment to reducing greenhouse gas

emissions and take a stance as climate leader if it wants to limit the extent of climate impacts in the region. Adaptation has more likelihood to succeed if the atmospheric and environmental changes are progressive and limited, rather than swift and disruptive. As the Canadian Arctic will be increasingly pressured by new dynamics such as resources extraction, increased shipping, tourism, sovereignty issue, the Canadian government should seek to become a positive leader at the International level, starting by developing an inclusive approach involving all Northerners in the process.

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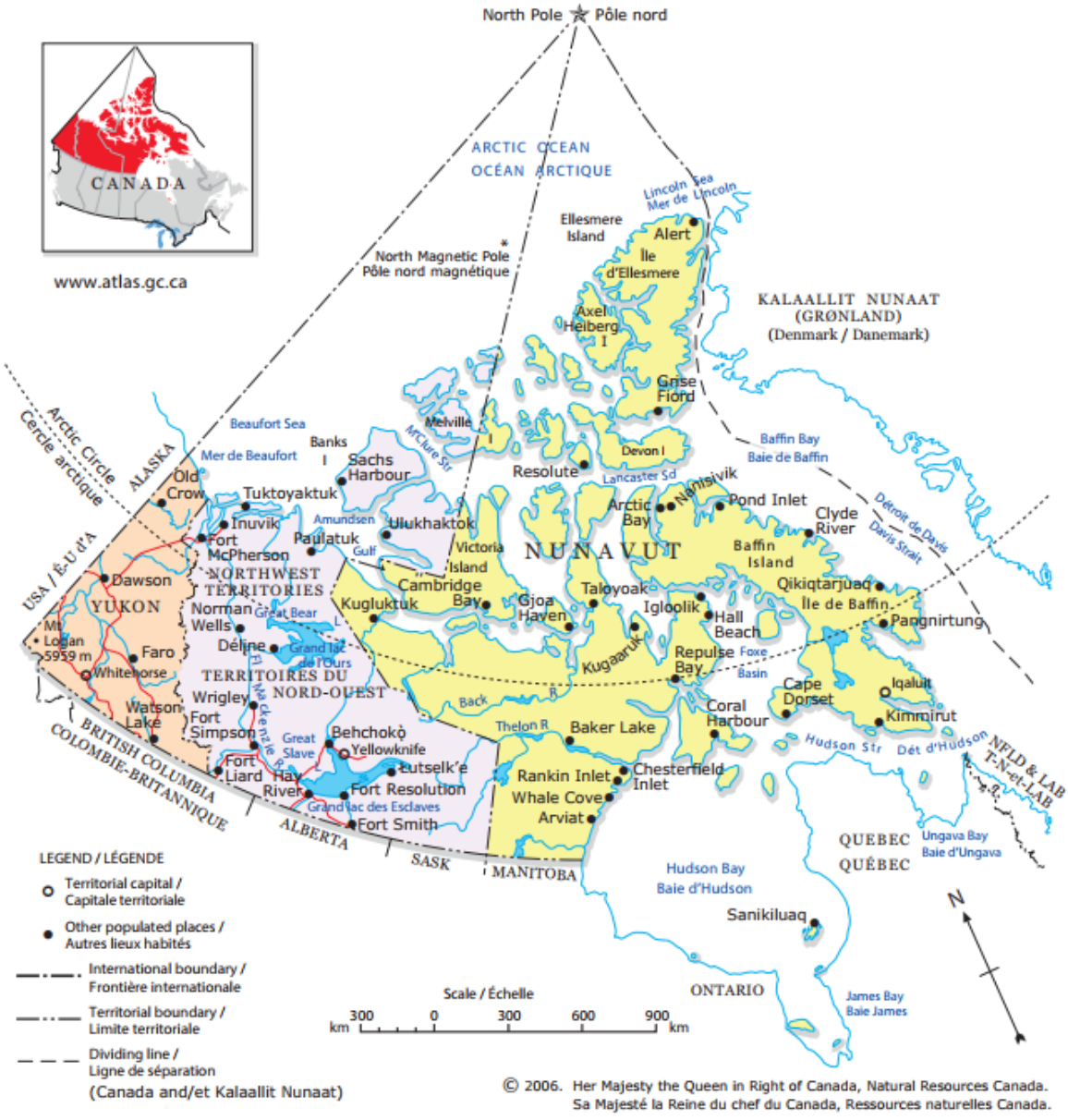
Appendix

Appendix 1: Canada's Northern Territory



Appendix 2: Different types of adaptation

Different types of adaptation:

ADAPTATION			
Based on	Type of adaptation		
Intent	Spontaneous	Planned	
Timing (relative to climate impact)	Reactive	Concurrent	Anticipatory
Temporal scope	Short term	Long term	
Spatial scope	Localized	Widespread	

Source: Modified from Smith et al. (1999) *in* Lemmen, Warren and Lacroix (2008)

Appendix 3: Environmental justice framework

The evaluative and normative contributions of energy justice.

Tenets	Evaluative	Normative
Distributional	Where are the injustices?	How should we solve them?
Recognition	Who is ignored?	How should we recognise?
Procedural	Is there fair process?	Which new processes?

Source: Jenkins et al. (2016, p. 175)

Appendix 4: Military Expenditure Commitments

Northern Strategy Military Expenditure Commitments

Program	Expenditure
6-8 Naval Patrol Vessels	$3.1 billion
6-8 Naval Patrol Vessels (maintenance/25 years)	$4.3 billion
Coast Guard Polar Icebreaker	$720 million
Deep Water Naval Port at Nanisivik	$100 million
Deep Water Naval Port at Nanisivik (maintenance/20 years)	$200 million
Expansion of the Canadian Rangers	$45 million
Northern Warfare Training Center	$4 million
Northern Warfare Training Center Yearly Expenditure	$2 million/year
Operation Nanook	$3 million/year, 2007–present
Total	**$8.6 Billion**

Source: Medalye and Foster (2012, p. 104)

Appendix 5: Geo-Mapping for Energy and Minerals

Geo-Mapping Projects and Resources

Project	Year	Resources	Research Base
Arctic Bay and Pond Inlet Mapping	2009	Oil and Gas	Geological Survey of Canada
Eastern Sverdrup Basin Mapping	2009	Oil and Gas	Geological Survey of Canada
Melville Peninsula	2009	Gold, copper, zinc, nickel, platinum, and diamonds	Geological Survey of Canada
South Baffin region	2009	Diamonds, gold, and other minerals (not specified)	Geological Survey of Canada
Hudson Bay and Foxe Basin	2010	Oil and Gas	Geological Survey of Canada
Eastern Baffin Island, Lancaster Sound, Jones Sound	2010	Oil and Gas	Geological Survey of Canada
North Baffin Bay	2010	Oil and Gas	Geological Survey of Canada
Jones Sound	2010	Oil and Gas	Geological Survey of Canada

Source: Medalye and Foster (2012, p.106)

Appendix 6: Canada's Northern Strategy news release

Canada's Northern Strategy

News Release

16 August 2013

Ottawa, Ontario

Building the Canadian North is an essential part of building our nation. To further address the opportunities and challenges that exist, the Government of Canada introduced Canada's Northern Strategy in 2007. The Strategy presents an overarching vision for the North, based on four priorities: exercising our Arctic sovereignty; promoting social and economic development; protecting our environmental heritage; and, improving and devolving Northern governance.

The Government of Canada continues to deliver on its Northern Strategy commitments. Economic development is progressing like never before. Investments in science are helping exploration companies discover important natural resource deposits. The commercialization of these deposits is being expedited through responsible resource development while respecting the environment. Northerners are being trained to fill the growing number of jobs being created and devolution is underway to help ensure that the territories participate fully in resource development.

Most recently, we entered into an historic devolution agreement to provide the Northwest Territories with greater decision-making powers over a range of new responsibilities which will lead to jobs, growth and long-term prosperity.

The Government of Canada is also building on strengthened social infrastructure through housing, education, medical, and recreation facilities.

This year in particular, *Economic Action Plan 2013: Jobs, Growth, and Long-Term Prosperity* outlines a number of initiatives to maintain the momentum of our Northern Strategy, including:

- $200 million for the construction of an all-season gravel road from Inuvik to Tuktoyaktuk in the Northwest Territories ($150 million committed in 2011 and then increased to $200 million in 2013). Construction of the 140-kilometre road began in early 2013;
- $100 million over two years (2013-2015) to support the construction of about 250 new housing units in Nunavut;
- Capital support for Yukon College's Centre for Northern Innovation in Mining in order to help Northerners benefit from local employment opportunities and rapid economic growth; and
- $4 million over three years (2013-2016) to protect against invasive species through the continued monitoring and enforcement of ballast water regulations and an increase in ballast water inspection capacity in Arctic waters.

These investments continue to build on prior commitments and concrete actions to improve everyday life in the North, such as:

- $27 million over five years (2011-2016) to expand adult basic education programming to increase employment opportunities for Northerners;
- An ongoing commitment to establish the Canadian High Arctic Research Station in Cambridge Bay;
- $50 million over two years (2012-2014) to protect wildlife species at risk;
- $5.2 billion over 11 years, starting in 2012, for the renewal of the Canadian Coast Guard Fleet;
- $40.5 million (2007-2013) to establish a commercial fisheries harbour in Pangnirtung, Nunavut;
- Up to $71 million (2009-2012) for improvements to the Mayo B hydroelectric facility in the Yukon;
- The expansion of the boundaries of the Nahanni National Park Reserve to protect over 30,000 km2 of crucial habitat for grizzly bears, woodland caribou and Dall's sheep;
- Improvements to northern regulatory regimes through the *Northern Jobs and Growth Act*, which received Royal Assent on June 19, 2013, that respond to the economic development needs of Northerners and build on our government's commitment to jobs, growth and long-term prosperity; and
- $6.4 million over two years (2012-2014) to support repairs and improvements to community infrastructure across the three territories.

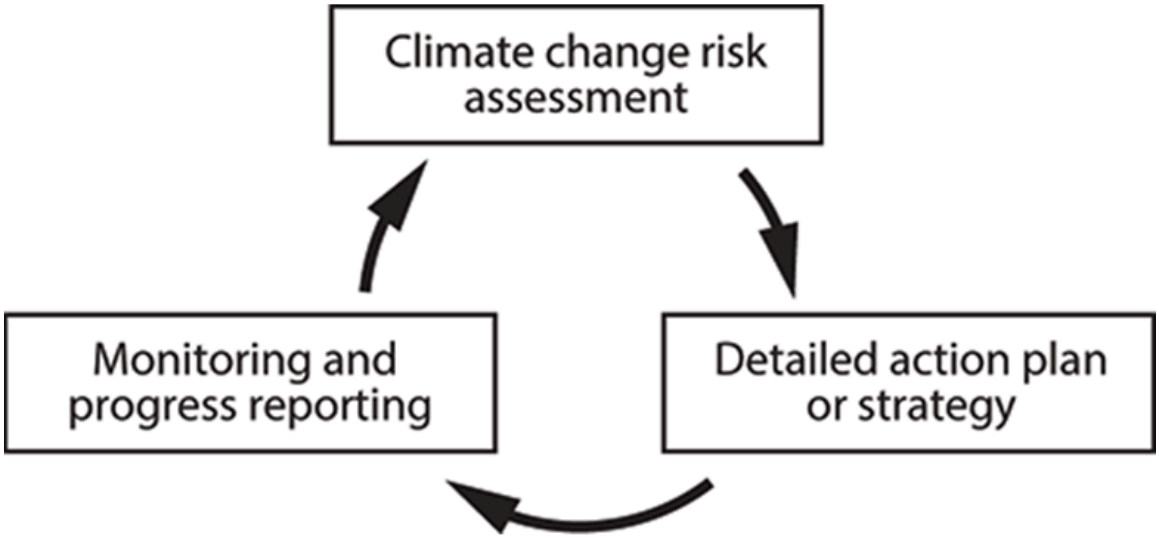
In addition, an investment of $1.7 million over two years (2009-2011) allowed for 19 recreational infrastructure projects across the three territories to improve community infrastructure, create short term jobs and support healthy communities.

The Government of Canada has made the North one of its top priorities. Through our Northern Strategy, we are working to ensure Canada's North achieves its full potential as a healthy, prosperous region within a strong and sovereign Canada.

For a complete report of progress on Canada's Northern Strategy and for information on the Government's accomplishments in the North, please visit: www.northernstrategy.gc.ca, and www.actionplan.gc.ca/en/page/accomplishments-north

Source: Government of Canada (2013). Canada's Northern Strategy-News Release.

Appendix 7: Evidence based adaptation planning



Source: Office of the Auditor General of Canada. (2017, exibits2.2)

Appendix 8: Climate Change Adaptation Program (CCAP) selected projects 2013-2014 for the three territories

Nunavut

Title of Project	Partner	Communiti(es)	CCAP Contribution
Incorporating Climate Change into Land Development – Terrain Analysis	Government of Nunavut	Nunavut Communities	$459,000
Pan-territorial Adaptation Outreach			
Homeowner's Guide to Permafrost in Nunavut			

Northwest Territories

Title of Project	Partner	Communiti(es)	CCAP Contribution
Food Security and Drinking Water Vulnerability Assessment Related to Permafrost Degradation in the Jean Marie River First Nation	Jean Marie River First Nation	Jean Marie River First Nation	$135,500
YKDFN Permafrost Mapping and Yellowknife River Watershed Project	Yellowknives Dene	Yellowknives Dene	$92,200
Integrating Climate Change Measures into all Municipal Planning and Decision Making - A Guide for Northern Communities (Phase 2)	NWTAC	NWTAC	$55,000
Northwest Territories Coordination, Extension, Permafrost Gap Analysis and the evaluation of a digital elevation model adaptation tool	Government of Northwest Territories	Northwest Territories communities	$500,000
Pan-Territorial Outreach			
Mountain Pine Beetle Vulnerability Assessment			
Hazardous Waste Risk Assessment Pilot Project Beaufort Delta/High Arctic Communities			
Terrain Mapping and Community Heritage Resource Management: Adapting to Climate Change in the Gwich'in Settlement Area.			
NWT Hazard Identification and Risk Assessment (HIRA)			
Risk Evaluation of Government Buildings in NWT Communities to Changing Climatic Conditions			
Permafrost Vertical Displacement Hazard Mapping			

Yukon

Title of Project	Partner	Communiti(es)	CCAP Contribution
Landscape Hazards in Yukon Communities: Geoscience Mapping for Climate Change Adaptation Planning	Northern Climate ExChange - Yukon College	Burwash Landing, Destruction Bay, Faro, Ross River, Beaver Creek	$187,849
Examining forest vulnerabilities to climate change and developing resilience enhancement strategies through long-term community partnerships in Yukon	Government of Yukon	Yukon communities	$500,000
Effects of changing permafrost conditions on agriculture and agriculture capability classification in Yukon			
Vulnerability of the North Alaska Highway to Climate Change			
Development of bioclimatic envelopes and interpretation of climate projections to frame adaptation strategies for Yukon's boreal forest			
Sensivity of Yukon Hydrological Response to Climate Warming: A Case Study for Sectoral Climate Change Adaptation			
The mountain pine beetle in novel habitats: predicting impacts to northern forests in a warming environment			
Pan-Territorial Adaptation Outreach			
Yukon Flood Plain Risk Mapping			
Communicating Climate Change Adaptation			

Source: Indigenous and Northern Affairs Canada. (2016). Climate Change Adaptation Program: selected projects 2013-2014

Appendix 9: Climate change Adaptation program selected projects 2014-2015 for the three territories

Nunavut

Name of Project	Partner	Communiti(es)	CCAP Contribution
Incorporating Climate Change into Land Development - Terrain Analysis	Government of Nunavut	All Nunavut Communities	$500,000
Climate Change Module for Government of Nunavut Decision-Makers			
Nunavut Permafrost Databank			

Northwest Territories

Name of Project	Partner	Communiti(es)	CCAP Contribution
Northwest Territories Coordination, Extension, Permafrost Gap Analysis and the Evaluation of a Digital Elevation Model Adaptation Tool	Government of Northwest Territories	Northwest Territories communities	$445,000
Mountain Pine Beetle Vulnerability Assessment			
Hazardous Waste Risk Assessment Pilot Project Beaufort Delta/High Arctic Communities			
Terrain Mapping and Community Heritage Resource Management: Adapting to Climate Change in the Gwich'in Settlement Area.			
NWT Hazard Identification and Risk Assessment (HIRA)			
Risk Evaluation of Government Buildings in NWT Communities to Changing Climatic Conditions			
Permafrost Vertical Displacement Hazard Mapping			

Yukon

Name of Project	Partner	Communiti(es)	CCAP Contribution
Landscape Hazards in Yukon Communities: Geoscience Mapping for Climate Change Adaptation Planning	Northern Climate ExChange - Yukon College	Burwash Landing, Destruction Bay, Faro, Ross River & Beaver Creek	$154,362
Current and Future Landscape Hazard Risks in Old Crow: Geoscience Mapping for Climate Change Adaptation Planning	Northern Climate ExChange - Yukon College	Old Crow	$170,000
Examining Forest Vulnerabilities to Climate Change and Developing Resilience Enhancement Strategies Through Long-term Community Partnerships in Yukon	Government of Yukon	Yukon communities	$500,000
Effects of Changing Permafrost Conditions on Agriculture and Agriculture Capability Classification in Yukon			
Vulnerability of the North Alaska Highway to Climate Change			
Development of Bioclimatic Envelopes and Interpretation of Climate Projections to Frame Adaptation Strategies for Yukon's Boreal Forest			
The Mountain Pine Beetle in Novel Habitats: Predicting Impacts to Northern Forests in a Warming Environment			
Yukon Flood Plain Risk Mapping			
Communicating Climate Change Adaptation			

Source: Indigenous and Northern Affairs Canada. (2016b). Climate Change Adaptation Program: selected projects 2014-2015

Appendix 10: Climate change Adaptation program selected projects 2015-2016 for the three territories

Yukon

Name of project	Partner	Communit(ies)	CCAP Contribution
Territorial Agreement	Government of Yukon	Yukon	$500,000
Champagne and Aishihik First Nations Community Climate Change Risk and Vulnerability Assessment and Adaptation Strategies	Champagne and Aishihik First Nations	Champagne Haines Junction Canyon Creek Takhini River Subdivision	$105,000
Current and future landscape hazards risk in Old Crow: Geoscience mapping for climate change adaptation planning	Yukon College	Old Crow	$170,000

Northwest Territories

Name of project	Partner	Communit(ies)	CCAP Contribution
Climate Impacts Tracking and Analysis (CITAS) - GNWT Corporate IT	Government of NWT	NWT	$150,000

Nunavut

Name of project	Partner	Communit(ies)	CCAP Contribution
Territorial Agreement	Government of Nunavut	Nunavut	$500,000

Indigenous and Northern Affairs Canada. (2016c). Climate Change Adaptation Program: selected projects 2015-2016