SACRIFICIAL ZONE OR LIVING ON BORROWED TIME: OIL EXPLOITATION IN NORTHERN ALBERTA AND ITS IMPACT ON THE ATHABASCA CHIPEWYAN FIRST NATION COMMUNITY

A Thesis

Submitted to the Faculty of Graduate Studies and Research

In Partial Fulfillment of the Requirements

for the Degree of

Master of Arts

in

Justice Studies

University of Regina

by

Chris Ekene Mbah

Regina, Saskatchewan

December 2015

UNIVERSITY OF REGINA

FACULTY OF GRADUATE STUDIES AND RESEARCH

SUPERVISORY AND EXAMINING COMMITTEE

Chris Ekene Mbah, candidate for the degree of Master of Arts in Justice Studies**,** has presented a thesis titled, ***Sacrificial Zone or Living on Borrowed Time: Oil Exploitation in Northern Alberta and its Impact on the Athabasca Chipewyan First Nation Community,*** in an oral examination held on December 9, 2015. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

External Examiner:	Dr. Katherine Arbuthnott, Department of Psychology
Supervisor:	Prof. Margot Hurlbert, Department of Justice Studies
Committee Member:	Dr. Harry Diaz, Department of Justice Studies
Committee Member:	Dr. Richard Ruddell, Department of Justice Studies
Chair of Defense:	Dr. James Farney, Department of Political Science

ABSTRACT

This research study explored the vulnerability and adaptive capacity of the Athabasca Chipewyan First Nation (ACFN) to the impacts of oil extraction in northern Alberta. The ACFN is one of many Aboriginal communities that have lived in northern Alberta for centuries. Historically, the community has relied on their natural environment for sustenance. The sources of livelihood for the ACFN have been affected at various levels by the negative impacts of oil extraction activities in the region. Such negative impacts on the environment and the people have exposed them to vulnerability issues, namely health and socioeconomic issues, and have equally challenged their ability to respond.

Using a semi-structured interview method, the investigator collected and analyzed the perceptions of ten members of the ACFN community about the impacts of oil extraction on their community and how the members of the community have responded. The findings corroborate existing views that oil extraction activities in northern Alberta have caused not only environmental disruptions but also have disrupted the Athabasca Chipewyan First Nation's traditional socioeconomic practices due to pollution and contamination of rivers, lakes and the forest. Oil extraction has also resulted in some negative health issues in the community.

In terms of coping and adaptive capacity, there is an unequal distribution of revenue; an inadequate institutional framework; loss of economic opportunity; low technological capacity and inadequate socioeconomic capital which resulted in low coping mechanisms. There is a growing trend of education and skills acquisition which contributes to an increasing level of coping mechanisms and adaptation for some members of the community. Based on the reflections of respondents, age is a determining factor in who acquires education to increase their coping possibilities. Also, family unity, social control and cohesion in the ACFN are hinged on the economic security of family members, particularly the breadwinners.

ACKNOWLEDGEMENTS

First, I thank God, my Creator, for His gift of life and strength. My sincere gratitude and appreciation to my thesis supervisor, Associate Professor Margot A. Hurlbert, for her guidance, input, editing and patience with me during the course of writing this thesis. This thesis was also made possible by input from Professors Harry (Polo) Diaz and Rick Ruddell. Thanks to Polo and Margot's invaluable foresight they prepared me for this thesis during the “Seminar on Environment and Development”. Thanks to my External Examiner, Professor Katherine Arbuthnott, for her sincere inputs towards making the thesis a reality. My gratitude also goes to the Department of Justice Studies and indeed the University of Regina for providing me with the platform to pursue my academic dreams. I hope in the future I can contribute to uplifting the university to greater heights.

To all of the members of the Athabasca Chipewyan First Nation, especially the respondents, thank you for your understanding and cooperation. You contributed in great measure to making this thesis a success. I have learned so much from my interaction with all of you and I will forever hold, in high esteem, your belief in the sanctity of the land.

DEDICATION

I dedicate this thesis to my mother, Ezinne Victoria Mbah. I thank you immensely for your prayers and moral support. You are indeed a great mother. To my siblings, thank you for your encouragement.

To Amaka Mbah, you are more than a wife - you are also my best friend. Thank you for enduring my absence from home, including while you were pregnant, while I wrote this thesis. Now, I will be there for you and our son.

Thank you to my friends for reminding me, through your actions, that failure was never an option.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

LIST OF FIGURES

LIST OF BOXES

LIST OF APPENDIXES

LIST OF ABBREVIATIONS

AANDC	Aboriginal Affairs and Northern Development Council
AIDS	Acquired Immune Deficiency Syndrome
ACB	Alberta Cancer Board
ACFN	Athabasca Chipewyan First Nation
CAPP	Canadian Association of Petroleum Producers
CIRL	Canadian Institute of Resource Law
CBC	Canadian Broadcasting Corporation
CDC	Centers for Disease Control and Prevention
CSR	Corporate social responsibility
CEMA	Cumulative Environmental Management Association
ERCB	Energy Resources and Conservation Board
EIA	Environmental Impact Assessment
GHGs	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
OECD	Organization for Economic Cooperation and Development
PHA	Public Health Agency
RAMP	Regional Aquatics Monitoring Program
RMWB	Regional Municipality of Wood Buffalo
RSDS	Regional Sustainable Development Strategy
RDS	Respondent-Driven Sampling
STI	Sexual Transmitted Infections
WHO	World Health Organization

Chapter One: Scope and Purpose

1.1 Introduction

This chapter provides an introduction to the thesis. It introduces the contextual framework of the vulnerability and adaptive capacity which is elaborated on in more detail in the literature review in Chapter 2 and describes the impact of oil extraction activities on the Athabasca Chipewyan First Nation (ACFN) in northern Alberta. The chapter also provides the problem statement, research questions, and an outline for the remainder of the thesis.

The research examined the community residents' perception of how oil mining activities have affected their environment, health, socioeconomic practices; as well as the responses the community members have adopted to cope and adapt to these impacts. This examination has been in the context of a vulnerability theoretical framework.

The presence of natural resources has resulted in a number of positive and negative economic and social outcomes. In many developed countries, natural resources particularly oil and natural gas, have contributed to those countries' economic development and to the existence of robust social programs and welfare schemes. Canada, the US, and Norway are among the countries where oil revenue has contributed to economic growth and development. However, in those developed nations the method of oil extraction activities has sometimes caused environmental disaster, particularly affecting traditional or indigenous communities, and their livelihood (Putz, Finken, & Goreham, 2011; Maldonado, 2014; Hopkins, 2008). Also, these peoples' capacity to respond to such impacts has been affected due to the effect such disasters have on the system and socioeconomic practices.

One such community in which oil extraction has had devastating impacts is the ACFN in northern Alberta. The biophysical (environmental) changes produced by the oil industries operating in the region have had cumulative negative effects on the community's environment, their culture, health and socioeconomic activities, since they live in close proximity to oil mining sites (Birn & Khanna, 2010; Tenenbaum, 2009; Gosselin, et al., 2010). As a result, the locals have varying levels of vulnerability which is shaped by their capacity to respond. This thesis examines the community's vulnerability, coping options and adaptive capacity to these impacts.

This research is important for a number of reasons. It contributes to an expanding body of knowledge on how natural resources extraction, specifically oil and natural gas, contributes to environmental hazards, namely climate change, health issues and disruption of traditional socioeconomic activities of a given population that rely on their environment for sustenance. Sections 1.2 through 1.5 provide background information about the research topic gained from secondary sources.

1.2 Oil Extraction in North America and its Impacts

Many regions in North America are endowed with numerous natural resources, which have been explored over the years by various companies (Maldonado, 2014). Also, the consequences of such resource extraction, namely oil, for some communities across the region; whether for host communities or communities with close proximities to oil extraction sites cannot be underestimated (Maldonado, 2014). The byproducts of oil extraction can damage the environment and adversely affect the socioeconomic, as well as health and traditional practices of the affected community (Office of the Chief Medical Officer of Health, 2012).

Natural resource extraction in North America has had devastating effects on some indigenous communities – and their land, the surrounding rivers and the forest that constitute the livelihood of these communities. To emphasize the impact of this devastation on the land and cultural pattern of Mikisew Cree First Nation (MCFN), George Poitras said,

> If we don't have land and we don't have anywhere to carry out our traditional lifestyles; we lose who we are as a people. So, if there's no land, then it's equivalent in our estimation to genocide of a people (Peterson 2007, p. 31).

There are other indigenous communities in North America that have also witnessed environmental changes similar to those in northern Alberta, owing to natural resources extraction. Describing the negative environmental changes in their community, a tribal member of Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw Indians, in Louisiana, said,

> If we lose the island we lose what brings us back to it. And that's the idea that that was our place. It was our place. Everybody else can say the government considered it uninhabitable, and we took it and inhabited and we made it our place, and now it is gone. It's going. And if it goes, we'll no longer have our special place. That's the one thing that keeps us together as a community, as a reservation, is we had our place. We don't have our place anymore. We have no place (Maldonado 2014, p.62).

Environmental hazards, as Melville (1994) pointed out, take numerous forms. In the case of the ACFN, in northern Alberta, soil contamination; ground water pollution and depletion; biodiversity loss; contamination of rivers; decline or loss of traditional economic practices; air pollution and threats to plants and human health have been prevalent (Office of the Chief Medical Officer of Health, 2012). Also, the influx of migrant oil workers into the region contributes to an increase in social vices and equally affected their socioeconomic activities (Birn & Khanna, 2010). Additionally, the

negative impact has precipitated the forced migration of wildlife in many parts of this region due to the destruction of ecological habitats (Birn & Khanna, 2010).

1.3 Traditional Economic Practices of the Athabasca Chipewyan First Nation

ACFN is an Aboriginal Reserve with a population of about 1,168 (Aboriginal Affairs and Northern Development Canada, 2015). Prior to the commercial exploration of oil in northern Alberta, which intensified in the late 1960s when Sun Oil Company (today called Suncor Energy) acquired the Great Canadian Oil Sands Project, regional indigenous communities in the region, including the ACFN, depended on their environment for sustenance and commercial activities (Birn & Khanna, 2010). The Athabasca River and the surrounding lakes and boreal forest provided sources of economic activities, primarily fishing and hunting. Nonetheless, long before commercial exploration of oil began, a boom in oil and gas extraction in northern Alberta was predicted.

> As early as 1793, the explorer Sir Alexander Mackenzie had mentioned that tar and oil could be found oozing from the banks of the Athabasca. Since that time, few explorers of the area failed to mention the tar sands or to speculate on its future potential. In 1875-76, A.R.C. Selwyn and Professor Macoun of the Geological Survey of Canada reported that petroleum existed in the Athabasca region in 'almost inexhaustible supplies'... and in 1890 and 1891 R.G. McConnell 'estimated that there were 4,700 million tons of tar in the region, as well as natural gas, bitumen, oil and pitch. (Daniel, 1999 p. 58).

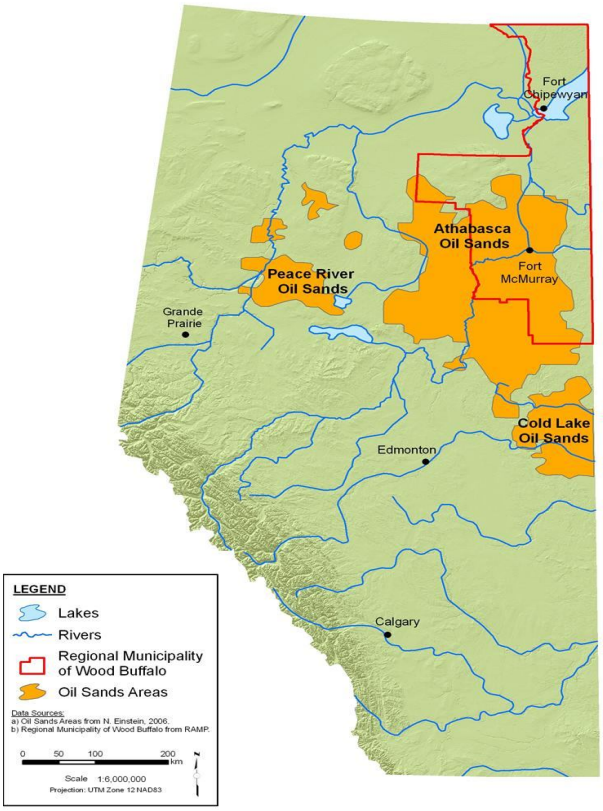
By 1870, Rupert's Land was acquired from the Hudson's Bay Company for oil exploration (Huseman &Short, 2012). However, prior to the intensification of oil extraction in northern Alberta in the 1960s, the oil sand (bitumen) was generally used for

roofing, patching canoes, fishing and to burn as smudge to ward off insects (Birn & Khanna, 2010).

1.4 Methods of Oil Sand Production and its Capacity to Pollute the Environment

Tar sand deposits in northern Alberta have been acknowledged as the third largest in terms of a global oil reserve after Venezuela and Saudi Arabia. It covers about 140,200 km^2 of land in the Athabasca, Cold Lake and Peace River areas (Bari & Kindzierski, 2015; Birn & Khanna, 2010). It is also the most attractive unconventional oil deposit in the world (Carlson & Stelfox, 2014). Map 1 below shows three main locations of oil mining in northern Alberta.

Map 1: Oil sands and mining areas in northern Alberta



Source: RAMP, (2006)

Eighty percent of oil sand deposits can be found underground, which requires a more resource intensive process known as *in situ* leaching or recovery to extract (Birn & Khanna, 2010). This operation involves the "…injection of steam into the ground to heat the bitumen, improving its mobility so it can be brought to the surface" (Birn & Khanna, 2010, p. 9). There are two methods of oil extraction using the *in situ* method. Cyclic steam stimulation involves injecting steam and allowing it to soak over an extended period, followed by a production period which involves pumping the heated bitumen to the surface (Birn & Khanna, 2010). The process is repeated until it is no longer economically viable to continue, usually a period of 6-8 months. The production rate, using this method, varies from 20-25% in recoverable oil (Birn & Khanna, 2010).

On the other hand, the steam-assisted gravity drainage (SAGD), which is a more cost-effective method, involves drilling two horizontal wells in the oil sand. Steam is then injected through the upper well to heat the oil sand for easy mobility and this accounts for over 50% of the recoverable oil (Birn & Khanna, 2010). The wastewater (tailings) from this process is then stored in surface (tailings) ponds. These ponds contribute to the pollution of the Athabasca River and the groundwater system, and also the pollution of the general landscape of the areas in question (Birn & Khanna, 2010).

Less than 20% of oil sand is shallow enough to permit surface mining. Using this method, "…the land must be drained, and the vegetation and soil removed and stored for later use in reclamation after the mining operation is complete" (Birn & Khanna, 2010, p. 8). Once the oil sand is exposed, it is then extracted and loaded into large trucks and is taken to a crusher. Mixed with hot water, the oil sand is then transported through pipes to

be processed; and about 90% of the oil is recovered in the process (Birn & Khanna, 2010).

In both *in situ* and surface mining methods, a considerable amount of energy is being used. Almost all of the water required for these operations is drawn from the Athabasca River, which is one of the largest sources of water in the region (Office of the Chief Medical Officer of Health, 2012; RAMP, n.d). Both the *in situ* and surface mining methods of oil sand extraction have the capacity to pollute the waterways, the land and the boreal forest.

1.5 Impacts of Oil Mining Operations

This section outlines and describes the impacts of oil mining operations in northern Alberta, specifically as it affects First Nation communities with close proximity to mining sites.

1.5.1 Greenhouse Gas Emission

According to the Organization for Economic Cooperation and Development (OECD) rankings, "Canada is among the three worst countries in the OECD on nine indicators: emission of greenhouse gases, sulphur dioxide, carbon dioxide and volatile organic compounds; consumption of water and energy, energy deficiency, volume of trees logged, and generations of nuclear waste" (cited in Hurlbert, 2011, p.149). Greenhouse gases (GHGs), including methane, chlorofluorocarbons, and carbon dioxide act as a shield that traps heat and radiation in the atmosphere and causes damage to the environment. Oil extraction is a carbon intensive process and the processes results in GHG emissions in the range of 62-164 kg of CO^2 equivalent per barrel (Dyer, 2009). This results in considerable damage to the ecosystem, including the air. According to

Dyer (2009), Canada's economy is among the dirtiest and least efficient in the industrialized world, as it generates more pollution and uses more energy to produce a given amount of economic output than other OECD countries.

Writing about oil sand development, the Expert Panel of the Royal Society of Canada found that the expansion of bitumen production means a corresponding increase in GHG emissions (Gosselin, et al., 2010). The panel also noted that there is every possibility that an increase in GHGs will continue due to an escalated expansion of oil production. The Alberta provincial government acknowledged that GHG emissions from oil sand extraction and processing are about four times greater than those from conventional crude oil production (Dyer, 2009). Gerdes and Skone (2009) remarked that in a long-term projection, oil sand would remain the most GHG intensive fuel source.

1.5.2 Tailings Ponds and their Consequences

Tailings refer to by-products of the oil mining processes which contain priority pollutants including naphthenic acids, mercury, unrecovered hydrocarbons and trace metals dumped in manmade ponds (Tenenbaum, 2009). This by-product, or wastewater, is harmful to aquatic organisms, fish, birds and mammals when leaked into the groundwater and surrounding rivers (Tenenbaum, 2009). Timoney and Lee (2009) in their anecdotal report on the consequences of oil sand pollution in Aboriginal communities argued that hazardous waste and pollution poses serious health risks to the inhabitants of these communities. Levy (1995) pointed out that diseases and deformities such as cancers, skin irritations, respiratory problems, neo-behavioural problems, reproductive risks such as birth defects and miscarriage, damage to immune systems and

body organs, in addition to increased risks of unintentional injuries, are all typical issues in regions with natural resource extraction.

By-products of oil sand development are dumped in tailings ponds, which cover more than a 130 square/km area in northern Alberta (Woynillowics & Severson-Baker, 2006). There are about 720 billion liters of toxic tailings in the Athabasca oil sand landscape and it is estimated that by 2040, these tailings are expected to occupy a 310 square/km area, which is almost the size of Vancouver (Dyer, 2009). Activists have raised some concerns about leakage from the tailings ponds into the groundwater system and surrounding soil and surface water, which has the potential to cause serious health hazards (Tenenbaum, 2009).

According to George Poitras, "…chemicals leaking from tailings ponds affect anybody or anything that relies on water as a source of drinking, or a place to live in" (Tenenbaum, 2009, p. A153). Restating this observation, Fabian, an Aboriginal elder in a community along the Athabasca River said, 'The River used to be blue. Now it's brown. Nobody can fish or drink from it. The air is bad. This has all happened so fast' (Thomas-Muller, 2008, n.p.).

However, Environment Canada argued that all tailings ponds are constructed with groundwater monitoring and seepage capture utilities and are monitored to ensure that seepage is minimized. The agency noted that as of 2008, there has been no definitive evidence that groundwater contamination from oil sands tailings ponds are leaking into the waterways or have caused any serious health risks (Birn & Khanna, 2010).

Corroborating this view, a Royal Society of Canada's Expert Panel said that there is very little correlation between the environmental contaminants from oil mining

operation and health issues reported in Aboriginal communities (Gosselin et al., 2010; Dyer, 2009). In fact, the Panel argued that there is no credible evidence to support accounts of excess cancer occurrences in Fort Chipewyan being caused by contaminants from oil mining operations (Gosselin et al, 2010).

However, federal government research confirmed that tailings ponds are releasing toxic and potential cancer-causing chemicals into the Athabasca River and into the air (CBC, 2014; Uechi, 2015; Weber, 2014). Also, evidence from various independent experts showed tailings ponds present numerous health risks. Physicians who have worked in Aboriginal communities in northern Alberta have consistently argued that environmental contaminants stemming from oil extraction create health complications for the inhabitants of those communities (Tenenbaum, 2009). John O'Connor, a physician working in the Fort Chipewyan Aboriginal community for over 16 years has consistently raised global awareness of the numerous health risks, based on his own findings, particularly an increase in cancer rates as a result of the impacts of oil sand extraction (Ferreras, 2015). His insistence and consistent view on the negative health impacts of oil sand extraction on the Aboriginal peoples resulted in a number of disagreements between the physician, Health Canada and the Alberta Cancer Board (ACB). Health Canada repudiated O'Connor's observations and claimed that the physician was spreading undue alarm (Urquhart, 2010). It should be noted that both agencies' reviews were not based on complete sets of data (Urquhart, 2010).

Dr. Keith Timoney, an ecologist with Treeline Ecological Research, noted that studies of local fish have shown that all walleye and female whitefish, and almost all male whitefish, tested exceeded the US guidelines for mercury consumption (cited in

Tenenbaum, 2009). Another study carried out by Timoney (2009) showed that carcinogens and toxic substances in fish, waterfowl, muskrat, beavers, moose, water and sediment downstream of the oil sand projects are higher than would be considered safe. Health Canada admitted that the study by Timoney and Lee (2009), which confirmed the high levels of pollution did present human health concerns. If the report prepared by the Tar Sands Solution Network (2014) stating that about 11 million liters of toxic waste water leaks into the Athabasca River every day is accurate, then indeed, tailings ponds pose a great risk to the fish, animals, and members of Aboriginal communities that depend on the river for daily use. Table 1 shows the levels of priority pollutants in aquatic birds and animals.

Table 1
Number of Samples and Types of Analyses Conducted

	Total Sampled	Veterinary analysis	Heavy metals (As,Cd,Hg,Se)	Polyclclic Aromatic Hydrocarbons PAHs	Muscle	Liver	Kidney
Moose	4	4	4	4	4	3	3
Duck	23	23	23	23	23	23	23
Muskrat	8	8	8	8	8	8	8
Beaver	3	3	3	3	3	3	3
Willow	14	-	13	-	-	-	-

Source: McLachlan, (2014)

The death of 1,600 ducks on a tailings pond in the Aboriginal community of Fort Chipewyan attests to this fact (Gosselin et al., 2010). Arising from the impacts of tailings ponds are cases of diabetes, hypertension, renal failure and lupus, which are all linked to toxins commonly found in tailings (Tenenbaum, 2009). In the words of George Poitras,

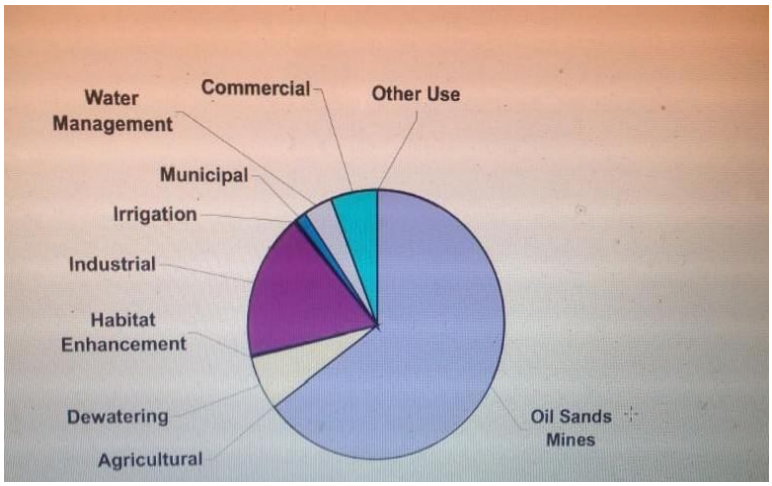
> We are seeing a terrifyingly high rate of cancer in Fort Chipewyan where I live. We are convinced that these cancers are linked to the tar sands development on our doorstep. It is shortening our lives (cited in Mech, 2011, p. 28).

1.5.3 Use and Pollution of the Athabasca River

The Athabasca River stretches over 1,538 kilometers from its source at the Columbia Glacier in Jasper National Park to Lake Athabasca in Wood Buffalo National Park (Woynillowicz & Severson-Baker, 2006; RAMP, n.d.). The river, which is the largest in Alberta, and one of the largest in North America, provides vital ecosystems as one of the major rivers of the region and equally serves as the backbone of human and industrial development in northern Alberta (RAMP, n.d). The Athabasca River is a vital resource for the plants, animals and people of northern Alberta (RAMP, n.d.). It is equally relevant to tar sand mining; it provides up to 65% of the water required for mining operations (Birk & Khanna, 2010).

These allotments are shown in Figure 1 below. Other sources of water for oil sand production include the Peace and Beaver River basins (CAPP, n.d). There are secondary sources of water which are from precipitation captured in the active mine area and groundwater pumped out to prevent the mines from filling with water (CAPP, n.d).

Figure 1
Licensed surface water allocations from the Athabasca River and its tributaries



Source: Woynillowicz and Severson-Baker (2006).

Oil sand extraction is a water-intensive activity and each barrel of oil requires a large amount of water to produce. As of 2010, oil mining operations withdrew 370 million cubic meters (m^3) of water per year from the river - enough to meet the water needs of over two million people, which in 2010, was twice the population of Calgary (Greenpeace, 2010). The demand for water in mining operations is continuously stretching the Athabasca River, thereby posing a greater threat to the fish population and its sustainability (RAMP, 2015; Woynillowicz & Severson-Baker, 2006). Also, virtually all of the water used in processing oil sand is not recycled, and therefore ends up in toxic tailings ponds, which further pollute the groundwater (Gosselin, 2010).

1.5.4 The Socioeconomic Impacts

Natural resources extraction, particularly oil mining, has always had impacts on the existing socioeconomic activities of host communities, or areas with close proximity to mining areas, particularly rural areas (Freudenburg, 1984). This effect occurs "when a rapid change in population, industrialization, and economic prosperity also leads to a host of social ills that impact community health" (Office of the Chief Medical Officer of Health, 2012). Such social ills include,

> Increased rates of crime levels; drug and alcohol abuse; homicide; sexually-transmitted diseases; domestic violence; inadequate supply and quality of housing; increased cost of living; increased community dissatisfaction; increased mental health and social services caseloads; increased hospital admissions; insufficient infrastructure; and insufficient capacity in public services including policing, local government, social services and heath care….potential health impacts as a result of air quality, noise vibration, physical hazards due to extensive heavy truck traffic, possible hazards to mental health and community well-being (p.5).

These impacts are “thought to be more intense for small communities with traditional ways of life that did not previously involve the industrial sector responsible for the boom” (Office of the Chief Medical Officer of Health, 2012, p.5). Their spokesperson noted that the mental health and well-being of these small communities is undermined as a result of feelings of helplessness over the loss of control of their destiny. This also brought about psychological trauma and may have caused an increased rate of crime in Aboriginal communities in northern Alberta and across North America (Office of the Chief Medical Officer of Health, 2012; Maldonado, 2014).

The destruction of the territorial land of Aboriginal communities, and pollution of the Athabasca River, and surrounding lakes caused by oil mining processes brought about a dislocation of economic activities, and social disruption in these communities (Huseman & Short, 2012). The rivers, and a large portion of the territorial lands, were either harmed by oil mining processes or taken over by the government via Treaty 8 to facilitate expansion of oil development. Unfortunately, land reclamation as a remedy to such destruction has not been very proactive for some of these communities, and therefore has become an issue of public debate over oil development in northern Alberta (Gosselin, et al. 2010). In other cases, land reclamation never succeeded in returning the land to its natural state and fertility (Mech, 2011).

According to a report by the Canadian Institute of Resource Law (CIRL), the impact of resource development on Aboriginal peoples living in the boreal forest region includes social disruption due to the sudden influx of workers to relatively isolated communities (cited in Mech, 2011). As a result, crime, drug offences, prostitution, domestic violence, family breakdown and other social vices have increased (Mech,

2011). Being exposed to these forms of social vices has its consequences; such as vulnerability to sexually transmitted infections (STIs) and increased criminality. Prostitution, for example, exposes young girls to high levels of unwanted pregnancies, STIs, and AIDS.

1.6 Problem Statement

Man-made activities, particularly the impacts of industrialization, have had repercussions that resulted in a number of sensitivities to environmental, socioeconomic issues, and increasing health risks for affected individuals and communities. Such individuals and communities are more vulnerable to these sensitivities when the capacity to cope or adapt is low. Capacity to cope or adapt describes how individuals and communities, from the point of strength respond to numerous sensitivities they are exposed to in their surroundings. This will be discussed further in sections 2.7 – 2.9 of Chapter Two. The impact of oil extraction on Aboriginal communities of northern Alberta, has been unprecedented in Canada (Tenenbaum, 2009). Using the Athabasca Chipewyan First Nation (ACFN) as an example, the study that supports this thesis explored reflections of selected respondents from this community about oil mining operations in the region and its impact on the community's environment, socioeconomic activities, and health conditions, as well as the community and individuals' ability to adapt to those changes. This thesis seeks to expand our understanding of the impacts of natural resource extraction on communities in resource-rich regions, particularly among marginalized peoples, by asking those who are directly impacted.

Prior to the first commercial production of oil in the 1930s, fish and other game were used as natural resources throughout northern Alberta (Birn & Khanna, 2010). With

the discovery and intensification of oil production in that region, there has been a corresponding increase in environmental degradation caused by pollution from oil mining processes and the associated development. Its impact on the economic, health, cultural and social fabric of the ACFN cannot be underestimated. From the loss of eco-habitat to ruined traditional economic activities, health issues, the loss of traditional lifestyles, population increase, an increase in crime, a deep sense of marginalization and social exclusion, the people within the ACFN have endured many hardships and have been left with a feeling of helplessness (Huseman & Short, 2012).

The same oil resources and exploitation that have been described as the 'Most destructive industrial project on earth by environmental, human rights, and indigenous activists alike' have also generated billions of dollars of revenue for the province of Alberta (Huseman & Short, 2012, p. 220). It has led to the creation of jobs, higher standards of living in the province, and an increase in social welfare and amenities. However, there seems to be an imbalance in the distribution of these benefits and this raises the concern of whether the economic advantages of oil production outweighs the negative effects in northern Aboriginal communities such as the Athabasca Chipewyan First Nation (Huseman & Short, 2012; Alberth et al., 2012).

1.7 Research Questions

There have been previous scholarly examinations on the impacts of natural resource (oil) extraction on local communities, like the Aboriginal communities in northern Alberta as described in sections 1.2 to 1.5. This, in addition to coping strategies and adaptive capacities of affected communities discussed in the literature review section

in Chapter Two informs the research questions. The main research question of the thesis is:

1. What are the main impacts of oil extraction activities on the ACFN members?

Three supporting research questions include

2. How are the impacts problematic to individuals and indeed, the ACFN?
3. What do community members do to reduce these impacts?
4. How do ACFN community members view their future?

1.8 Significance of the Research

In spite of the substantial economic revenue generated by natural resource extraction across developed nations, the exploitation of natural resources in northern Alberta has resulted in devastation that has impacted Aboriginal peoples. Numerous scholars have described how resource extraction, particularly oil mining, has negatively impacted the host regions. While some scholars have limited their study to environmental issues (Blaikie & Brookfield, 1987; Cutter et al., 2006; IPCC, 2007; Strydom, 2002; Wisner, et al., 2005), others have investigated the impact of natural resource extraction on socioeconomic activities, health, and cultural practices (Berman et al., 2012; Huseman & Short, 2012; Mech, 2011; Alberth et al., 2012), of the area in question, particularly indigenous communities.

In North America, academic scholars, health experts, and government agencies have provided empirical evidence of the negative socioeconomic and health impacts of environmental disaster stemming from natural resource extraction (Birkmann et al. 2009; Birn & Khanna, 2010; Ford & Pearce, 2010; Gosselin et al., 2010; Huseman & Short, 2012; Maldonado, 2014; McLachlan, 2014; Timoney, 2009; Urquhart, 2010; Woynillowics & Severson-Baker, 2006).

In spite of the substantial economic revenue generated by natural resource extraction, oil mining in northern Alberta has resulted in devastation that has impacted some communities (Huseman & Short, 2012). These impacts, according to the affected people and communities, include not only environmental degradation and loss of traditional economic activities, but also exposure to crime, poverty, and dislocation of cultural patterns, health issues and many other forms of social ills. To contribute to body of knowledge on oil extraction and its impacts across affected communities, this thesis uses the Athabasca Chipewyan First Nation, an indigenous community with close proximity to oil mining sites in northern Alberta, as an illustrative study area. Also, it seeks to know from the perspective of members of the community factors that shape individual and the community's coping options.

1.9 Structure of the Thesis

Chapter 1 provides a contextual framework for the thesis subject matter. The chapter describes natural resource extraction in northern Alberta and its impact on Aboriginal peoples. It further provides a problem statement and set of research questions that guided the rest of the study. Chapter 2 presents a review of literature on vulnerability and adaptation to environmental hazards and its cumulative impacts on a community. It considers various aspects of vulnerability, namely environmental, social and vulnerability to climate change as it relates to the subject matter of the research study. Chapter 3 focuses on the methodology adopted for the study. Here, the researcher discussed the methods used in carrying out the research; including the description of the study area and gaining access, and techniques used in selection of informants. The chapter also briefly discussed some ethical issues considered by the researcher. Chapter

4 presents the analysis of data collected to answer the research questions. In this chapter, based on data collected as it relates to the subject matter, the researcher answered the research questions. Chapter 5 further provides information on research findings, and discusses some policy issues.

Chapter Two: Literature Review

2.1 Introduction

This thesis is about vulnerability and adaptation to natural resource extraction and this theoretical perspective provides the framework for the literature review. This chapter reviews various scholarly perspectives on the concept of vulnerability, which can contribute to an understanding of environmental damages and other related problems caused by natural resource extraction.

2.2 Environmental Disasters and the Vulnerability of the Exposed Unit

Vulnerability is a function of exposure, sensitivity and adaptive capacity (Alberth, Hjerpe, & Schauser, 2012). Global patterns of environmental disaster or hazards are increasingly putting society at risk of exposure and making people vulnerable (Kasperson & Kasperson, 2001). Environmental hazards refers to various natural and man-made disturbances that alter the natural state of our surroundings and at the same time, expose local inhabitants to various degrees of environmental, health and socioeconomic risks (Alberth et al., 2012; Berman et al., 2012; Wisner, et al, 2005).

Exposure, as used in this context, 'refers to the degree of environmental stress upon a particular unit or system'; represented as 'either long-term changes in environmental conditions, including the magnitude and or frequency and extreme of such occurrences' (Alberth et al, 2012, p. 9). For example, exposure to climate change is part of the interrelations of human and environmental systems. Therefore, risk of exposure is seen in cumulative terms; such as localized and widespread land degradation, contamination of waterways, and equally land degradation caused by natural resource extraction (Turner et al., 1990). Communities face social and economic challenges that

increase risks of exposure to environmental disaster. Such challenges are well situated considering the interconnection between humans and their environment. Such levels of exposure of a given population require investigation to understand not just the nature of such a disaster, but also the capacity of the affected group to respond to the disaster, which defines their level of vulnerability.

2.3 Human-Environment Systems and the Issue of Vulnerability and Adaptation

Humans, and their socioeconomic practices, cannot be separated from their environment. Both are connected in a chain-like formation. What affects the environment negatively can, as well, be a direct or indirect outcome and consequence of human actions; hence the concept of coupled human-environment used to explain the interdependence and relationship between humans and their environment (Turner et al., 2003). Such coupling affects the human-systems' (actors and societies) interaction and response to disaster and its vulnerability (Turner et al., 2003). The vulnerability of coupled human-environment systems directs attention to what and who are vulnerable to multiple environmental and human changes, how the changes are attenuated or amplified by different human and environmental conditions, and what can be done to reduce vulnerability to these changes; that is their adaptive capacity (Turner, et al., 2003).

Vulnerability is "typically discussed to be a function of three overlapping elements: exposure, sensitivity and adaptive capacity" (Turner et al., 2003, cited in Schroter et al., 2005, p. 575). How climate change affects agricultural production, for example, can be assessed and measured not only in terms of exposure to elevated temperature, but also by crop yield sensitivity to the elevated temperature, and also the ability of farmers to adapt to the effects of the elevated temperature. For example, by

planting more heat resistant crops adaptation occurs and vulnerability is reduced. Also, the vulnerability of a given population to contaminated water sources, namely rivers and lakes can be explained in terms of exposure to water borne diseases. Their capacity (access to resources) to respond proactively (or not) to the impact of such exposure determines vulnerability. Capacity to adapt could mean the availability of technological capacity, such as water treatment plants that can enable a community to purify their water for drinking, or finding alternative sources of drinking water like bottled water which can also be difficult and may be shaped by the community's economic resources.

2.4 Evolution of the Vulnerability Concept in Disaster Studies

Since the beginning of the 20th century, there has been a consistent effort by social scientists to approach the study of disaster from an integrative perspective (Quarantelli, 1988). During this period, the approach and analysis of disasters was dominated by views from the natural sciences. For example, the impacts of earthquakes, floods, volcanic eruptions, and mudslides were investigated and documented. However, these events were viewed by the naturalist school as acts of God and not questioned. This bias and narrow view according to Liverman (1994) dominated discourse, even with the advancement of technology in the 1970s (Cardona, 2004). Government authorities, in a bid to shift responsibilities for their acts, also ascribed to this belief (Cardona, 2004).

No doubt, the evaluation of disaster is an important aspect of risk analysis. However, it is also important to investigate the level of exposure and fragility of communities affected by such hazards. Investigating natural disasters and how people are affected is a step toward understanding vulnerability. But that alone, is too narrow since "it remains focused upon the hazards and not upon the conditions that favour the

occurrence of such hazards" which include not only biophysical changes but also, other social, economic and cultural factors not covered by the naturalist school (Cardona, 2004, p. 40). Again, the naturalist school failed to acknowledge in their analysis the views and perceptions of individuals or communities affected by disaster.

As the need for an integrative approach to disaster studies increased, the views and collective perceptions of affected populations began to be reckoned with in the scholarly discourse. Social and economic factors began to gain attention in disaster analysis; in addition to understanding the ways in which a community could adapt to changes that confront them. Scholars in the applied sciences were the first to start developing this integrative approach of understanding vulnerability and adaptation. The focus of attention for scholars in this group shifted from natural causes of events to the vulnerability of the exposed group or unit. According to Cardona (2004),

> Attention was given to the physical properties of the system that could suffer damage or harm due to an external phenomenon or to the idea that a failure or disaster could occur in the system due to the technology employed" (p. 41)

Scholars in geography, physical, urban and territorial planning, economics and environmental management led this movement (Cardona, 2004). The group shifted the argument on disaster from natural cause events and started looking into the capacity of adaptation or the adjustment of a community faced with man-made disaster. The perception held by a group of scholars in the applied sciences formed the foundation of the vulnerability model, which the social sciences developed further.

In analyzing disaster, Scholars in the social sciences considers the perspective of affected individuals and societies; how they perceive, identify and give meaning to environmental problems through shared beliefs, meanings and interpretations of issues

and circumstances (Taylor, 2000). Annan (2003) argued that “Hazards only become hazards when people's lives and livelihoods are swept away” (n.p). A group can be vulnerable to disaster when the losses experienced by the group exceed the capacity of the population to cope or respond. In other words, their level of sensitivity is higher than their capacity to adapt.

From this perspective, vulnerability has a social character and is “not limited to potential physical damage or to a demographic determinant” (Cardona, 1993, p. 42). Cardona (2004), suggests that vulnerability originates on the following levels: physical fragility or exposure. This means that a human settlement is prone to being affected as a result of its proximity to locations of disaster and a lack of physical resistance. There is also vulnerability resulting from socio-economic fragility. This means the susceptibility to harm from exposure due to marginalization and other disadvantageous conditions as a result of socioeconomic factors like employment loss and poverty. Also, there is the lack of resilience, which implies limitations of access to resources which affects human capacity to adapt or absorb the impact of disaster. Put more succinctly, vulnerability results from economic, demographic and political processes that affect the assignation and distribution of resources among different groups of people (Cardona, 1993).

According to Westgate and O’Keefe (1976), vulnerability cannot be defined or measured without reference to the capacity of a population to absorb, respond, and recover from the impact of disaster and other forms of environmental shock. The same disaster may have varied implications for people in different communities. An event that could have little or no implications for a large community could have devastating consequences for a small community due to the differential absorption and adaptive

capacity of both societies and social systems (Westgate & O'Keefe, 1976). In this context, place-based analysis and assessment of vulnerability becomes imperative given the differential exposure and risk experienced by a given population. Place, as used here, refers to a study area that is small relative to large study areas that are always taken into consideration while discussing larger issues, such as the impact of climate change impact reports (Schroter et al., 2005). Also, determining the level of vulnerability and adaptation from the social science perspective takes into consideration the political, social and economic contextual conditions of the population or group (Cardona, 2004). For example, social discrimination; expropriation; exploitation; political oppression; poverty and other factors related to colonialism and capitalism make some communities more vulnerable to environmental disaster. Additionally, factors such as fragility of the family and the collective economy, the absence of basic social utilities, lack of access to property, the presence of ethnic and political discrimination, polluted air and water resources, high rates of illiteracy, and the absence of educational facilities resulting from economic, social and economic processes need to be taken into consideration when considering a community's vulnerability. (Cardona, 1993; 2004)

2.5 Conceptualizing Vulnerability

The extant literature on the vulnerability model encompasses a number of definitions and concepts developed in various fields and contexts, but primarily natural hazards (Cutter et al., 2003); ecology (Folke et al., 2002); political ecology (Blaikie et al., 1994; Wisner et al., 2004); food security (Dilley & Boudreau, 2001; Watts & Bohle, 1993); sustainable livelihoods (Chambers & Conway, 1991, Turner et al., 2003); and

environmental change (Liverman, 1994). As the concept developed within an interdisciplinary context, so did variations in its interpretation (Young et al., 2010).

Vogel and O'Brien (2004) and Watts and Bohle (1993) asserted that vulnerability occurs at various levels and differential, therefore it varies across physical space among and within groups. Vulnerability to environmental disaster and associated risk means the "potential for loss" (Cutter et al., 2003, p. 242). Loss, as used from a vulnerability perspective, varies and depends on a group's geographical location, social class and their access to resources to enable them to respond. Access to social, political, technological and economic resources that a community possesses enables them to respond to environmental disaster (O'Brien et al, 2011). The lack of or inadequate capacity to respond to these disasters means increasing social vulnerability as a contributory factor. In other words, one cannot talk about environmental vulnerability without discussing social vulnerability. Both sides of vulnerability are tied to the human-environmental system and interaction (also known as coupled human-environment). Table 2 below contains various definitions of vulnerability.

Table 2: Selected Working Definitions of Vulnerability

Definition	Source
"Vulnerability can be defined as "the extent to which a system or actor is susceptible to, or incapable of coping with the detrimental consequences of environmental changes as a result of natural or human activities."	Alberth, Hjerpe, & Schauser, (2012), p. 8
"Vulnerability refers to "the extent to which environmental and socio-economic changes influence the capacity of regions, sectors, ecosystems, and social groups to respond to various types of natural and socioeconomic shocks."	Leichenko & O'Brien, (2002), p. 3
"Vulnerability refers to the state of individuals, of groups, of communities defined in terms of their ability to cope with and adapt to any external stress placed on their livelihoods and well-being."	Kelly & Adger, (2000), p. 328
"Vulnerability of any system (at any scale) is reflective of (or a function of) the exposure and sensitivity of that system to hazardous conditions and the ability or capacity or resilience of the system to cope, adapt or recover from the effects of those conditions."	Smit & Wandel, (2006), p. 286

"Pre-event, inherent characteristics of the social system that create the potential for harm", "used to describe states of susceptibility to harm, powerlessness, and marginality of both physical and social systems"; "Patterns of differential access to resources or differential susceptibility to loss."	Colburn, (2011), p. 10
"Vulnerability as the extent a system is prone to and unable to cope with shocks and stresses, determined by different social, ecological, and political conditions at multiple levels."	Berman et al., (2012), p. 88

A similarity in the definitions provided in the table above focuses on natural and human induced environmental hazards (man-made disasters), and the impacts of such hazards on the general wellbeing of society. Secondly, vulnerability describes individuals and communities' sensitivity to environmental changes or shocks and their propensity to cope. Methods of assessing vulnerability will be outlined in the remaining sections.

2.6 Approaches to Vulnerability Assessment in Human-Environment Systems

One of the approaches to vulnerability assessment is the global (biophysical) change vulnerability assessment. Global change vulnerability assessment "Is the likelihood that a specific coupled human-environment system will experience harm from exposure to stress associated with alterations of societies and the environment, accounting for the process of adaptation" (Schroter et al., 2005, p. 575). The term human-environment system highlights the fact that humans and their environment, including both natural and built environment cannot be viewed separately, but as an integrated whole. It not only discusses environmental changes, but also how social, political and economic processes shape outcomes, consequences and responses to such changes in our surroundings; and how such changes affect humans. Table 3 below presents global (environmental) changes vulnerability and what it means in the coupled human-environment system.

Table 3: Global Environmental Vulnerability Discourse

Environmental Change Discourse	Description
Biophysical	• Takes the dynamic Earth system as a starting point and focuses on what humans are doing to biological and physical conditions and processes. • Reflects the 'Enlightenment' paradigm of positivist science, which is based on an understanding that more information and knowledge will enable society to better manage environmental problems.
Critical	• Emphasizes how social and political relations shape processes, responses, and outcomes from environmental change. • Reflects social theory, post-structuralism and post-modernist approaches to knowledge. Many proponents question the rational, scientific paradigm that underlies the biophysical and human–environment discourses. • Draws on the work of philosophers and postmodern theorists. Proponents argue that scientific enquiry, theories and hypotheses represent constructions of reality that are influenced by history and by the current cultural, political and economic context.
Human environment	• Situates global environmental change within the context of interrelated human and environmental systems, where the natural environment is inseparable from human activities. • Draws upon references to the 'coupled human–environment system', resilience, and adaptive management. • Nature–society interactions are considered to operate at multiple scales, and interact with multiple stressors.

Source: O'Brien et al. (2011, p. 77)

Global change vulnerability assessment includes not only the analysis of vulnerability of a given population or community to environmental changes, but also the identification of specific options (coping capacity) for stakeholders to reduce the impact of exposure to such changes (Schroter et al., 2005). Stakeholders include specific populations, or organizations with an interest in the evolution of a specific human-environment system. Therefore, the objective of global change vulnerability assessment "is to inform the decision-making of specific stakeholders about options for adapting to the effects of global change" (Schroter et al., 2005, p. 575). Schroter et al. (2005) identified and proposed some criteria that global change vulnerability assessment should satisfy to achieve the objectives stated above.

First, the knowledge base engaged for analysis should be varied and flexible. This means that researchers should engage or collaborate with stakeholders to learn their

perspectives, knowledge and concerns regarding their level of vulnerability. This criterion, again, highlights part of the social science discourse in the analysis of vulnerability. Secondly, vulnerability assessment should be place-based. Place-based, as used in this context, means a defined study area that is small, such as a village, community or group, instead of a country or groups of countries. This strengthens the view that vulnerability to changes should be seen through the lens of people affected and their unique circumstances, including lack of access to resources to adapt to the changes. The implication is that what makes one community or group vulnerable may differ from others due to their stronger capacity and access to resources to adapt to the changes.

Furthermore, global change drivers should be recognized as multiple challenges, which "may give rise to an amplification or attenuation of risk" (Schroter, et al., 2005, p. 577). Also, vulnerability assessment should allow for differential adaptive capacity. Given the disparate access to resources or political and institutional barriers, the abilities of all people in a given place to adapt or cope are not the same. Some individuals and/or social classes may be better equipped to cope with some specific stress than others. As Schroter et al. (2005) noted, "differential adaptation profiles can account for the possible combination of adaptation constraints and opportunities for a given case, and how these factors may vary between and within populations" (p. 577).

Social vulnerability is another element in the vulnerability model that contributes to a greater understanding of the relationship between humans and their environment in the course of constant interaction in the system. Put simply, social vulnerability is a product of social inequality in the system (Cutter, 2000). It is something that exists and is inherent within a system or society independent of external hazards (Brooks, 2003).

External hazards refer to hazards not inherent within the system and not produced within the system. Social vulnerability can be determined by various factors, namely lack of access to resources. Resources in this context include information, knowledge, infrastructure and technology, access to economic resources and political power and representation. It also includes a lack of social capital including social networks and connections, beliefs and customs (Cutter, 2000; Brooks, 2003).

The disruptions or changes in the environment brought about by resource extraction activities may result in substantial losses to individuals and communities who depend on their surroundings for economic activities, thereby increasing levels of poverty which further limits their capacity to respond in times of disaster. Therefore, poverty, as a product of social vulnerability can be factored into discussing the vulnerability of a population to environmental changes since it can further entrench its effects in individuals and within communities, resulting to high sensitivity. Furthermore, the outcome of environmental disaster includes hazards experienced by people and groups. Disasters as measured in human terms include lives lost, people affected and economic losses, which are direct elements of social vulnerability. Table 4 below shows examples of social vulnerability to some conditions and its influences on individuals and groups' capacity to cope in periods of disaster.

Table 4: Social Vulnerability to Environmental Hazards

Conditions	Description	Source
Socioeconomic status (income, political power, prestige)	The ability to absorb losses and enhance resilience to hazard impacts. Wealth enables communities to absorb and recover from losses more quickly due to insurance, social safety nets, and entitlement programs.	Cutter, Mitchell, & Scott (2000)
Commercial and industrial development	The value, quality, and density of commercial and industrial buildings provide an indicator of the state of economic health of a community, and potential losses in the business community, and longer-term issues with recovery after an	Heinz Center for Science, Economics, and the Environment (2000)

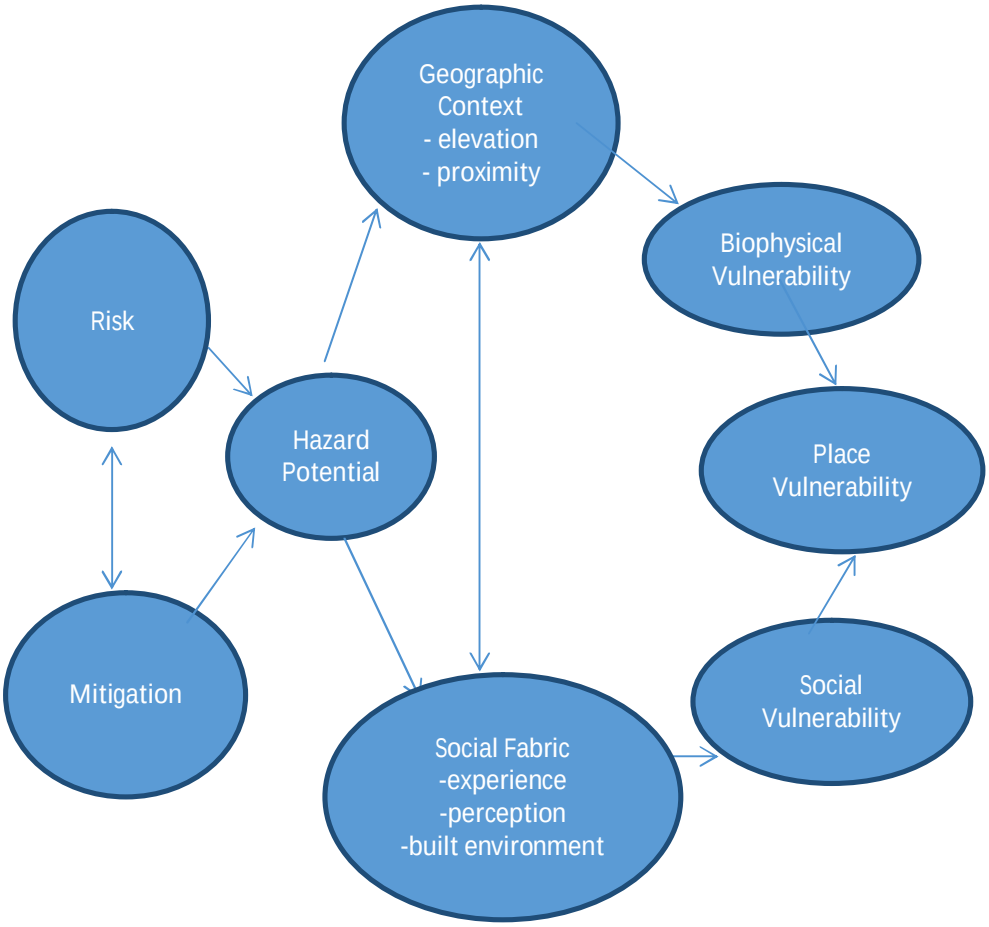
	event.	
Employment loss	The potential loss of employment following a disaster increases the number of unemployed workers in a community, contributing to a slower recovery from the disaster.	Mileti (1999)
Rural/urban	Rural residents may be more vulnerable due to lower incomes and more dependent on locally based resource extraction economies (e.g., farming, fishing).	Cutter, Mitchell, & Scott (2000)
Infrastructure and lifelines	Loss of sewers, bridges, water, communications, and transportation infrastructure compounds potential disaster losses. The loss of infrastructure may place an insurmountable financial burden on smaller communities that lack the financial resources to rebuild.	Heinz Center for Science, Economics, and the Environment (2000)
Occupation	Some occupations, especially land based economic activities, may be severely impacted by a hazard event. Self-employed fishermen suffer when their means of production is lost and may not have the requisite capital to resume work in a timely fashion.	Heinz Center for Science, Economics, and the Environment (2000)
Family structure	Families with large numbers of dependents or single-parent households often have limited finances to outsource care for dependents, and thus must juggle work responsibilities and care for family members. All affect the resilience to and recovery from hazards.	Heinz Center for Science, Economics, and the Environment (2000)
Education and knowledge	Education is linked to socioeconomic status, with higher educational attainment resulting in greater lifetime earnings. Lower education constrains the ability to understand warning information and access to recovery information.	Heinz Center for Science, Economics, and the Environment (2000)
Medical services	Health care providers, including physicians, nursing homes, and hospitals, are important post-event sources of relief. The lack of proximate medical services will lengthen immediate relief and longer term recovery from disasters	Heinz Center for Science, Economics, and the Environment (2000)
Social dependence	Those people who are totally dependent on social services for survival are already economically and socially marginalized and require additional support in the post-disaster period.	Hewitt (2000)
Social capital	The absence of social bonds, collective values, cooperation, trust and common linkages at the community level reduces the community's capacity to respond to environmental hazards	Pelling (1997)
Institutional capital	Confronting environmental hazards is a function of availability and access to institutional resources by a vulnerable group or community. Communities with well-developed public institutions are considered to have higher adaptive capacity than those lacking them	Kelly & Adger, (1999); Smith & Lenhart, (1996).

Source: Cutter, et al., (2003), pp. 246-248

The vulnerability theoretical framework as a conceptual approach to environmental studies recognizes these connections at various levels and engages both environmental and social vulnerability in the discourse. Social vulnerability, however, has not been given as much attention in research as environmental vulnerability. According to Cutter et al. (2003), "socially created vulnerabilities are largely ignored, mainly due to the difficulty in quantifying them, which also explains why social losses are normally absent in after-disaster loss/loss estimation reports" (p. 243).

In examining components of social vulnerability, the authors argued that "risk (an objective measure of the likelihood of a hazard event) interacts with mitigation (measure to lessen risks or reduce their impacts) to produce the hazard potential" (p. 243). The hazard potential is equally influenced by site and condition of the community (built environment), in addition to the social fabric of the place. Social fabric, as used here, includes community experience with hazards, and their ability to respond to, cope with, recover from and adapt to hazards, which in turn is influenced by economic, demographic, housing and political characteristics (Cutter et al., 2003). The social and environmental vulnerability interact to produce the overall vulnerability individuals and community faces as shown in Figure 2 below.

Figure 2: Elements of Social and Global Biophysical Vulnerability of a Unit



Source: Cutter, et al., (2006), p. 244

2.7 Sensitivity to Environmental Hazards

Sensitivity is one of the essential components of the vulnerability theory. It is "the degree to which a system or actor is either adversely or positively influenced by environmental changes and climate variability" (Alberth et al., 2012, p. 9). Sensitivity to environmental stressors largely depends on the level or strength of response, which is influenced by financial resources, human capital, institutional capacities, and socioeconomic infrastructure. Environmental impact is therefore determined by the combination of exposure, sensitivity and level of coping options/adaptive capacity to the changes the community experiences (Alberth et al., 2012). A community, for example,

that is highly exposed to biophysical changes but sparsely populated will probably suffer less impact than a region that is only moderately exposed but densely populated (Greiving et al., 2011).

Most Aboriginal communities in Canada cannot be categorized as densely populated but their habitation style in reserves/clusters means that such biophysical changes can still have a significant cumulative impact. A case in point, pollution of the ACFN land and the Athabasca River has threatened wildlife, biodiversity, water and food security, with limited replacement options, thus increasing their vulnerability to hazards and diseases associated with environmental degradation (Tenenbaum, 2009).

Sensitivity results more from dependence on the environment for livelihood, including food, shelter, medicine, decision making and justice, geographical context, plus a range of intersecting inequalities, including financial, socioeconomic and cultural status and technological know-how, making up the adaptive capacity (Bachofen & Cameron, n.d.). Communities with a high dependence on their environment for sustenance and traditional economic activities can be highly vulnerable to environmental impacts if adequate coping measures are not in place. Aboriginal communities in northern Alberta depend on the Athabasca River and surrounding lakes for sustenance and economic activities, and they also have cultural ties to the river and land. These ties, however, have been threatened by long periods of colonialism, and by the post-colonial policies of the federal and provincial governments and the activities of the oil companies (Rutherford, 2010). Therefore, as these threats can be countered by adaptive capacity, so the effects of such impacts are related to the adaptation.

These communities experience sensitivities ranging from physical and environmental to social, health and economic sensitivities (Alberth et al., 2012). Each of these sensitivities, though interlinked, have salient characteristics that capture the high and low levels of sensitivities communities are exposed to as groups and individuals. Noise pollution from trains transporting tar sand products in and out of oil mining areas in the Fort McMurray region is a good example of physical sensitivity. There are also cases of health sensitivities associated with environmental hazards, namely pollution of the community's drinking water (Kelly et al, 2009).

2.8 Coping Mechanisms and Adaptive Capacity

Coping mechanisms and adaptive capacity represents resources available to individuals in responding to (potential) environmental stressors. They are an integral part of the vulnerability discourse. Both terms are not mutually exclusive as they explain the immediate and long-term responses to present and future environmental changes individual and communities faces (Berman et al., 2012). Coping mechanisms focused on the ability of the system and actors to draw on available skills, resources and experiences as an immediate response to manage adverse stress or shocks brought about by environmental changes (ISDR, Terminology on Disaster Risk Reduction, 2009). Adaptive capacity refers to "the ability to prepare in advance for stresses and changes and to adjust, respond and adapt to the effects caused by the stress" (Berman et al., 2012, p. 91). Table 5 below outlines these differences.

Table 5
Differences between Coping Mechanism and Adaptive Capacity

Coping capacity or coping strategies	Adaptive capacity or adaptation	Reference
Short-term response to an immediate and habitual decline in access to food	Permanent change in the ways in which food is acquired	(Davies, 1993)

Ability to respond to an occurrence of harm and to avoid its potential impacts	Ability to transform structure, functioning or organisation to survive under hazards' threatening existence	(Kelly & Adger, 2000)
Range of actions available to respond to the perceived climate change risks in a given policy context	Ability to change the set of available inputs that determine the level of coping capacity	(Yohe & Tol, 2002)
The responses that people employ to maintain wellbeing in the face of environmental stress within the existing structures	Changing the framework within which coping takes place	(Eriksen et al., 2005)
Immediate responses to hazards such as a specific flood event	Medium- and long term strategies for changes in institutional frameworks	(Birkmann et al., 2009)
Design and implementation of risk management institutions—such as disaster preparedness plans—that can mitigate the most immediate climate impacts	Socioeconomic and political reforms that addresses the inequalities at the root of differential vulnerabilities	(Lemos &Tompkins, 2008)
The strategies used by those living with rapid onset disasters such as flash floods, and chronic disasters, including drought and food insecurity	Change in those practices and underlying institutions that generate the root and proximate causes of risk, frame capacity to cope and further rounds of adaptation to climate change	(Pelling, 2011)

Source: Berman et al., 2012, p. 90.

Environmental stressors, such as water or air pollution, destruction of the land and deforestation have traditionally been addressed within the coping mechanism paradigms, but adjusting to these changes such as reduction in food production and a decline in economic activities like fishing have been the core concern of adaptation (Berman et al., 2012). Therefore, coping mechanisms include taking effective measures to reduce potential damages resulting from changes in the environment, while adaptation implies adjusting to these environmental changes. Davies (1993) makes a distinction between short-term coping responses and long-term adaptive capacity. While the short-term coping mechanisms refers to responses individuals can make to resist stressors within the existing structural constraints, long-term adaptation covers the "transformation of the structure, functioning and organization of the system in question" (Berman et al., 2012, p. 90). It is the "capabilities, resources, institutional resources of a

system, or actors that enable them to adapt to environmental changes, stress, or climate conditions that have altered or will alter in the future and their possible impacts" (Alberth et al., 2012, p. 9).

Level of response is considered to be adequate when communities and their members can resist or accommodate negative changes without transforming their environment, health and socioeconomic activities. Some communities are more vulnerable to these negative changes, which can alter their environment, causing more harmful impacts, namely disruptions of socioeconomic activities and wellbeing.

Being able to take effective measures to reduce or adapt to the impacts of environmental stressors requires institutional or individual capacities, and other forms of assets including economic resources, human capital, social infrastructure, technological capabilities and the economic and political power (Alberth et al., 2012). The absence or lack of these resources will render actors and communities susceptible to the impact of environmental changes, hence the increase in vulnerability. It is apparent that just as communities and their populations have different levels of sensitivities to environmental risk, so also the level of their adaptive capacities differs.

2.9 Exploring the Determinants of Coping Mechanisms and Adaptive Capacity

There are a number of characteristics of an actor or a system that shapes or influences its capacity to respond to stressors. These determinants include economic resources, availability of technology, human capital, social capital and equity (Smit et al., 2001; Kelly & Adger, 1999). Coping or adapting to environmental changes, its impacts and risk on societies "takes place in a dynamic social, economic, technological, biophysical and political context that varies over time, location and sector" (Smit et al.,

p. 7). The combination and variability of the elements determines the capacity of communities and individuals to respond.

2.9.1 Economic Resources

The economic assets of a society play a significant role in their adaptive capacity (Kates, 2000; Smit et al., 2001). According to Dow (1992), while poverty is not necessarily synonymous with vulnerability, it is directly linked to vulnerability and remains “a rough indicator of the ability to cope” (cited in Smit et al., 2001, p. 895). The poor and marginalized members in a society are the most vulnerable and lack the financial capacity that would allow them to successfully manage hazards (Berman et al., 2012). Kelly and Adger (1999) noted that poverty influences a community’s coping capacity as it restricts their options and empowerment to adapt. Therefore, poorer communities or disadvantaged groups within a population can be more vulnerable to the exposure of environmental sensitivities.

2.9.2 Level of Technology

A community with little or no access to technology can suffer from an inability to implement coping and adaptive measures by limiting their potential responses (Scheraga & Grambsch, 1998). The technology can determine the level of adaptation or coping mechanisms of a community exposed to environmental hazards. For example, a community with polluted air, water and land requires protective structures, water treatment measures, land reclamation and methods of preserving wildlife to adjust to such changes. The use of technology in the evaluation of the contamination level of regions around the Athabasca River in northern Alberta showed a high presence of

priority pollutants beyond the Alberta guidelines for the protection of aquatic life (Kelly et al., 2009).

2.9.3 Availability of Human Capital

Human capital refers to a set of skills, qualities, and knowledge that characterize individuals and the community's strength in responding to environmental stressors (Smit et al. 2001). Human capital is instrumental in determining how societies or individuals cope or adapt to environmental stressors. As Fankhauser and Tol (1997) pointed out, "successful adaptation requires recognition of the necessity to adapt, knowledge about available options, the capacity to access them and the ability to implement most suitable ones" (cited in Smit et al., 2001, p. 896). Understanding the direct and indirect negative impact of environmental pollution as a result of oil mining operations is not enough. There is also a need to study and implement measures to ameliorate these problems (Downing, 1996).

In order to build adaptive capacity, individuals have to understand the nature of changes that have affected their community as well as prepare and initiate measures to manage them. In order words, building adaptive capacity requires a strong, unifying vision; education, skills, scientific understanding of the problems; an openness to face challenges; pragmatism in developing solutions; community involvement; and commitment at the highest political level (Holmes, 1996; Scheraga & Grambsch, 1998). These factors contribute to the increased adaptive capacity of individuals and communities. The absence of these characteristics, as Scheraga & Grambsch, (1998) note, exposes a community to a high degree of vulnerability.

2.9.4 Availability of Social Capital and Public Institutions

Social capital is a very important coping strategy and adaptive capacity tool to environmental hazards faced by a group. The term, according to the Organization for Economic Co-Operation and Development (OECD) means "networks together with shared norms, values and understandings that facilitate co-operation within or among groups" (OECD, n.d.). It involves building bonds, bridging and forming common linkages to pursue a common goal. In other words, the absence of social bonds, collective values, cooperation, trust and common linkages at the community level reduces the community's capacity to respond to environmental hazards (Pelling, 1997).

Furthermore, communities with well-developed public institutions are considered to have higher adaptive capacity than those lacking them (Smith & Lenhart, 1996). Confronting environmental hazards is a function of availability and access to institutional resources by a vulnerable group or community (Kelly & Adger, 1999). Access to resources includes the availability of social infrastructure, quality healthcare, social order, political institutions and equal representation in government.

2.10 Criticisms and Limitations of the Vulnerability Approach

The vulnerability approach to understanding group exposure to environmental disaster and adaptation has been criticized as being narrow "due to the marked tendency to study the behavior of the population in situations of emergency or imminent emergency" or "technological incidents that affect their health" (Cardona, 2004, p.45). There is little interest in research that captures the processes that contribute to the social determinants of such a disaster (emergency) or potential disaster (imminent emergency).

However, in the area of adaptive capacity, substantial research has been done to show how communities absorb or adapt to the potential disasters they may confront.

From the definitions and explanations of vulnerability provided thus far, the term is often seen or interpreted as a characteristic or as a feature, and not as a condition, or circumstance or predisposition to damage, frailties and a lack of resilience or capacity for recovery (Cardona, 2003; Turner, et al., 2003). When vulnerability is interpreted as a characteristic or feature of a system, it can generally be assumed that there is no risk of exposure to potential disasters. To demonstrate, poverty has been misconstrued to be equivalent to vulnerability and not as a factor of vulnerability (Cardona, 2004).

What is concerning about the discussion on the concept of vulnerability is the lack of development of an effective and integrative multidisciplinary and interdisciplinary perspective of environmental disaster and the community's adaptation to exposure to potential disasters. Disaster or the ever-increasing risk of disaster is a problem in society. Some of the contributing factors are population growth, urbanization and trends in land usurpation due to colonialism and unfettered capitalism which have increased the vulnerability of the exposed unit.

Despite suggested solutions to reduce vulnerability by increasing adaptive capacity, some communities do not have adequate access to the resources to carry out these strategies. In some cases, due to social and cultural factors, some communities do not embrace the solutions offered (Cardona, 2004).

Environmental disaster has evolved from being seen as a natural phenomenon to a product of the relationship between nature and the organizational structure of society. As Turner et al (2003) noted,

> "No easy task given the complexity of factors, processes and feedback operating within even relatively simple coupled human-environment systems". The difficulties of the task are amplified by scalar dynamics, be they global processes operating on the local systems of assessment, the asynchronous character of important social and natural processes, or the various, even incompatible goals of the different stakeholders in the system." (p. 8085).

2.11 Summary

This chapter presented a review of the extant literature on human related activities, which have disrupted the natural environment. The chapter started by discussing vulnerability approaches that can help in broadening our knowledge of the impact of environmental changes on communities, particularly as a result of natural resource extraction activities. Some elements of the vulnerability model, namely the issue of community sensitivity, coping mechanisms, and adaptive capacity to environmental stressors were also described. The chapter concluded by identifying the determinants of adaptive capacity and criticisms of the vulnerability approach.

Chapter Three: Research Methodology

3.1 Introduction

The thesis utilized a qualitative approach and methodology to exploring the environmental, health and socioeconomic impact of oil mining operations in northern Alberta, more specifically its impact on the Athabasca Chipewyan First Nation (ACFN). This chapter describes the selection of the study area, the recruitment of respondents, respondent characteristics, methods of gaining access to the sample, data collection techniques, the structure of interviews, the methodological approach and the ethical considerations considered by the researcher.

3.2 Selection of Study Area

The ACFN is an Aboriginal settlement consisting of an area of about 1024 km^2 within the Regional Municipality of Wood Buffalo (RMWB) in northern Alberta and has about 1,200 registered members (ACFN, n.d.; Bari, 2015; Urquhart, 2010). The community was known historically for hunting, trapping, fishing and gathering activities as a livelihood, economic development, and as part of cultural practice (ACFN, n.d). In this context, one core value of the ACFN is living off their traditional land as a way of supporting their people, creating social bonding, and enhancing their cultural practices (ACFN, n.d.). The Athabasca Chipewyan First Nation, along with seven other Aboriginal communities, signed Treaty 8 which guaranteed the rights of the peoples over the aforementioned activities. These activities, however, have been impacted by oil extraction activities.

The reasons for selecting the area where the ACFN resides are as follows. Firstly, the community is in close proximity to the oil extraction sites in northern Alberta. Oil

companies' activities have been blamed for environmental degradation and other negative effects of oil extraction activities. Therefore, as a community that has directly experienced these impacts, seeking input from residents about the subject matter can expand our knowledge. Secondly, the community has traditionally depended on the Athabasca River for subsistence and economic development. This river and surrounding lakes, which have also been polluted, serve oil companies as a source of billions of litres of water needed for oil extraction processes (Woynillowicz & Severson-Baker, 2006). Table 6 shows the characteristics of the First Nation communities in the RMWB.

Table 6: First Nations in the Regional Municipality of Wood Buffalo

Community	Registered members (April 2010)	Number of reserve areas	Reserve area (hectares)	Primary community
Mikisew Cree First Nation	2,592	9	5,111	Fort Chipewyan
Athabasca Chipewyan First Nation	905	8	34,767	Fort Chipewyan
Fort McKay First Nation	668	5	14,886	Fort McKay
Fort McMurray #468 First Nation	621	4	3,231	Anzac
Chipewyan Prairie Dene First Nation	718	3	3,079	Janvier/Chad

Source: Urquhart, (2010)

3.3 Recruitment of Respondents

The thesis adopted the respondent-driven sampling (RDS) method in the recruitment of respondents. RDS is a form of referral sampling methods whereby the researcher recruits respondents from the network of primary respondents (Bryant, 2013, Heckathorn, 1997). This approach is similar to snowball sampling, but aims to reduce the biases inherent in the latter. Snowball sampling recruits respondents "within the largest networks and therefore is more visible" (Bryant, 2013, p. 600), which increases the opportunity for biases, while RDS uses only respondents' own networks to drive limited recruitment (Bryant, 2013). In other words, the researcher using RDS will potentially

rely on the initial contacts made for interviews to generate recruitment for subsequent interviews. This method involves two strategies, the quota system and the dual incentive system, utilized so as to minimize the biases associated with snowball sampling (Heckathorn, Semaan, Broadhead, & Hughes, 2002).

The introduction of the quota system ensures that respondents can recruit a maximum of three other respondents from his/her network, so as to reduce (and not eliminate) biases associated with snowball method (Heckathorn, 1997). Using the dual incentive system would mean providing incentives, such as cash, to respondents to participate in the interview and more incentives to recruit at least three more respondents. Both methods of RDS, Bryant (2014) said reduces biases "associated with the selection of initial recruits and is thought to be eliminated and the sample is said to have achieved equilibrium" (p. 600). The fact that all respondents are from the same community and experiences environmental issues at different levels makes it impossible to completely eliminate biases, but keeps it at minimal. Also, this makes it impossible to generalize study findings.

In the study that supports this thesis, the quota system of RDS was utilized but the dual incentive system was not since the researcher have limited fund. The researcher depended on the goodwill of respondents who were able to provide contact information of more respondents. One weakness of the RDS method is the time-consuming nature of recruiting respondents (Bryant, 2014), which was a big challenge for the researcher. Furthermore, some respondents opted out or did not complete the interview which also contributed to a time-consuming issue associated with RDS. The views of respondents that opted out of the interview, and those who did not participate fully were not included

in the data analysis. Their reasons for opting out of the interview are briefly discussed in section 3.7 which addresses ethical considerations.

3.4 Gaining Access

The researcher's first attempt at gaining access to respondents was to contact the Athabasca Chipewyan First Nation office staff. A formal letter explained the purpose of the interviews and the University of Regina's Ethics Board letter of clearance was attached for further information. In response, the researcher was given suggestions on who to contact. At this point, a relationship with the community was established. Originally, the researcher planned to interview at least 24 randomly chosen respondents from the ACFN but was able to initiate conversations with only 18 people. Eventually, only 10 respondents from the community participated in the interview process.

There were some factors that affected the final number of respondents. Several potential respondents discussed the same issues during the interview without providing new information. For avoidance of repetition, data from different respondents providing the same information was not used during analysis, as that can amount to repletion of the same issue. Other potential respondents, for reasons of trust and safety, refused to participate in the interview or could not finish the interview, in which case, their views were not considered in analysis. Secondly, the population of the community is small and it was difficult to reach more potential respondents. Also, the RDS (quota system) used to select respondents made it difficult to reach more people. The researcher wanted to ensure that respondents were not recruited from large networks so as to avoid or reduce undue biases.

3.5 Respondents' Characteristics

The respondents' education or vocational training, and gender are presented in Table 7. The table does not include the marital status of respondents in order to protect their privacy since the community is small. Also, all respondent are adult members of the ACFN between the ages of 35 and 65. It was important to select only adults for the interview for some reasons. Firstly, adult members make up the workforce of the community. Secondly, they live in the reserve and depend on their environment for sustenance and socioeconomic activities. Also, because they may have been directly or indirectly affected by the environmental impacts of oil extraction in the region, they can speak from experience and it is very imperative for the research to seek perspective of those that has had or experienced the impacts of oil extraction in the region.

Youths may not be able to provide an insightful assessment of these changes due to their inexperience and they may not have had any independent living experiences or livelihood affected by environmental changes. Secondly, as the ACFN was used as the case study area, it was imperative to interview only members of that community. Of the ten respondents, eight were males and two females. With respect to education, six have acquired certification in different skills and training, two respondents are college graduates, while the remaining two have no formal post-secondary education.

Table 7: Respondents' Characteristics

Pseudonyms	Education	Gender
Cooper	Certificate Training	Male
Jenny	College Graduate	Female
Johny	Learned from job	Male
Kane	Certificate Training	Female
Kobe	Certificate Training	Male
Marvin	Certificate Training	Male
Paul	Learned from job	Male
Phil	Certificate Training	Male
Pillar	College Graduate	Male

Ryan	Certificate Training	Male

3.6 Data Collection Technique

A semi-structured interview approach was used (the interview guide is presented in Appendix C). One merit of this technique is that there are no strict rules as to how questions are asked and the order in which they are asked when using this approach. This flexibility helped the researcher probe the respondents' personal views, perspectives and experiences more deeply. As respondents answered the questions, additional questions relevant to the theme of the interview were asked. The focus of the interviews was on vulnerability and the adaptive capacity of the ACFN to oil extraction activities. Questions asked by the researcher addressed issues of environmental degradation, health consequences and the socioeconomic impacts of oil extraction and other associated development. There were other questions that touched on the communities' coping mechanisms and adaptation. Essentially, these questions were asked to access information that would address the subject matter of the thesis.

Flexibility, rather than rigidity, on the part of the researcher and respondents played a key role during the interview process. The questions asked were sequential and in most cases, linked to the previous ones asked or answered. Mindful of the sensitivity of the interview topic, questions were asked in a manner so as not to offend the respondent. Most respondents provided concise response to questions asked.

Telephone interviews were used to collect data. According to Mitchell and Zmud (1999), phone interviews are increasingly used in qualitative research. Using them for data collection presents both benefits and challenges. These benefits include using economic and human resources efficiently, minimizing disadvantages associated with in-

person interviewing, developing positive relationships between researchers and participants, and improving the quality of data collection. Two of the main challenges in using telephone interviews are maintaining participant involvement and clear communication (Mitchell & Zmud, 1999). During the interviews, the researcher ensured that the respondents stayed on topic through structured discussion.

The researcher assured each respondent that every conversation would be confidential and not disclosed to any third party. Emphasizing the importance of privacy to the respondent is very important, particularly, as the interview was to be conducted via telephone. According to Burke and Miller (2001), if the issue of confidentiality is not well communicated, it can reduce the likelihood of participation.

An average interview lasted approximately 20 to 30 minutes. These interviews were recorded and then transcribed by handwriting. In order to establish a rapport, the researcher introduced himself. This was followed by some general conversation and involved telling the respondent about myself, my cultural practices and occupation. This was done to gain the respondents' trust. The strategy of starting with this courteous interaction is aimed at creating rapport where respondents feel free and comfortable to air their views throughout the interview. The researcher clearly explained the purpose of the study to each respondent and reiterated that confidentiality and privacy guided their participation. Again, this approach was used to build trust between the researcher and the respondent. Pseudonyms are used in the thesis to differentiate the respondents and was done to protect their identity, privacy and confidentiality.

3.7 Structure of the Interview

Issues surrounding natural resource extraction, its impact on the environment and local residents and how they coped and adapted to change informed the interviews. This, as was indicated in Chapter One, is the subject of the thesis and was also reflected in the literature review presented in Chapter Two, which provided a conceptual understanding of vulnerability and adaptation. The interview guide (see Appendix C) is drawn from the main research questions, solicited information from respondents in the ACFN on the impact of oil extraction, including environmental, health and socioeconomic issues the community members face, and their adaptive capacity. The interview guide contains a set of questions that are intended to act as a guide in answering the four research questions posed in Chapter One. The link between research questions and literature review is shown in Table 8 below.

Table 8: Linking Research Questions to the Literature Reviewed and the Interview Guide

Research questions on vulnerability and adaptation (Global theme)		**Link to interview guide/literature review**
	Themes	
What are the main impacts of oil extraction activities on the ACFN?	Impacts	What have you experienced as a result of the oil sands extraction in your community? Question on Vulnerability - impacts
How are the impacts problematic to individuals and indeed, the ACFN?	Impacts and Sensitivities	What are your health concerns in regard to the pollution of the environment by oil extraction activities? Can you describe the level of pollution of the Athabasca River and the land? Has your community's social framework been affected by the impacts of oil extraction? How has the influx of oil workers shaped your community's landscape? How are families affected by these impacts? *Questions on vulnerability – sensitivities (*cont.*)
What do they do to reduce impacts?	Coping and Adaptive Capacity	How does your community respond to the impacts of oil extraction activities in northern Alberta? Are there differences in the level of response? Are there members of your community who have benefited from the oil companies?

		*Question on coping mechanisms and adaptation
How do ACFN community members view their future?	Future	What is the future of your community in the face of these changes resulting from oil extraction? *Question on future implication and interview final remarks

Altogether, the interview guide that was developed provided a series of questions that focused on the issue of vulnerability and adaptation to the impacts of oil extraction the local residents and community faces.

3.8 Informed Consent and Breach

Seeking and receiving the consent of respondents participating in an interview during research is a very important step toward data collection (Boejie, 2010). Neuman (2011) described the importance of informed consent in social science research and how this shapes trust and security of all participants in a study, including the researcher. According to Neuman (2011), respondents in any interview should have the freedom of choice in participating in an interview and also in knowing why the research is being conducted. The study conformed to this condition.

In the initial contact with respondents, the researcher introduced himself, stated the purpose of the research and specifically asked for their oral consent before the interview began. The consent form is attached as Appendix B. In the course of the interviews, eight participants did not complete the interview citing frustration, oppression, safety concerns and trust issues. The incomplete interviews were neither transcribed nor were they analyzed. Furthermore, their views were not considered during the analysis. Respondents who did not participate or who opted out of the interview were thanked for their time.

3.9 Ethical Considerations

Several problematic issues emerged during the interviews. The researcher anticipated interviewing more respondents than the number who participated. Twenty-four respondents were called, eighteen spoke with the researcher and ten completed the interview. At the beginning of the interviews, the respondents were given the choice to opt out of the research at any point. In some cases, the respondents declined to talk until after they called the primary respondent who provided the researcher with the contact information of potential respondents. This is time-consuming and was one of the challenges since the researcher had to call many times before successfully recruiting potential respondents. The researcher accommodated the time schedules of the respondents once they agreed to participate. Because of the lengthy recruitment process using RDS, ten separate interviews were completed.

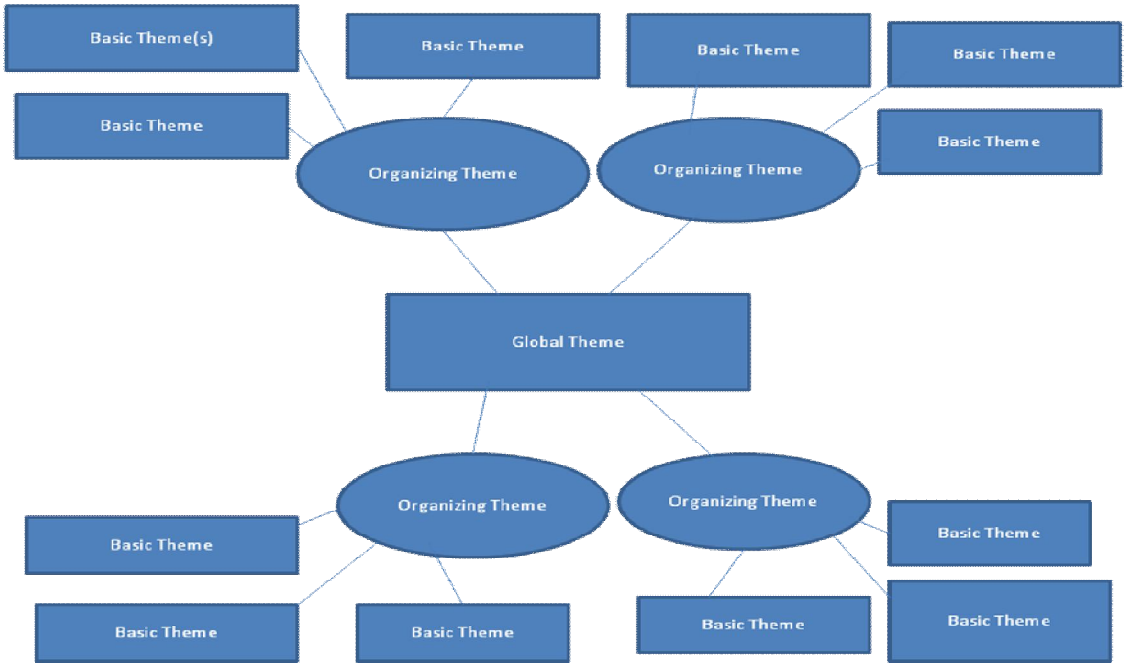
The researcher was able to thoroughly explain his role in gathering such information for academic purposes to expand knowledge and inform the literature on the impacts of oil extraction. The researcher assured the respondents that they would have access to the thesis before its publication. The researcher used the interview guide to ensure that there was minimal deviation from the questions. However, the researcher was respectful while conducting these interviews as the questions asked touched on issues that are sensitive to the people and community, their cultural practices and socioeconomic activities. Building trust before such interviews was not difficult as the initial introductory ice-breaking conversation provided the foundation for rapport. As a result, the respondents were very forthcoming in the telephone interviews.

3.10 A Thematic Network Approach to Qualitative Analysis

A thematic network approach was used to interpret the data collected in the interviews. Thematic analysis "is a method of identifying and reporting patterns within data", and "interpreting the resulting thematic structures by seeking commonalities, relationships, overarching patterns, theoretical structures, or explanatory principles" (Braun & Clarke, 2006, p. 79; Mills, Durepos & Wiebe, 2010, p. 2). There are five purposes of thematic analysis; it's a means of seeing, of finding relationships, of analyzing, of systematically observing a case and of qualitative data (Boyatzis, 2005).

According to Attride-Stirling (2001), it "seeks to unearth the themes salient in a text at different levels" and through thematic networks, "aims to facilitate the structuring and depiction" of such themes (p. 387). It involves a rich description of data coded into related themes that are directly adapted to the research subject (Attride-Stirling, 2001). The different theme levels, according to Attride-Stirling (2001, pp. 388-89) include the global themes (tells us what the text as a whole is about within the context of analysis), organizing (clusters of significations that summarizes the principal assumptions of a group of themes) and basic themes (simple premises, characteristics of the data, and on their own they say very little about the test as a whole and therefore need to be read within the context of other basic themes). Figure 3 shows Attride-Stirling's (2001) structure of thematic networks.

Figure 3: Structure of Thematic Networks



Source: Attride-Stirling (2001) p. 387

This researcher utilized Attride-Stirling's, (2001) thematic network to capture the rich descriptions of respondents' observations about the impact of oil extraction on their community. The process of thematic analysis starts when the researcher "begins to notice, and look for, patterns of meaning and issues of potential interest in the data" and is "arranged into meaningful and manageable chunks of text such as passages, quotations, single words, or other criteria judged necessary for a particular analysis (Braun & Clarke, 2006, p. 86; Attride-Stirling, 2001, p. 391).

The researcher, after transcribing the interviews, coded the data and then, identified salient issues that were present. Attride-Stirling (2001) noted that codes can be a word, collection of words or phrases, pictures or diagrams that contains salient points which can be helpful in the coding process. In this thesis, codes will be represented by text and phrases culled from the original data collected. These issues were then

organized into basic themes. The basic themes were selected from the research questions and the literature (impacts, coping and adaptive capacity). The codes were then reorganized into more manageable clusters of similar issues in the organizing themes. A further summary of the main claims, propositions, arguments, assertions or assumptions in the organizing themes formed the global theme (of vulnerability and adaptation) discussed later in the thesis. The next stage explored the thematic networks, which involved a rich description of themes, supported by quotations from the transcription.

Box 1: **Steps in analyses employing thematic networks**

Analysis Stage A: Reduction or breakdown of text

Step 1. Code Material
(a) Devise a coding process
(b) Dissect text into text segments using the coding process

Step 2. Identify Themes
(a) Abstract themes from coded text segments
(b) Refine themes

Step 3. Construct Thematic Networks
(a) Arrange themes
(b) Select basic themes
(c) Rearrange into organizing themes
(d) Deduce global theme(s)
(e) Illustrate as thematic network(s)
(f) Verify and refine the network(s)

Analysis Stage B: Exploration of Text

Step 4. Describe and Explore Thematic Networks
(a) Describe the network
(b) Explore the network

Step 5. Summarize Thematic Networks

Analysis Stage C: Integration Of Exploration
Step 6. Interpret patterns

Source: Attride-Stirling, (2001), p. 391

3.11 Summary

This chapter described the methodological approach developed by the researcher in the collection and interpretation of the data. The chapter described the rationale for the selection of the study area as well as the strategy for the selection and recruitment of respondents. Telephone interviews and semi-structured questions were used as the data collection strategy and a rationale was provided for this approach. The strategy for

analyzing the data, the thematic networks analysis, was also introduced. The chapter concluded with an overview of the ethical considerations of the research and how informed consent was obtained.

Chapter Four: Data Presentation and Analysis

4.1 Introduction

This chapter presents the results from the analysis of the interviews. These interviews were analyzed using a thematic analytical approach (see 3.10), which enabled the researcher to identify salient themes within the data. The first step in this approach starts with the coding process. This involves extracting text, words and or phrases from the data, which are grouped into issues that formed the basic themes, in keeping with the steps of thematic analysis described by Attride-Stirling (2001). This was followed by an analysis of the basic themes, which enabled the researcher to identify four organizing themes. The organizing themes were then used to generate a global theme.

4.2 Coding Process and Linkage to Research Questions

Coding is a "process of closely inspecting text to look for recurrent themes, topics, or relationships, and marking similar passages with a code or label to categorize them for later retrieval or theory-building" (Mills et al., 2010, p.3). Coding is used to identify salient issues in interviews. The researcher, in the present study, focused on dissecting interviews conducted to draw codes that best reflected the research questions in section 1.7 herein. The writer identified crucial issues and concerns that featured predominantly in the interviews and coded them appropriately. These revolve around the Athabasca Chipewyan First Nation residents' sensitivity to the impacts of oil extraction activities in northern Alberta which has made the population vulnerable and challenged their adaptive capacity.

In Table 8, the researcher focused on dissecting the text in accordance with the Attride-Stirling (2001) coding framework and the global theme of vulnerability and

adaptation, and the basic themes of impacts, sensitivities, coping and adaptive capacity, and future in accordance with the literature in chapter 2 and interview guide. In some cases, the code consists of a single word; or a collection of words, making up a phrase or phrases. In order to ensure that the dissection of text captured all the areas the interview covered, the researcher went line by line through the interview transcripts to identify the issues that were instrumental to the coding process. To avoid redundancy in the coding framework, when there are similar issues, the researcher used a word or phrase that can speak to that issue. This is done after bringing out the salient issues in each of the ten transcripts. Table 9 below shows the issues that were identified after the transcripts were coded and analyzed.

Table 9: Coding Process

What are the main impacts of oil extraction activities on the ACFN?	
Selected Words/Phases	**Codes**
The Athabasca River is	Athabasca River
Fishes in the river are deformed	Fishes are deformed
Fishes are impaired and have tumors	Impaired and Tumor
Air quality in this region is poor	Poor air quality
Carbon dioxide released into the air	Carbon dioxide
Huge migration of animals from the forest	Migration of animals
The river is contaminated	River contaminated
How are the impacts problematic to individuals and indeed, the ACFN? (sensitivities)	
We now have persistent health issues	Health issues
Cancer is common in our community	Cancer
We depend on our environment for food	Food
Tourists heard of negative stories of oil sands	Negative stories
Crime has increased in our community	Crime increased
Our livelihood is being destroyed	Livelihood destroyed
Production is way down	Production decreased
Water levels are dropping, making it difficult for hunters	Water levels dropping
People are afraid to eat the fish	Afraid to eat the fish
We know that chemicals are being released into the water and into the air	Chemicals released into the air
Many people have diabetes now	Diabetes
These pollutants are showing up every day in the rivers	Pollutants showing up
What do they do to reduce impacts? (coping)	

Education and skills required to respond	Education and skills
Response differs according to strength	Respond according to strength
I am talking about many who are jobless	Jobless
They make us apply for social programs	Apply for social programs
Fishing and hunting are our traditional occupation	Traditional occupation
Our economic activities has declined	Economic activities
Drug use is on the rise	Drug use
They flatly refused to share money	Refused money
The young people are highly mobile, moving up to the oil sands	Young people are mobile
The commercial fish industry can no longer market its fish	No longer market fish
By 1980, unemployment here has reached 90%.	Unemployment
We are being marginalized	Marginalized
They lost their homes, they lost everything	Lost everything
Our incomes were virtually zero	Income virtually zero
How do ACFN community members view their future? (future)	
We are being forced off our land	Forced off our land
The government doesn't care	Government doesn't care
We are suffering	Suffering
This is the only place we have	Only place e we have
Canada is an extremely racist country and society and particularly toward Aboriginal people	Racist country
We were just left aside to die	Left to die
Alberta is particularly willing to sacrifice its environment for economic gains	Sacrifice its environment
Canada will never ever have enough money to clean it up	Never have enough money
There is no future for the oil sands	No future for oil sand
We are left hopeless	Hopeless

4.3 Identifying Basic Themes

This thesis used an inductive approach to identifying themes within the basic themes and global theme. In this process, themes emerged from and are grounded in the collected data (Mills et al., 2010). This step follows the coding process and involves refining the texts and codes. This required the researcher to search through the issues to identify the basic terms. This step, according to (Mills, et al., 2010) can be done by

"Noticing patterns, attending to how participants label events, defining emergent themes, constantly comparing data against codes and categories, cycling back through documents to revise coding, recording interpretive insights in research memos, and

developing data displays that reveal overarching patterns, the researcher builds a complex exploratory, descriptive, or explanatory case analysis grounded in the particulars of the case or multiple cases." (p. 3)

The researcher read through the text segment and codes and assessed them for meaning. Table 10 illustrates the issues and basic themes that were identified. The basic themes that emerged reflect not only the vulnerability and sensitivities of the ACFN to the negative impacts of oil extraction but also the factors that shape the community's response and adaptive capacity to such impacts. This covers the four research questions posed in section Chapter One (1.7).

Table 10: Codes to Basic Themes

Identifying Basic Themes Relating to Vulnerability, Impacts, Sensitivities		
Codes	**Issues Discussed**	**Basic Themes**
Poor air quality Carbon dioxide Health issues Production decreased Chemicals released into the air	Sensitivities to environmental shocks stemming from oil extraction activities.	Impact of greenhouse gases on air quality
Water levels are dropping River is polluted river is contaminated Food Production decreased Athabasca River Pollutants showing up Migration of animals	Sensitivities to environmental shocks stemming from oil extraction activities	Contamination of the Athabasca River
Impaired and tumor Fishes are deformed Afraid to eat the fish River is contaminated Water levels dropping Livelihood destroyed Traditional occupation	Sensitivities to economic issues stemming from oil extraction activities	Decline in fish and commercial fishing
Migration of animals Negative stories	Sensitivities to environmental shocks stemming from oil extraction activities	Decline in tourism activities
Isolated community don't care Crime increased Attracts drug trade	Sensitivities to economic issues stemming from oil extraction activities	Migrant workers and an increase in social vices in ACFN
Encroached on our land new municipality No respect for Aboriginal culture	Social sensitivities to oil extraction activities	Cultural sensitivity and Aboriginal land displacement

Racist country		
Health issues Diabetes Cancer Afraid to eat the fish River is contaminated Poor air quality River is polluted Chemicals released into the air Pollutants showing up	Sensitivity to health issues	Rise in health risks
Identifying Basic Themes Relating to Coping and Adaptive Capacity		
Marginalized Apply for social programs Lost everything Refused money	Coping and adaptive capacity to impacts of oil extraction activities	Inequitable distribution of revenue and allocation of infrastructure
Education and skills Respond according to strength Jobless	Coping and adaptive capacity to impacts of oil extraction activities	Inadequate human capital
Government doesn't care Sacrifice its environment Health issues	Coping and adaptive capacity to impacts of oil extraction activities	Availability of institutions and technological capacity
No respect for Aboriginal culture Isolated community Respond according to Strength Apply for social programs Drug Lost everything Refused money	Coping and adaptive capacity to impacts of oil extraction activities	Disruptions in social capital
Unemployment Incomes were virtually zero Lost everything Jobless young people are mobile Marginalized No longer market fish Jobless	Coping and adaptive capacity to impacts of oil extraction activities	Lack of economic capital
Identifying Basic Themes Relating to Respondents Perception of Future in their Community		
Forced off our land Government doesn't care Suffering Only place we have Racist country Left to die Sacrifice its environment Never have enough money No future for oil sand Hopeless	Perception of the future of ACFN community	ACFN as a Sacrificial Zone

4.4 Constructing the Thematic Network

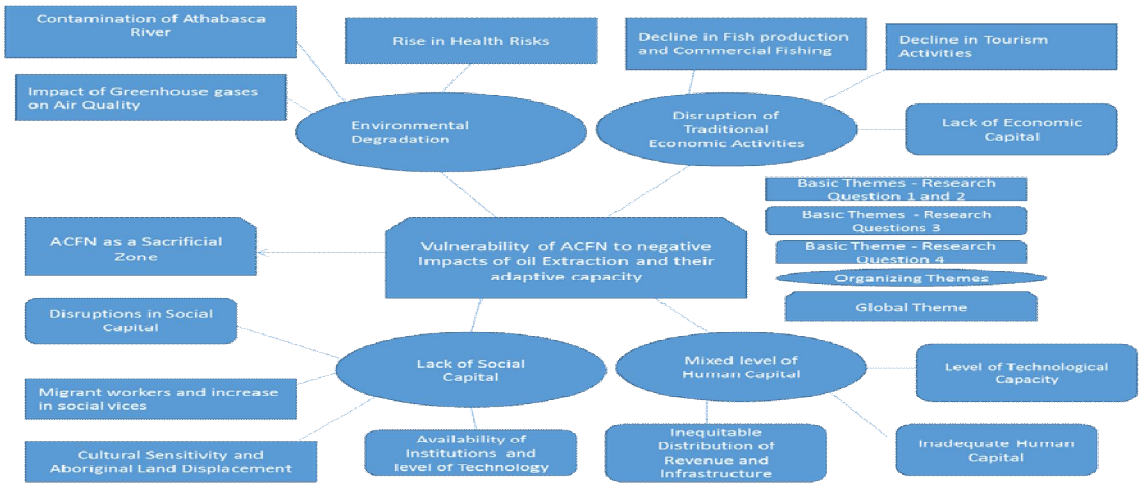
The network analysis is instrumental to providing clarity of basic themes in the context of broader issues to reveal the organizing themes. According to Attride-Stirling (2001), organizing themes "organizes the basic themes into clusters of similar issues (p. 389). Further integration of organizing themes form the global themes which tell us what the whole data is all about. In other words, "are both a summary of the main themes and a revealing interpretation of the texts".

The following four organizing themes that discussed vulnerability and adaptation emerged after grouping the fourteen basic themes:

1. Environmental Degradation: Impact of Greenhouse gases on Air Quality, Contamination of Athabasca River, and Rise in Health Risks.
2. Disruption of traditional economic resources and activities: Decline in Fish production and Commercial Fishing, Decline in Tourism Activities, Lack of Economic Capital
3. Lack of social capital: Migrant workers and increase in social vices, Cultural Sensitivity and Aboriginal Land Displacement, Availability of Institutions and level of Technology, Disruptions in Social Capital, and ACFN as a sacrificial zone.
4. Mixed level of human capital: Inadequate Human Capital, Inequitable Distribution of Revenue and Infrastructure, and Level of Technological Capacity.

Both the basic and four organizing themes that emerged address the central research question and the three other supporting research questions; as also illustrated in Table 10. While the four organizing themes captures sets of interrelated basic themes, Attride-Stirling (2001) suggested that the global themes should capture or "summarize the main claim, proposition, argument, assertion or assumption that the organizing themes are about" (p. 389) as shown in Figure 4. A discussion of global themes will follow after interpreting basic and global themes.

Figure 4: Thematic Network of Vulnerability and Adaptive Capacity of the ACFN to the Impact of Oil Extraction Activities



4.5 Discussion and Interpretation of Basic Themes - Impacts

The discussion and analysis in this section answers the question of impacts and sensitivity of the Athabasca Chipewyan First Nation in response to oil mining activities, which informs some interview guide questions (1-9) used by the researcher. Attride-Stirling (2001) suggested the need to systematically explore the themes that emerged, in an attempt to provide a clear interpretation of them. The themes that emerged from the interviews touched on two aspects of the subject matter of the research question which essentially deals with the vulnerability of the ACFN to negative impacts of oil extraction and factors that shape the community's adaptive capacity. The basic themes that emerged in regard to the vulnerability of individuals and the community, in addition to their coping mechanisms and adaptation, are discussed in section 4.5 – 4.7 herein. The next section presents basic themes obtained and followed by an interpretation of the themes. This is followed by discussion of the organizing themes to show their linkages to the basic themes that were identified, and also in relation to broader global theme.

4.5.1 *Basic Theme 1*: The Impact of Greenhouse Gases on Air Quality

The ACFN respondents reported that there has been extensive air pollution resulting from oil production in northern Alberta. The impact of oil extraction on the quality of air around oil mining sites cannot be underestimated. The emission of greenhouse gases from the equipment used in oil mining has negatively affected the air quality and made respondents sensitive to airborne diseases. As Pillar (personal communication, 2014) explained during an interview, mining tar sand requires a large quantity of energy, which contributes to polluting the air.

While reflecting on the condition of their environment prior to oil extraction, Johny (personal communication, 2014) said,

"Some years back, we had clean air in this community"

In the words of Cooper (personal communication, 2014), "We breathe in the freaking gas from these companies. The atmosphere is filled with carbon dioxide. These people are killing us and the government doesn't care". "From their equipment to the trucks, trailers, everything contributes in polluting the air."

4.5.2 *Basic Theme 2:* Contamination of the Athabasca River

Water pollution caused by oil mining is another area of great concern to the respondents. The Athabasca River and surrounding lakes form the larger part of the ACFN natural habitat and built environment and therefore any negative changes in the waterways in the course of oil extraction or the tailings ponds, impacts them negatively. Respondents expressed frustration and helplessness regarding the pollution of their territories. According to Johny (personal communication, 2014),

> Oil companies make millions of dollars from us, from oil sand. They are destroying the Athabasca River, the lakes, everything. And we are helpless. You know, it is completely impossible to clean this mess [*sic*]. We just watch our

> environment getting destroyed. This is the only place we have. This is the place our ancestors lived centuries ago.

Their deep concern is not only the pollution of the Athabasca River, but also the peoples' sensitivity to water related issues. One big concern of the community is the deformity of fish and the near destruction of aquatic resources, which were traditional sources of livelihood and economic activity. Meanwhile, consumption of such fish has its own health implications. According to Jenny (personal communication, 2014),

> Everything is deformed in this community...I mean the rivers and fish in them, animals, forest. We are all affected. People are afraid to eat the fish from our marine system and that is Lake Athabasca and Athabasca River. Scientists are warning us. We are seeing large numbers of deformed fishes here now [*sic*].

Other respondents also expressed their concern over the contamination of waterways.

> These guys are making millions of dollars from oil sand. Our environment is polluted and we are suffering. It's bad, its [*sic*] freaking bad. The wild animals are displaced. The forest is gone. And also, they are withdrawing millions of cubic meters of water each year for oil sand production. The water levels are dropping and made it difficult for the hunters. This is a hunting community, a land based community and also water based community that uses the land [*sic*]. And we can no longer access the best hunting, the very best picking pastures, uhhmm, even houses can no longer be accessed by waters because water is too low now.

> Pollution from oil extraction activities can kill or deform every living thing in the river and wipe out dozens of communities water supply. So that's frightening and they keep doing it, growing in vigor, growing bigger and bigger, more and more. And they keep saying, they are gonna [*sic*] fix it but they don't know how and they never will.

4.5.3 *Basic Theme 3:* Increase in Health Risks

Analysis of the interviews also revealed that the ACFN faces numerous health risks associated with changes brought about by oil extraction and an inability to cope

with or adjust to these impacts. Respondents expressed their deepest concern over the increasing health related problems that were unknown in their community before the intensification of oil mining in the late 1960s and 70s. All respondents said that there has been a rise in cancer cases and people reporting respiratory diseases. Pillar (personal communication, 2014) summed up the community's sensitivities to health issues. In his view,

> Well, it is our perception here that cancer is becoming way too common. The Alberta government disagrees, saying everybody get cancer nowadays. Hmm, but I know that 40 years ago, cancer here was considered a death sentence and pretty rare and people didn't die of cancer that same 40 years ago. Now just about everybody that dies here has cancer and some of them are very rare that Edmonton might see five cases a year and we see one but Edmonton has tens of thousand [*sic*] of population than our community. We are seeing one-fifth, 20% of what Edmonton get in absolute numbers. So we are worried about the cancer.

Such observations are consistent with medical research. A study of cancer incidences in Fort Chipewyan between 1995-2006 conducted by the Alberta Cancer Board Division of Population Health and Information Surveillance showed "higher-than-expected numbers of cancer of the blood and lymphatic system, biliary tract cancers as a group, and soft tissue were found" (Natural Resources Defence Council, 2014, n.p). These health conditions are likely linked to chemicals used by oil industries that directly pollute the underground water (Timoney, 2009). The correlation between oil mining activities and a rise in cancer cases and respiratory problems among members of the ACFN might also be linked to surface water pollution, namely the Athabasca River, and Athabasca Lake and groundwater caused by tailings pond leakages (Birn & Khanna, 2010). The position of the Alberta government and those of health experts are similar to the views reported by the respondents but differ on the prevalence rate.

There have been cases where toxic water contained in tailings ponds has leaked into the groundwater system, which in turn leaked into the surrounding Athabasca River, lakes and soil, thereby polluting the waterways (National Energy Board, n.d). This is the contention of environmental activists and physicians who work in the region (Dyer, 2009) and was corroborated by the comments from respondents interviewed. Data collected from the interviews revealed that the Athabasca Chipewyan First Nation community members believe that pollutants in their environment are responsible for the many cases of cancer and other health problems in their community.

Kane's (personal communication, 2014) view on the issue of health related problems could be interpreted to mean that the Alberta government is living in a state of denial and disconnection with the reality in the ACFN community. These officials refuse to acknowledge the serious impact of oil mining activities on the health of Aboriginal peoples in northern Alberta. According to Kane (personal communication, 2014)

> The environment is totally changed, impaired, and wildlife populations are dramatically reduced. Even though people have moved off land into the town settings, the water levels have dropped, and the rivers, and the lakes, lake Athabasca and the main river and the animals, the birds, the fish. These pollutants are showing up every day in the rivers, [...]so they can't tell us that there is no pollution because you are it seeing everyday around you. But of course, they live in Calgary and Edmonton. They don't even know, they won't recognize the pollution in the wilderness. They stood on it. Because they don't know their environment. And you can't know your environment if you live in the city. You only know, you know how to plant a tree or something but you can't claim if you live in that city that you know the environment as well as somebody whose family has lived in a place for four or five hundred generations, right.

Cooper (personal communication, 2014) recognizes the community's sensitivity to water pollution and the health issues the consumption of such water poses. According to the respondent, "I don't let my children live in Fort Chip. I just don't want them to

come here and live in Fort Chip and get cancers, and have to drink the polluted water, and breathe the polluted air".

The deformity in fish and harm to marine animals caused by pollution challenges the community's food security. This has also meant an overreliance on eating non-traditional food which exposes them to other health problems, such as obesity and diabetes. It is significant to point out that community members have always relied on their environment – land, water and forest – as a source of their food. Therefore, regardless of the prevalence of non-traditional food available, the ACFN residents have not accepted these changes as progress. Rather, most participants admitted that the destruction of their traditional style of life is a setback to their healthy development and cultural practices. The change from a traditional diet of bison, fish, moose, and fruits to a dependence on processed foods, which the indigenous community was not accustomed to, has exacerbated health related problems. According to Pillar (personal communication, 2014),

> Well, hmm, generally, well, many members of Athabasca Chipewyan First Nation Community have diabetes now. And we think it is related to the change of life style. When people here move off land into the town, they can no longer continue with their old diet of meat, and berries, and fish. They have to switch to bread and sugar and processed foods. And that is probably the primary source of so much diabetes.

The insufficiency of health screening for early detection of these diseases remains a significant challenge to the respondents who express the feeling that they are victims of their own environment and almost forgotten by the Alberta government. In speaking of the extent of environmental injustice and neglect by the Alberta government and oil companies, Cooper (personal communication, 2014) said,

> Alberta is particularly willing to sacrifice its environment for economic gains and I presume that almost all Albertans that live in Calgary and Edmonton came from somewhere else in the last fifty years. So they just don't have that connection. Almost none of them had ever been here to see this environment.

4.5.4 *Basic Theme 4:* Decline in Fish Production and Commercial Fishing

ACFN residents traditionally relied on fishing and hunting as a significant part of their economic activity. According to the respondents, this traditional practice has virtually collapsed due to the negative impacts of oil extraction on waterways, thereby leaving them vulnerable to economic hardship. Pollution of the rivers results in the depletion of aquatic resources due to diseases and deformities found in fish. Such levels of decline ultimately result in the loss of economic opportunities. This, in turn, contributes to poverty in a community that depended on their surroundings for food and economic support. According to Kobe (personal communication, 2014) “We see high numbers of deformed fish now. So the commercial fish industry can no longer market their fish. The industry has collapsed.”

Paul (personal communication, 2014) painted a gloomy picture of the health of fish which corroborated the views of Kobe (personal communication, 2014)

> We see deformed and sick fish; fish with crooked spines or with big gizzard on their skin or tumors. It is quite alarming and it has become so common that you can't avoid seeing them. That harms tourism potential and also harms food potential. And we know from scientist that the deformities in fish are mostly caused by chemicals in the water, from the byproduct of mining, emmm, particularly, emmm, tar mining [*sic*]. Some of them are so toxic that they have been shown to cause deformity in fish embryos of 1.3 billion in the water. We know that the chemicals are being released into the water and into the air with signs of proving that [*sic*].

According to Pillar (personal communication, 2014),

> The environment is already impaired. Productivity (in terms of food and commercial activities) is way down of its natural environment and the pollution

> may take a thousand years to clean up because they are polluting ground water and the rivers, and the lakes. They are polluting everything.

Kobe (personal communication, 2014) said,

> You realize that our community depends on our environment for economic activities. Fishing has declined due to the pollution of the river by the oil mining activities. The Athabasca River is polluted and that affected fish productivity and health. This, in turn affected our fishing activity

4.5.5 *Basic Theme 5:* Decline in Tourism Activities

ACFN residents have participated actively in the tourism industry and derived revenue from these ventures. The tourism industry thrived because of the boreal forest, which is home to exotic and wild animals and therefore attracts tourists. The boreal forest, according to the respondents, has virtually disappeared due to encroachment and pollution. In a frustrated tone, Pillar (personal communication, 2014) painted a picture of environmental racism that is prevalent in the region. Oil companies, in their quest for profits, have continuously engaged in unhindered oil extraction in northern Alberta and in the process, continue to destroy the boreal forest, causing migration of wildlife that had previously attracted tourists to the region. Such migration of wildlife and decline in tourism activities further entrenches economic hardship in the community, thereby making them more sensitive to economic shocks that affect their ability to cope or adapt to the changes.

While Pillar (personal communication, 2014) did not express strong objection to oil extraction in the region, he condemned what he saw as excessive exploitation of the environment without adequate attention to sustainability. The respondents expressed concern about the profit motives of oil companies, which can be satisfied only by

extracting more oil. Kobe (personal communication, 2014) was more assertive in his response on the impact of oil extraction activities on tourism industry.

> Tourism industry has also collapsed because the world doesn't want to come to see the wilderness anymore in this part of the world. They see and hear all the negative stories of oil sand. Close to the year 2000, we depended on the European tourists for tourism industry but they have stopped coming because they hear that everything is polluted and damaged in this part of the world

The pursuit of profit by the corporations institutionalizes environmental racism. This is because the costs and benefits of oil extraction are not evenly distributed. While the local community suffers from its negative impacts, the corporations from the cities benefit. This can be understood, considering the nature of market forces that characterizes a capitalist society. According to Pillar (personal communication, 2014),

> Oil companies exist to make profit and they make enough profit. They will do virtually anything to get the right to make that profit. They influence government, they threaten people, they lie to people. They do everything in the book. And you must have heard of Shell oil's reputation around the world. We are finding the same thing here too.

Johny (personal communication, 2014) said,

> Our community used to participate in the tourism industry because we have environment that support tourism.

Having said this, it needs to be noted that the oil economy in the region has equally benefitted some residents, as the oil companies have employed youths who had some training. See section 4.6.2 below.

4.5.6 *Basic Theme 6:* Migrant Workers and an Increase in Social Vices

The influx of migrant workers who want employment in the lucrative oil industry may also have contributed to the prevalence of social vices in the ACFN. The interviews revealed that there is no general consensus on the relationship between an increasing rate

of social vices such as crime and drug abuse and the emergence of the oil economy. However, the influx of migrant oil workers into the region, in some ways, does make the community more susceptible to crime. The relationship may be the result of income disparities in the region. Interviews with respondents confirmed that there are a large number of well-paid migrant oil workers, living alongside the Athabasca Chipewyan First Nation who are impoverished. While the migrant workers are engaging in illicit acts like drug abuse, ACFN residents seem to have acted out due to frustration.

As Paul (personal communication, 2014) claimed during the interview, social vices such as an increase in drug use was a response to poverty and the breakdown of social values and support which used to be part of the ACFN tradition. In other words, the influx of newcomers with little stake in the community brings about a rise in crime in a community because the social order is deteriorating. Therefore, while the oil economy increases the purchasing power of those engaged in the oil economy, crime and all forms of social vices increased.

According to Kobe (personal communication, 2014),

> Crime is on the rise in this community. I don't know if this has to do with newcomers around here. But it certainly has to do with poverty in our community and having rich neighbours.

Another respondent, Johny, also made a connection between the economic breakdown in the community to an increase in drug use, crime and family breakdown resulting from economic hardship. This was the position of Johny (personal communications, 2014) when asked how oil extraction has affected families in the community. According to him,

> These pollutants (referring to by-products of oil extraction activities that have polluted the environment) have affected the economic foundation of some families. This further causes more issues for that family that eventually causes disintegration. Our youths are now engaged in so many activities that exposes them to many risk. They do drugs.

As pointed out in the first paragraph of this subsection, the youths referred to by Johny could be acting out due to frustration, caused by the loss of means of livelihood and disruption of their community by new neighbours. Some families never actually had access to resources to sustain them as reflected in Johny's statement. Poverty and family disintegration, according to Johny (personal communication), resulting from the breakdown of family values also gives rise to increased prostitution in the region. This, in turn, brings increased issues of health risks, including sexually transmitted infections.

Altogether, the social disruption caused by the influx of migrant workers, in addition to family breakdown and poverty work together to expose the ACFN to social vices**.**

4.5.7 *Basic Theme 7:* Cultural Sensitivity and Aboriginal Land Displacement

The influx of migrants and emergence of new communities such as semi-permanent man camps in northern Alberta brought cultural shock to Aboriginal communities. Respondents from the ACFN expressed their displeasure over the influx of migrants in the region as this negatively affected their traditional territories and cultural practices. This is because these migrants are unfamiliar with Aboriginal culture and traditional practices. According to Pillar (personal communication, 2014),

> It is the huge migration of people into this region who have no knowledge of Canada and no knowledge of Alberta. They are coming from all over the world and it created a new city of 100,000 and it is growing very fast. And those people, so we call them, have no respect for Aboriginal people or, the treaties, or

> history here, or anything. They don't. So they are going ahead and making decisions as if they are the only people here. And it is in fact the Aboriginal community, because, hmm, they are overwhelmed by this 100,000 new residents, compare [*sic*] to about 15,000 Aboriginal community.

While migration into this region has contributed to cultural sensitivity issues, since "newcomers, attracted by high salaries, often have very little engagement in the community" (Ruddell, 2011, p. 330), Alberta government practices, land encroachment and flagrant abuse of Treaty 8 seemed to have caused more reaction and grievances than the former in the ACFN. The establishment of new territories in the Regional Municipality of Wood Buffalo (RMWB) and the Land Use Plan initiated by the local and provincial governments have turned the Aboriginal communities into mere recipients of government policies and initiatives without any contribution from them; or at least, little regard for their input during policymaking. Respondents claimed that the Land Use Plan, which was implemented without their consultation is a flagrant abuse of power by the provincial government. Expressing his objection to government land policies and development in northern Alberta, Marvin (personal communication, 2014) said,

> The government of Alberta in 1995 created a new municipality that stretches from Laquadash in the south to the Northwest Territory border. It is a huge municipality completely dominated by the newcomers who live in the urban centre and out of touch with this community. Ehh, I could say from 2010 to 2013, they were viewed like enemy here because of the way they treated people here. As a result, we finally responded with a strong language and action. They know now that they can't ignore us.

While Marvin (personal communication, 2014) expressed more concern with the displacement of Aboriginal people caused by the establishment of the newcomers territory, Phil (personal communication, 2014) expressed anger with the attitude of the

government that ignored their input while drawing up a new Land Use Plan which will ultimately affect them (Aboriginal territories and communities). According to him,

> Albertan [*sic*] government has created a new land use plan for this corner of Alberta that completely and totally disregarded all of the input that the Aboriginal community put into the plan. And they basically declared any area that has oil sand as wide open for development, no restriction. Any area that doesn't have oil sand and uranium is now a wilderness park and that is for our community.... And now the result of that plan is LART, low Athabasca regional town. The municipality now has zoned certain area that is cherished by the community. And we anticipate that our country will now be overwhelmed by people on ATV, boats, air craft and everything, just swamping into this country for the natural resources.

It is noteworthy that many Aboriginal people responded to this infiltration of their land and communities by moving out of their community to urban centres. Pillar and Kobe (personal communications, 2014) corroborated this observation.

> Oil sand is also displacing our community. We are being forced to move off land due to pollution. The government has also encroached in our traditional territories.

In urban centres, it was not easy for former ACFN residents to secure employment since most good jobs require some formal education, which these Aboriginal people lacked. A lack of education and job-related skills affected their adaptation in town. In other words, choosing to move to urban centres as a response to the challenges posed by environmental degradation and the other consequent impacts of oil extraction could not ameliorate their economic difficulties caused in the first place, by the loss of jobs in their traditional communities and their displacement from the land.

4.6 Coping and Adaptive Capacity: Basic Themes that Emerged from the Data

While the previous section addresses the community's vulnerability and sensitivities to environmental and socioeconomic issues, this section attempts to answer the third and fourth research question on factors that shape the ACFN peoples' response

to the vulnerabilities caused by the impacts of oil extraction activities. This distinction is made to clarify themes that support sensitivity to the negative impacts of oil extraction activities and those themes that relate to coping strategies and adaptive capacity to such impacts. Interview guide questions 10-12 stem from the third research question.

4.6.1 *Basic Theme 8*: Inequitable Distribution of Revenue and Infrastructure

Respondents expressed disappointment about the inequitable distribution of revenue and unequal development that has occurred in Alberta. Community members feel disappointed that the Alberta government deliberately ignored the terms of Treaty 8 and continuously marginalizes them, in addition to the pollution and land encroachment they have experienced. As a result of this, the community feels a high sense of marginalization within Alberta. In expressing concern for the unequal distribution of revenue from oil resources, Marvin (personal communication, 2014) stated,

> They flatly refused to share money and they make us apply for programs. We have been arguing that the First Nation should get a direct stream of revenue from all these developments because they didn't pass so directly. Because the government refused, now, we are negotiating directly with the oil companies.

While Marvin (personal communication, 2014) seemed more directly concerned with the issue of marginalization of Aboriginal communities in terms of revenue sharing and provision of social amenities, Pillar (personal communication, 2014) brought another dimension to the issue of inequity in Alberta, accusing not only the provincial, but also the federal government of being racist. In his words,

> I don't know, if you have noticed it, Canada is a very extremely racist country and society and it's particularly towards the Aboriginal people and that tend to continue especially in Harper's government. Racism is rising again. So we are fighting all of those things and it's all tied to the development of oil sand.

Another interesting theme that flowed from comments about the inequitable distribution of revenue is the sense of exclusion in the decision making processes in regard to these economic changes in the ACFN. Therefore, the grievances among the respondents are not only about the impact of oil mining activities on their communities but the fact that the Alberta government has oftentimes refused to recognize their input or take their suggestions of how to end environmental injustice and racism. Instead, they are basically at the receiving end of government policies and programs.

4.6.2 *Basic Theme 9:* Inadequate Human Capital

Members of the ACFN, with some post-secondary education and job related skills, have adapted more successfully to the negative changes in their community. The levels of education, public awareness and empowerment have shaped the community's response to the impacts of oil extraction. From the perspectives of respondents, there are more young people who have acquired some level of higher education. Formal education and skills also increases one's job opportunities, which translates to higher economic power when one is gainfully employed. Therefore, being educated increases the coping ability of some members of the community. Most young and educated members of the ACFN have obtained work in oil related industries. In doing so they have the economic power to adapt or adjust to the negative socioeconomic consequences of oil mining. As Pillar (personal communication, 2014) said, "The young people are highly mobile, moving up to the oil sand". Therefore, their perceptions about the impact of oil mining in northern Alberta differs from that of the older residents.

Pillar (personal communication, 2014) illustrated how being young and educated influences an individual's response to the impact of oil mining. According to him, these

individuals who are employed by oil companies make it possible for them to respond positively to the same impact felt more negatively by those with fewer resources.

> If you work in the oil sand and you make $150-200 thousand a year, if you are young, that means you buy skittles, boats, trucks, house. You just buy it. And that is how they respond. Hmm [*sic*]… as the First Nation people become more and more familiar with the oil sand industry, they joined more and more. And now, we are seeing properties as never been experienced here for centuries. And the young people adapt fast to prosperity
> .

Similarly, Kobe (personal communication, 2014) said,

> Coping is a lot better for those who are engaged with the oil companies. Getting job with companies is however difficult without adequate training. Many of the community members have established occupation. They didn't go to school and as such doesn't have the same opportunity. Besides, they are not necessarily very young. I can say collectively though, it is a lot difficult to cope with these impacts.

The older adults and elders of the ACFN community expressed a gloomy perception of oil mining in northern Alberta and the impacts on their community. What the researcher deduced from the interviews is that there seems to be few positive impacts of oil mining. This is because it has destroyed their traditional ways of life, ruined their traditional economic activities of fishing and hunting and has left them poor, powerless and jobless. This leaves some of the older members of ACFN with inadequate coping mechanisms. According to Phil (personal communication, 2014),

> That leaves the older people, hmm,… [*sic*] we were just left aside to die. And get old and pass away. And everybody hopefully forget about the old people and the old community that was here. That is what the government wants. Older people were generally unemployed because they just can't, they just can't adapt to the radically, emm, to these changes. But the young people grew up in it. It is natural to them. So, on one hand, many people here are afraid of what is coming, on the other hand, many people embrace the oil sand.

Corroborating this view, Johny (personal communication, 2014) said,

> I am talking about those that depend on the environment for everything. The old parents, elders. These are the ones that have lost everything. They are the ones that feel the impact more.

As the viability of the environment declines due to environmental devastation, so too does the traditional economic enterprise. Those who cannot get absorbed into the oil economy have fewer opportunities and the size of this group is becoming prevalent. According to Phil (personal communication, 2014), "So, on one hand, many people here are afraid of what is coming, on the other hand, many people embrace the oil sand". Kobe's (personal communication, 2014) claim supports that observation.

> With the contamination of Athabasca River, commercial activity declined. Families could no longer support themselves adequately for food and economic activities. Poverty increased and this made coping with negative effects of oil sand mining more difficult.

It is worth noting that increasing social disorder such as domestic violence, prostitution and drug related offenses in the ACFN was partly caused by a breakdown of family relationships due to economic hardship. This is, in addition to negative impacts, caused by an influx of immigrants into the region. Economic security and strong family organization contributes to a stronger social cohesion and family ties. From the perspectives of respondents, economic security and stronger informal social control can be secured with some level of formal education and the acquisition of job related skills which can increase the potential for employment.

4.6.3 *Basic Theme 10*: Availability of Institutions

The respondents expressed the view that there is a near absence of institutional framework to help their community cope with the negative impacts of oil mining activities in their community. Institutional framework, as used here, refers to public structures, government presence or establishments put in place for the effective

functioning of society. Government, for example, can establish agencies to regulate the operation of companies or to monitor events or occurrences in a community. In the area of environment assessment and health risk, the respondents claimed that their community has been neglected and forgotten. In other words, the Alberta government that should care about the environmental devastation and the consequent socioeconomic and health impact has done little to alleviate the suffering in the community. One respondent said that the Alberta government doesn't know the extent of damage and health risks the Athabasca Chipewyan First Nation is experiencing since they have not been to the place to assess the level of environmental ruin and health risks.

The right to good health and food, according to the UN is a fundamental human right and denial of such a right to a minority group, whether by omission or commission, is a violation of human rights and instills feelings of neglect, inequality and marginalization. The government's refusal to acknowledge the health risks in the ACFN associated with oil mining is even more problematic for the community members and they have resolved to force it down the throat of government by any means possible. According to Jenny (personal communication, 2014)

> Their complete lack of knowledge of Aboriginal issues, and their racist or complex racist assumption makes it easy to beat them in court because they can't understand, they don't understand the treaty, they don't understand what the Supreme Court have [*sic*] been saying for the past 20 years. They just can't. It can't get into their head because of their racist assumptions. And we are gonna [*sic*] push them right back, I would say not just us but the Aboriginal community across Canada.

4.6.4 *Basic Theme 11:* Level of Technological Capacity

The use of environmentally friendly technology during oil extraction activities and also in environmental reclamation can contribute to increasing the coping

mechanisms, and ultimately, the adaptive capacity of communities affected by oil mining operations. As Mol (1997) remarked while discussing ecological modernization, it takes the effort of human ingenuity – inventions and innovation in science and technology – to explore and consequently destroy the environment. Since it takes the application of science and technology by human agents to destroy the environment, one can argue that technology should also be developed and used to restore the environment to its natural state.

For members of the Athabasca Chipewyan First Nation, such technology is neither adequate to clean up the existing pollution nor have the oil companies or government initiated any strong proactive measures aimed at environmental restructuring. “They want the oil, and they don’t want to clean the mess”, Ryan (personal communication, 2014) observed. All the respondents said that oil mining in northern Alberta has destroyed their territory – from the fertile land, to the boreal forest and the Athabasca River and Athabasca Lakes. This leaves residents exposed to economic hardship and to devastating health risks as a result of exposure to pollution and consumption of contaminated foods and water. As Pillar (personal communication, 2014) said, “Pollution may take a thousand years to clean. The activities of oil companies are polluting groundwater and the rivers and the lakes. They are polluting everything”.

The respondents also admitted that there is no adequate water treatment technology that can purify the contaminated water for drinking. As a result, there has been an increase in the number of cancer cases and other illnesses and infections caused by consumption of contaminated fish and water. The availability of water treatment

plants can increase the capacity of the communities to reduce waterborne diseases. This is in addition to the availability and accessibility of healthcare facilities to diagnose these health related issues and provide care to affected people. The ACFN community members interviewed said that both the oil companies and the Alberta government have done so little in cleaning up the environment. Their focus is purely on profit and tax revenues. As Pillar (personal communication, 2014) said,

> Oil companies exist to make profit and to make enough profit, they will do virtually anything to get the right to make that profit. They influence government, they threaten people, they take advantage of people, they lie to people. They do everything in their book.

The adoption of environmentally friendly technology in oil extraction can bring about a reduction in environmental pollution and can contribute to environmental reclamation. After environmental reclamation occurs, members of the community can return to their traditional economic pursuits, which increases the community's adaptive abilities. . However, this has not been the case for the Athabasca Chipewyan First Nation.

4.6.5 *Basic Theme 12:* Disruptions in Social Capital

The presence of a strong social order, cultural values and norms, increases a community's response to environmental shocks. Oil extraction activities bring growth and equally cause disruptions in some societies. Social capital involves building bonds, having shared norms and values, bridging and forming linkages to pursue a common goal. According to Ruddell (2011), "Rates of physical and social disorder, as well as crime, are an outcome of social disruptions" (p. 330). As most respondents admitted, the ACFN faces unprecedented social upheaval that has threatened the goal of social capital in the society. These threats came in the form of increased social vices such as substance

abuse and prostitution, cultural shock due to population change and industrialization which results in a breakdown of informal social control, loss of social cohesion, and inhibits support networks that could have been instrumental in building adaptive capacity to adjust to the new changes.

While there are cases of drug use in the community, an influx of oil workers increased the illicit use and prostitution (Ruddell, 2011). Paul (personal communication, 2014) stated,

> Well, certainly, since Fort McMurray attracts so much money, it also attracts the drug trade. It is now possible to get cocaine and drugs like that in Fort Chipewyan which is a little isolated community. Hmm, the young people tell me it is prevalent. Drug sale is prevalent and many parents are concerned about it. Myself, it's not as bad as it used to be in my perspective. So, drugs and alcohol have always been here. Hmm, most young people makes good living. I am more concerned about raising the kids. Some people fall off the edge of everything and become addicts.

There is also the issue of family breakdown caused by the loss of economic opportunities for breadwinners, which exposes families to disunity, domestic violence and loss of social control and cohesion. High levels of bonding, co-operation and informal social control in a community are paramount to the high level of adaptive capacity to any environmental challenges in a given community. Some individuals and families in the ACFN community lack this strength of adaptation. Also, the increase in social vices caused by the influx of migrants and family breakdown is complicated by the attitude of negligence, marginalization and social exclusion the community experiences. According to Pillar (personal communication, 2014) "They call it the sacrificial zone here".

4.6.6 *Basic Theme 13*: Lack of Economic Capital

From an economic perspective, respondents expressed an inability to empower members of the ACFN whose traditional sources of economic development disappeared. The ACFN had been a society predominantly reliant on hunting and fishing. According to Johny (personal communication, 2014) “This community is a hunting community. We fish and hunt. That is what we are known for. We have done it for hundreds of years”.

These two economic activities provide a source of food and economic security for many families. When these opportunities are disrupted or devastated by the activities of oil companies, without any strong attempt to restructure or reform the environment for sustainability, there is a negative effect on the empowerment of community members. As Phil (personal communication, 2014) stated,

> By 1980, unemployment here has reached 90%. 90% of the people of the people had to live or go on government assistance. Incomes were virtually zero and everybody lost everything. They lost their homes, they lost everything. They just had few clothes and enough food for the day at a time and that is how we lived here 10 to 15 years ago.

Furthermore, food and economic security helps to promote family unity, less involvement in social vices and more harmony. This, in turn, increases the propensity of a community to adapt more strongly to environmental shocks. However, the oil companies’ reluctance to mitigate pollution, the contamination of the Athabasca River, the boreal forest and the decline in traditional economic activities leaves the community exposed to economic sensitivity.

Furthermore, respondents said that their community faces poverty due to oil mining activities that have disrupted their traditional economic activities and governmental reluctance to engage in equitable revenue sharing. Both factors result in an

over-reliance on government funded social assistance. As a result, the community is looking for other ways to increase their adaptive capacity.

4.7 Basic Theme 14: ACFN as a Sacrificial Zone – the Future

This theme reflects the perceptions of respondents when asked about the future of their community. Discussing the future of the ACFN, respondents said that proactive action on the part of oil companies is required. This entails using more environmentally friendly technologies toward oil production and compensation to landowners for damages to the environment. Whereas it has always been difficult to get the oil companies to voluntarily conform to these policies, this should be required in regions where oil companies harm the environment. Provincial Government should also play a greater role in assessing environmental impacts.

However, going by the rhetoric of the Alberta government one can argue that the provincial attitude toward taking these measures has been slow (Tenenbaum, 2009). For the people of the ACFN (and all First Nation communities affected by oil mining) to enjoy any relief from the impact of oil production in northern Alberta, the provincial and federal governments need to be serious about environmental assessment and regulation of oil production. The former premier of the Province of Alberta, Ed Stelmach, while addressing a US audience of present and potential oil sands investors stated that "We've barely scratched the surface of oil sands development, and we are just getting started" (Thompson & Radford, 2011). This does not in any way portray an end to oil sand development.

To the respondents in this study, the Alberta government's claims about the extent of environmental devastation caused by oil extraction activities are far from the

truth. All of the respondents shared the perception that until they've wrung the last drop of oil sand from the earth, the Alberta government and oil companies will not leave northern Alberta and they will not stop polluting. Respondents believe that companies will dig up land in search of oil and when they don't find oil, they will abandon the land. As long as profits are the primary goal of oil companies and the revenue for the Alberta government continues to come from oil, there is no end in sight for this development. (This thesis was concluded before the election that installed the new Liberal government. One can't say exactly what direction the new government will take in regard to oil sand development).

The respondents were basically pessimistic about the future of their environment. According to Cooper (personal communication, 2014),

> What the oil sand is causing is so so big, Canada will never ever have enough money to clean it up. It will cost hundreds of billions of dollars to clean up They are gonna [*sic*] sacrifice northeast Alberta to get to the oil. They are not thinking of northern Saskatchewan and Northwest Territories who also get the negative impacts. They get nothing positive out of it. They don't care because those places are out of their jurisdiction and then are downstream and we don't worry about them.

One issue that all of the respondents expressed frustration about is in relation to the pollution of the Athabasca River, Lake Athabasca and other surrounding lakes. To them, the destruction of the river and surrounding waterways will lead to their own demise. The destruction is largely caused by the pollution from oil production and the tailings ponds. According to Kane (personal communication, 2014),

> It might kill or deform every living thing in the river and wipe out dozens of communities water supply. So that's frightening and they keep doing it, growing up in vigor, growing bigger and bigger, more and more. And they keep saying, they are gonna fix it but they don't know how and they never will. ...you can't believe what anybody tells you from Edmonton because they don't know what

> they are talking about. Almost none of them has ever been here to see this environment.

Pillar (personal communication, 2014) made a very interesting remark on the future of oil sand extraction in northern Alberta. The respondent pointed out that perhaps in the future, oil might not be the most significant source of energy. In other words, the product may become less relevant as the world switches to other sources of energy. Of course, that is already happening with the production of solar and wind energy; particularly in developed countries which remain the world's largest consumers of oil. Pillar (personal communication, 2014) questioned what that could mean for his community, which has been left in ruins. During the course of the interview, Pillar also made a case for how the large revenue generated by oil is the motivating factor for oil companies. He said,

> There is no future for the oil sand. It might produce for another 20-30 years but as the world switches to other forms of energy, oil sand is very costly to produce. Hmm, if oil stays below $80 a barrel for even two years, most activities in this corner of Alberta will stop. Only the established operators will keep operating but there will be no more new expansion. So, hmm, our economy now depend 100% on the oil sand and goes up and down and the oil sand is doomed to a short life. So, hmm, those 100-200,000 people that moved here, they will pack their bags and leave. And the oil steps down and the native people will be left here and there will be again no jobs. They will have to develop a new economy. Hmm that is just the history of mining in Canada. All mines do that. They close down and the town becomes empty. That is what is going to happen if the oil sand drops. They need $80 a barrel to make a profit right now. If it drops to $60, for Fort McMurray, almost everybody will go bankrupt. An average house in Fort McMurray now is about $800,000 and that is only because carpenters makes $50 per hour. Everybody makes big wages and so everything cost a lot. And I think of those with, 40-50,000 with $760,000 mortgage, what's gonna [*sic*] happen to them when suddenly their incomes disappears? And hmm, oil companies don't care . They will, they will just bubble and go somewhere else where it is cheaper to produce oil. They are not thinking of the future here. They, they, to them, the future is only high oil in prices. And so, the aboriginal people will remain and the migrants will that moved here will move on somewhere else as resources dissipate. That happened before with fur trade, sawmills, it happened with uranium mine and it will happen to oil sand...you can't believe anything.

Barely three weeks after this interview was conducted, the price of oil plunged to $40 per barrel, even less than Pillar anticipated. Canada, especially the province of Alberta, and oil companies in the province are already feeling the deep impact (Ewart, 2015). How changes in oil prices will affect the Athabasca Chipewyan First Nation and the long-term future of Alberta is unknown. Considering the current low oil prices throughout the world, which have been projected to last for several years, the future of the oil economy is not very promising (Ewart, 2015). Will the province now go beyond 'scratching the surface' and start digging deep as Ed Stelmach, the former Premier stated?

Given the negative impacts on the environment and people of northern Alberta, what will be the fate of other Aboriginal communities in close proximity to oil mining sites if these companies intensify oil sand production? Is their community really a sacrificial zone? The data collected from the interviews revealed a society that is struggling to cope and adapt to the impacts of oil extraction activities.

4.8 Organizing Themes and Interpretations

Organizing themes emerge from the clustering of basic themes around related issues that emerge from data (Attride-Stirling, 2001). Organizing themes are important as they capture the salient issues covered in basic themes. Table 11 shows how the basic themes are clustered into four organizing themes.

Table 11: Basic Themes to Organizing Themes

Basic Themes	Organizing Themes
Impact of greenhouse gases emission on the quality of air in northern Alberta Contamination of the Athabasca River, surrounding lakes and its impact on food production	Environmental Degradation
Decline in fish, commercial fishing and hunting Decline in tourism	Disruption of Traditional Economic Activities

Migrant workers and an increase in social vices in the ACFN The issue of cultural sensitivity and Aboriginal land displacement Disruptions in social capital	Lack of Social Capital
Inequitable distribution of revenue and allocation of infrastructure Education and skills acquisition Rise in health risks Lack of economic capital Availability of institutions, technology and infrastructure	Mixed level of Human Capital

4.8.1 *Organizing Theme 1*: Environmental Degradation

One core issue that has characterized natural resource extraction is the negative changes it brings to the environment. Regions with large-scale extraction operations tend to produce more environmental stressors which pose numerous risks to the local residents. While the impacts of oil extraction activities have not been fully documented (Gosselin et al., 2010), respondents shared the belief that oil extraction in the region has resulted in an environmental abuse of their traditional lands. Greenhouse gas emissions, the deposits of toxic chemicals on the land and oil spillage are examples of the harm done resulting in the ruination of the land, forest, air and water. These factors were described in the literature review and relate to the research questions.

In addition, numerous tailings ponds were created by the oil companies to store wastewater from oil mining contaminate the rivers, and groundwater. This contamination causes health complications and the loss of traditional means of economic activities. Taken together, these environmental impacts have multiple negative effects on the community. They expose the community to environmental sensitivity, food insecurity and elevated health risks.

As mentioned in Chapter One, one of the terms of Treaty 8 between the federal government and First Nations in northern Alberta is the protection of fishing and hunting rights. Since the rivers, land and boreal forest are affected by pollution from oil

extraction activities, it is easy to understand the concerns about food security expressed by the respondents.

The landscape, rivers, lakes and boreal forest which the community relies upon on for subsistence and economic development have been greatly affected by the impact of oil extraction. Also, the community's capacity to respond to these changes has been low due to a lack of human, social, economic and technological capital when compared to the government or oil companies. This is in addition to historical neglect, marginalization and social exclusion of the community by the Alberta government (Rutherford, 2010). To corroborate the claim of the destruction of Aboriginal land, water and the boreal forest by the activities of oil companies, Ryan (personal communication, 2014) traced it to the unfettered capitalism that does not take into consideration factors that can adversely affect a community.

It is noteworthy that respondents from oil extraction regions who have experienced the negative impact of oil extraction have called their community a sacrificial zone, in relation to the urban areas that benefit from such resources (Mbah, 2013). From the land to the boreal forest, water and air, the ecological habitats of the ACFN and other Aboriginal communities in close proximity to oil mining sites have been impaired. These environmental stressors generally challenge the community's traditional practices of living off their lands and the culture of mutual support. Respondents expressed their deepest concern about this issue because of its harm to established cultural patterns. In the area of environmental degradation, interviews with respondents identified two core issues, namely, the negative impact on the quality of air and the quality of water available to the community.

4.8.2 *Organizing Theme 2:* Disruptions of Traditional Economic Activities

Access to economic capital plays a significant role in shaping adaptive capacity to changes occurring in a society (Kates, 2000; Smit et al. 2001). Dow (1992), stated that poverty can be linked to vulnerability and remains "a rough indicator of the ability to cope" (cited in Smit et al. 2001, p. 895). In other words, the poor in a society, in terms of economic resources, are the most vulnerable and lack the financial capacity that would allow them to successfully manage critical changes within their community (Berman et al., 2012). Kelly and Adger (1999) noted that poverty and a lack of economic opportunity contributes to low coping and adaptive capacity since those affected have fewer options to adapt.

Economic activities are sources of empowerment and self-fulfillment. However, both qualities are lost when a community loses their sources of such activities. For generations, the ACFN and other First Nations in Canada lived in traditional settings held together by common ancestry and cultural tradition, including economic practices. Before colonization, these people relied on fishing and hunting for sustenance. The long period of colonialism and the negative impacts of oil extraction have eroded the community's sense of empowerment, self-actualization, and exposes them to economic hardship and poverty. Respondents reflected on these issues and agreed that their vulnerability to negative impacts of oil extraction in the region can be attributed to their inability to adapt.

4.8.3 *Organizing Theme 3*: Lack of Social Capital

Social capital is an all-encompassing factor in discussing societal vulnerability to changes and adaptation in their environment. It encompasses community bonding,

collective values and shared goals, and availability of social order. At the community level, for example, the absence of social bonds, collective values, cooperation, trust and common linkages reduces its community's capacity to respond to environmental hazards (Pelling, 1997). On the other hand, a community with a deep sense of social order, norms and values can display a high sense of commonality and support network when people work together to achieve a common purpose, thereby strengthening their coping and adaptive abilities.

DesBrisay (1994) observed that a lack of social capital in Aboriginal communities resulted from stressors caused by resource extraction by stating,

> "When there is a significant change to the social order of those communities; when the change creates considerable stress and disruption at the family and the individual level; when the pace of change is rapid; when change results in, or occurs in, communities which are less integrated, less interdependent, and without a strong collective set of values; and when residents experience a loss of roles, and concomitant feelings of powerlessness, loss of self-reliance, and loss of self-esteem" (p. 108)

DesBrisay (1994) states that most of the resource projects that are associated with severe and persistent social problems are also those that have inflicted significant damage to the land (DesBrisay, 1994). Respondents shared this belief. Results from the interview that was analyzed showed that the breakdown of social order and societal norms, economic hardship, and inequitable distribution of resources lowered the community's coping and adaptive mechanisms. These factors also led to an increase in crime and family disunity, which brought about a loss of social cohesion and control.

4.8.4 *Organizing Theme 4*: Mixed Level of Human Capital

Human capital refers to those elements or characteristics of human beings that shapes their relationship with their environment. Human capital determines the strength of an individual or a community in coping or adapting to negative environmental changes. These capacities involve a set of skills acquired through education and training, and knowledge that enable individuals to respond to issues that affect environmental stressors. They include recognition of the necessity to adapt, and knowledge, access to and implementing available options (Smit et al., 2001). The availability of these assets will enable a more effective response to the harms resulting from resource development. Taken together, these factors are the core elements of human capital.

According to Holmes (1996), responding to harms caused by environmental hazards require a unifying vision; scientific understanding of the problems; an openness to face challenges; proactive in developing solutions; community involvement; and commitment at the highest political level to build such adaptive capacity. The Athabasca Chipewyan First Nation faces tremendous environmental stressors resulting in health and socioeconomic risks, caused by oil extraction activities. Environmental, health and socioeconomic stressors occur when an individual or a community appraises a situation as threatening and do not have an appropriate coping mechanism, or when their coping mechanisms are not adequate for all members of the community (Cohen & McKay, 1984).

Results from the ten interviews showed that the community is experiencing the negative effects of oil extraction. Although some community members have acquired the skills, training and education to increase their employability potential which creates more

options for them, most members of the community lacked the necessary skills, knowledge, training, and education to respond to the new changes. These issues emerged in the interpretation of two basic themes: (a) education and skills and, (b) lack of economic resources.

4.9 Global Theme in Analysis: Vulnerability and Adaptive Capacity of the ACFN to the Negative Impacts of Oil Extraction in Northern Alberta

The global theme that emerged from the analyses is the vulnerability of the Athabasca Chipewyan First Nation to negative impacts of oil extraction and their adaptive capacity. This theme was revealed from the four organizing themes which were informed by an analysis of a larger number of basic themes. (see Table 12 below)

From the explanation of the organizing themes above, it has become clear that such themes were built around the clusters of basic themes that address the research questions (see Sections 4.5 to 4.7). While the basic themes addressed in organizing themes cannot totally be separated from each other, as they are interrelated, it needs to be stated that the groupings were basically made in an attempt to significantly address an aspect of the subject matter while linking them at various levels during the analysis of the data.

The first organizing theme that reflects the first global theme is environmental degradation. Environmental degradation includes the following basic themes; the impact of greenhouse gas emissions on the quality of air in northern Alberta; the contamination of the Athabasca River, surrounding lakes and its impact on food production, and a rise in health risks. All of the basic themes explored environmental changes to the surroundings of the ACFN and equally address the community's vulnerability to these changes and their adaptive capacity.

The basic theme of the negative impact of greenhouse gas emissions on the quality of air addresses the fundamental issue of air quality associated with the release of pollutants into the atmosphere through oil extraction activities. These emissions, the respondents said, have affected them negatively. The release of such pollutants also caused the forced migration of wildlife, and some community members moved away due to air pollution. Both empirical evidence and interviews conducted revealed that lung and respiratory diseases are prevalent in the ACFN. Therefore, while the community remains susceptible to greenhouse gas emissions, they also lack a strong adaptive capacity to respond.

The basic theme of the contamination of the Athabasca River, surrounding lakes and its impact on food production addresses the vulnerability of the ACFN to food production and security caused by oil extraction. These directly affect the sources of the community's traditional economic prosperity, which was based on hunting. The basic theme of the rise in health risks addressed the vulnerability of the community to numerous health issues, owing to the contamination of the environment, which according to the respondents is the main source of their livelihood.

Livelihood, as used in this context, is not restricted to food security, but it is also relevant in the context of economic activity. This is one of the interrelated areas in the organizing themes. Respondents admitted that the contamination of their surroundings by the activities of oil companies polluted the physical environment and everything in it. This was made worse by the impact of tailings ponds, which polluted not only the surface water, but the groundwater as well. These had negative impacts on the community’s economic activity while being exposed to numerous health risks, such as

cancer, as well as economic hardship. The increasing number of cases of diabetes was also cited as resulting from the consumption of non-traditional foods, instead of the former diet of fish, wild game, and berries. These impacts increase the vulnerability of the community, and as stated earlier, moving off the land seemed to be one of the last resorts used by some community members to adapt.

The organizing theme of the disruption of traditional economic activities captures three basic themes namely, the decline in fish, commercial fishing and hunting, the decline in tourism activities; the inequitable distribution of revenue and allocation of infrastructure, and the lack of economic resources. Interviews with respondents confirmed the decline in food production, commercial fishing and hunting was a result of oil extraction as these activities cannot thrive in a polluted environment. Most respondents claimed that such a decline in their commercial activities translates to economic insecurity. Economic insecurity was also an issue some respondents identified as contributing to family disintegration and generation divide.

Similarly, the decline in tourism, which is another basic theme, also causes economic hardship for many ACFN members. This is because the community could no longer engage in the tourism industry due to environmental changes. These impacts, in addition to the lack of (economic) resources expose individuals and families to joblessness. Some respondents revealed that there was an apparent inequality in the distribution of resources. The impact of this meant that most members of the community who have lost their traditional occupations are less able to adapt to change. Moreover, economic distress also led to family disintegration. The organizing theme of the lack of social capital incorporated three basic themes after regrouping.

These basic themes include migrant workers and an increase in social vices in the ACFN, the issue of cultural sensitivity and Aboriginal land displacement, and the availability of infrastructure and institutions. In the context of migrant workers and their relationship to the rise in social vices, the respondents spoke about how the newcomers' affluence brought about the increase in drug use and prostitution. Most respondents revealed that, there is little interaction between them and the newcomers. The migrant workers don't respect their culture and at the same time have infiltrated their community and contributed to social problems. These factors increased vulnerability to changing social conditions. The basic theme of lack of technology and institutions meant that social amenities like water treatment, healthcare facilities and the institutional framework that can support environmental impact assessment (EIA) contributed to the vulnerability of the ACFN to environmentally induced social issues.

As stated in the literature review, our social environment is a significant determinant of health. In other words, when the social determinant of health is lacking in a given community, those people are more vulnerable to environmental conditions. According to the respondents, availability of better healthcare could have facilitated early diagnoses of health issues associated with oil extraction activities. As one respondent said, the government has minimized the causes of the increasing number of cases of cancer in their community. At the same time, an Environmental Impact Assessment (EIA) can help to identify risks involved. Although, the respondents did not use the phrase, EIA, during interviews, they implied the same when they spoke of the government's lack of concern for their environment. Respondents felt that the

government is more interested in the revenue from oil, not in its consequences, which have made them vulnerable.

Of the four organizing themes, the issue of human capital is very significant. That is, the basic theme of education and skills acquisition and its ability to shape vulnerability. Commercial fishing, hunting and tourism, the three traditional means of livelihood for the ACFN do not require a formal education. As a result, a large number of ACFN members do not have the requisite skills and/or education to work in the oil industry which contributes to underemployment and poverty. Some younger community members, by contrast, acquired education and training and were able to integrate into the oil economy, earn a good salary and were better able to respond to vulnerability. For this reason, many young people see nothing wrong with oil sand development, unlike the older ones and elders who don't completely share the same opinion.

Table 12: Linkages between Basic, Organizing and Global Themes

Basic Themes	**Organizing Themes**	**Global Theme**
Impact of greenhouse gases emission on the quality of air in northern Alberta Contamination of Athabasca river, surrounding lakes and its impact on food production Rise in health risks	Environmental Degradation	Vulnerability of the ACFN to the negative impacts of oil extraction and their adaptive capacity.
Decline in fish, commercial fishery and hunting Decline in tourism activities Inequitable distribution of revenue and allocation of infrastructure Lack of economic capital Family disintegration	Disruption of Traditional Economic Activities	
Migrant workers and an increase in social vices in the ACFN The issue of cultural sensitivity and Aboriginal land displacement Availability of infrastructure and institutions	Lack of Social Capital	
Education and skills acquisition	Mixed level of Human Capital	

4.10 Summary

Chapter Four focused on analyzing data that was collected through interviews with Athabasca Chipewyan First Nation residents. The interviews solicited information about the impact of oil extraction activities in northern Alberta and the vulnerability and sensitivity of the ACFN, how the community responded to such impacts and adapted, and the future implication of oil extraction activities on the ACFN. Using the thematic network approach to qualitative analysis, the analysis identified a number of basic, organizing and global themes. In the context of vulnerability and adaptation, the chapter discussed oil extraction in northern Alberta and its environmental, socioeconomic and health impact on the ACFN community.

Chapter Five: Conclusion

5.1 Introduction

This concluding chapter describes the findings of the research, states how the research questions were addressed and reports the key research findings. The concluding section will make a case for further research.

5.2 Research Questions and a Summary of Results from Data

The thesis answered four basic research questions relating to the impacts of oil extraction and the coping mechanisms of the Athabasca Chipewyan First Nation.

The first research question focused on the main impacts of oil extraction activities on the ACFN. This question is broad in context and was used to capture the respondents' perceptions on the issue. In answering this question, the respondents expressed concern about the issue of environmental degradation; the issue of air pollution, the impacts on the boreal forest, and water contamination, particularly the pollution of the Athabasca River, which is a main source of the community's food and economic activities.

The second research question explored why such impacts are problematic to them. All of the respondents voiced their concerns about the increasing health risks the community is experiencing due to the environmental changes since oil mining started. In addition, the respondents were deeply concerned about the issue of food security, the disruption of their traditional livelihoods and economic activities (fishing, hunting and participation in the tourism industry). In response to the possible health concerns and social disruption of the community due to environmental changes, the respondents focused on the dwindling social capital of their community, owing to many factors,

including the rapid population growth of migrant oil workers who brought with them increasing social vices, including drug use, a loss of social bonds and family networks; government encroachment on their traditional lands; and the increasing prevalence of health issues such as cancer and respiratory diseases. The views and perceptions of respondents were critically analyzed in the context of the vulnerability of their community, both individually and collectively.

The third research question focused on the community's ability to cope and its adaptive capacity to the numerous impacts the respondents identified. The researcher identified some factors, such as a mixed level of human capital, disruptions of traditional economic activities, lack of social capital, inadequate distribution of revenue and infrastructures, inadequate institutional framework and availability of technology as the underlying factors that determine how individuals and the community respond to environmental and socioeconomic changes. These were explained in detail in section 4.6.1 – 4.6.6. With the exception of a mixed level of human capital that resulted in differential coping mechanisms for some members of the ACFN, the other factors that shape coping mechanisms and adaptive capacity for the community were low, hence the increasing sensitivities to shocks resulting from oil extraction activities. Thus, the community is more vulnerable than ever.

The last research question asked about their future. Here, respondents expressed the desire for a cleaner and safer environment for the people of the ACFN. Faced with the numerous negative impacts the community has experienced they don't see that desire coming to fruition in the future, considering the intensification of oil extraction activities in northern Alberta.

5.3 Research Findings

The extant literature, presented and discussed in Chapter One, describes the impacts of natural resources extraction, how affected communities respond to such impacts, and the factors that determine the levels of adaptation. However, there are some key areas that this research discovered that could contribute to our understanding of the impact of oil extraction and the adaptive capacity of affected communities. For the ACFN community, one discovery made during the course of the study is that higher adaptive capacity is synonymous with being young and educated. Though existing literature has argued that education supports higher adaptive capacity, the researcher discovered that in the context of the ACFN, it seems only the young are more interested in acquiring education and thereby increasing their adaptive capacity. This was reflected in the analysis of the data where it was revealed that the ACFN community has struggled with coping with the impact of oil extraction in northern Alberta, but has displayed different levels of coping mechanisms, which favour the young and educated. While not necessarily a guarantee, most members of the ACFN community with some level of education respond more proactively to the environmental, economic and health sensitivities the community is experiencing.

Being young, as used in this context, means adults in their late 20s and 30s. Athabasca Chipewyan First Nation members in this age group seem to have a higher level of coping mechanisms and adaptation. This implies that they have greater access to a better quality of life defined by higher salaries and more choices, as opposed to living with polluted food and water, inadequate shelter and other human development

indicators of poverty. For example, data collected shows that wealthier members of the ACFN community with higher economic power have access to bottled water and better choices of food not sourced from their environment. This economic power does not equate to a reduction in the rate of environmental pollution or proactive measures on the part of oil companies or the government toward environmental reforms or restructuring, but simply having the economic resources to make alternative choices in relation to necessities like food, water and shelter.

Another discovery made during the course of the interviews which support existing findings is that social disruptions and vices in the ACFN community are not a direct consequence of oil exploitation in northern Alberta but an outcome of various factors interlinked with oil production, such as an influx of migrants in the region, and a wide income gap in the region. Also, the loss of economic opportunity and security resulting from the dislocation of traditional economic practices, namely fishing, hunting and tourism, particularly among the older members of the community, might contribute to family breakdown and an increase in social vices. Without economic security, social control and cohesion, families are disadvantaged and children become more susceptible to a life of crime.

5.4 Impacts of Oil Extraction Activities in Northern Alberta: Some Policy Issues and Suggested Recommendations

As noted in Chapter One, humans interact with the environment at various levels and in relation to various activities. Without a doubt, natural resources should be discovered and harnessed for the betterment and development of the society. In reality, such is not the case, as oil extraction has lop-sided developments in some regions. For example, while parts of Alberta, namely Calgary and Edmonton, have enjoyed

considerable development and availability of socioeconomic infrastructures, the same can not be said of northern Alberta, particularly Aboriginal communities that live on reserves close to oil mining sites and thrive on their traditional territories. They have suffered the negative consequences of oil extraction as the data and analysis has shown. As a matter of policy, there is the need to ensure the protection of communities whose environment is being harmed by the activities of oil companies in the region. As this research has shown, the inadequacy or failure in both instances is at the centre of environmental issues and other negative impacts on the Athabasca Chipewyan First Nation and other Aboriginal communities in northern Alberta.

As Hurlbert (2011) noted, there is a need to address the protection of communities from environmental degradation, prevent adverse health impacts as a result of deteriorating environmental conditions before the harm occurs. There is also the need to ensure appropriate assignment of culpability for environmental harm; and shifting the burden of proof of contamination to industries instead of the people and communities affected. Finally, there is a need for compensation for the impacts of environmental degradation with targeted remedial action and resources. The ACFN and other Aboriginal communities in northern Alberta have instituted various court proceedings against the Alberta government and oil companies (Hurlbert, 2011)). The big challenge to these lawsuits is the community's limited economic power to sustain the cost of such lengthy litigation.

Protection of communities from environmental degradation should, as a matter of policy, be implemented in areas that suffer from or can be potentially exposed to the negative impacts of natural resource development. As highlighted above, natural

resource extraction is important for the general development of a country and improved social welfare of its citizenry. However, such resource extraction should not be carried out at a disproportionate cost to a people or community. The cost and benefit of resource extraction should be well harnessed to reflect equity in the system. Therefore, oil mining in northern Alberta should be implemented in such a manner that it should not cause undue detriment to either its host community or those surrounding it. This can be achieved by adopting environmental friendly technology in oil mining (Mol, 1997).

Government leaders should recognize the importance of environmental sustainability as the province continues to export natural resources. This can be implemented by ensuring that the natural environment is not compromised in the course of natural resource extraction. Also, the benefit of oil sand development should be more evenly spread. In this regard, the ACFN is still hoping for and waiting for an equitable solution. Reversing this negative trend for the collective benefit of all peoples in the region should remain an important objective for the provincial government.

Furthermore, existing research and the study that supports the thesis show that pollution and contamination of the environment as a result of oil extraction activities in northern Alberta has serious human health impacts; in addition to the disruption of society, and the general ecosystem. However, controversy and debates over the extent or level of such health risks have made collective efforts toward addressing these health issues very difficult.

The views of ACFN community members interviewed in the course of this research study showed that there are negative health impacts associated with oil extraction activities. This is because the government is disconnected from the

community as most respondents admitted. The government should work with community members in the area of environmental assessment or, at least, listen to physicians and scientists who have clearly identified health risks associated with the impacts of oil extraction activities on communities in the operating sites. The government, in addition to the oil companies, can work toward preventing health problems. Such efforts should start with the protection of the environment from contamination and pollution. This can be followed by other interrelated efforts in the area of environment and health assessment of communities that are in close proximity to these oil extraction sites; not just the ACFN community.

However, the conflicting reports of government agencies, physicians, environmental activists (detailed in Chapter 1) and members of the Aboriginal community interviewed cannot bring about any justifiable end to the existing issue. As indicated, what is needed is collective efforts in the areas of preventive measures and environmental and health risk assessment. Evidence from oil extraction activities in other regions in North America have shown that there are significant problems and issues suffered by communities in the oil producing region as presently experienced in northern Alberta. (Maldonado, 2014; Putz, Finken, & Goreham, 2011)

5.5 Conclusions and Further Research

This thesis examined the various aspects of environmental vulnerability and the adaptive capacity of the Athabasca Chipewyan First Nation community caused by oil extraction activities in northern Alberta. While the data collected confirmed further the findings of existing empirical evidence, there were new findings. In addition, this study extends our understanding of adaptive capacity to the impacts of oil mining. Being

young and educated seems to favour higher adaptive capacity while Aboriginal family breakdown caused by loss of economic opportunity (equally caused by economic disruption as part of the negative impacts of oil mining) have been associated with an increase in social vices.

There is need for further research in two related areas: a community's adaptive capacity to oil mining impacts and family cohesiveness and control. There is a need to investigate older ACFN community members who are unable to acquire education to enable them to redirect their energy to other economic opportunities, or be employed by the oil companies so as to increase their adaptive capacity. One can speculate that a lack of financial resources is a key issue but there could be more fundamental reasons. After all, those in the ACFN community who were able to acquire education did so within the constraints of the few available resources. Finally, there is also a need to investigate if economic security alone translates to stronger Aboriginal family bonds, social control and cohesion.

REFERENCES

Aboriginal Affairs and Northern Development Canada. (2015). First nation detail – registered population. Retrieved from http://pse5-esd5.ainc-inac.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=463&lang=eng

Adger, W. N. (1999). Exploring income inequality in rural, coastal Vietnam. *Journal of Development Studies 35*(5)*:* 96-119. DOI: 10.1080/00220389908422593

Adger, W. N. (2006). Vulnerability. *Global Environmental Change 16*(3): 268-281. DOI: 10.1016/ j.gloenvcha.2006.02.006

Alberth, J., Hjerpe, M., & Schauser, I. (2012). *Conceptualisation of Vulnerability and Review of Assessments around the Baltic Sea Region*, 7. Baltadapt Report.

Angell, A. C., & Parkins, J. R. (2011). Resource development and aboriginal culture in the Canadian north. *Polar Record 47*(01): 67-79. DOI: 10.1017/S0032247410000124

Annan, K. (2003). The Secretary-General's message for the International Day for Disaster Reduction. Retrieved from http://www.un.org/sg/statements/?nid=551

Athabasca Chipewyan First Nation (2015). Governance. Retrieved from http://www.acfn.com/#!governance/cuae

Athanasiou, T., Baer, P. (2002). *Dead Heat: Global Justice and Global Warming*, Seven Stories Press: New York.

Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative Research 1*(3): 385-405. DOI: 10.1177/146879410100100307

Bachofen, C., & Cameron, E. (n.d). Vulnerability: exposure, sensitivity and adaptive capacity. *SDCC Learning in Focus*, The World Bank.

Bankoff, G. (2003). Constructing vulnerability: the historical, natural and social generation of flooding in metropolitan Manila. *Disasters 27*(3): 224–238. DOI:10.1111/1467-7717.00230

Bari, M., & Kindzierski, W. B. (2015). Fifteen-year trends in criteria air pollutants in oil sands communities of Alberta, Canada. *Environment International 74:* 200-208.

DOI:10.1016/j.envint.2014.10.009

Berman, R., Quinn, C., & Paavola, J. (2012). The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environmental Development 2:* 86-100. DOI:10.1016/j.envdev.2012.03.017

Birkmann, J., et al. (2009). In: Birkmann, J., Tetzlaff, G., Zentel, K. (Eds.), Addressing the Challenge: Recommendations and Quality Criteria for Linking Disaster Risk Reduction and Adaptation to Climate Change. DKKV Publication Series 38, Bonn.

Birn, K., & Khanna, P. (2010). A discussion paper on the oil sands: challenges and opportunities, *World Energy Congress*. Retrieved from http://www.indiaenergycongress.in/montreal/library/pdf/403.pdf

Blaikie, P., Cannon, T., Davis, I.., & Wisner, B. (1994). *At Risk: Natural hazards, People's Vulnerability, and Disasters*. New York: Routledge.

Boeije, H. (2009). *Analysis in qualitative research*. London: Sage Publications.

Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. London: Sage Publications.

Boyce, J., Cotter, A., & Perreault, S. (2014, July 23). Police Reported Crime Statistics in Canada, 2013. *Juristat* 85-002-X: 1-39. Retrieved from http://www.statcan.gc.ca/pub/85-002-x/2014001/article/14040-eng.pdf

Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology 3* (2): 77-101. DOI: 10.1191/1478088706qp063oa

Brooks, N. (2003). Vulnerability, risk and adaptation: A conceptual framework. *Tyndall Centre for Climate Change Research Working Paper 38:* 1-16. Retrieved from http://www.tyndall.ac.uk/content/vulnerability-risk-and-adaptation-conceptual-framework

Bryant, J. (2014). Using respondent-driven sampling with 'hard to reach' marginalised young people: problems with slow recruitment and small network size. *International Journal of Social Research Methodology 17*(6): 599-611. DOI: 10.1080/13645579.2013.811921

Burke, L. A., & Miller, M. K. (2001). Phone Interviewing as a Means of Data Collection: Lessons Learned and Practical Recommendations. In *Forum*

Qualitative Sozialforschung/Forum: Qualitative Social Research 2(2), Art 7. Retrieved from http://www.qualitative-research.net/index.php/fqs/article/view/959/2094

Canadian Association of Petroleum Producers (2015). Canada's Oil Sands, Water Use. Retrieved from http://www.oilsandstoday.ca/topics/WaterUse/Pages/default.aspx

Cardona, O. D. (1993). Natural disasters, global change and sustainable development: a strategy for reducing effect. III Meeting of Scientific Advisory Council for the International Geophere-Biosphere Program, Forum on Earth System Research, ICSU, Ensenada, Baja California, Mexico.

Cardona, O. D. (2004). The need for rethinking the concepts of vulnerability and risk from a holistic perspective: a necessary review and criticism for effective risk management. In Bankoff, G, Frerks, G, & Hilhorst, D. (Ed). *Mapping Vulnerability: Disasters, development and people*. pp. 37-51. Earthscan Publishers: London.

Carlson, M., & Stelfox, J. B. (2014). Alberta Oil Sands Development and Risk Management of Canadian Boreal Ecosystems. In *Peak Oil, Economic Growth, and Wildlife Conservation,* pp. 219-244. New York: Springer.

Carter, N. (2007). *The Politics of the Environment: Ideas, Activism, Policy*. 2nd Edition. Cambridge: Cambridge University Press

CBC News (2014). Oilsands study confirms tailings found in groundwater, river: Federal study shows water from tailings ponds leaching into Athabasca River. *CBC News.* Retrieved from http://www.cbc.ca/news/canada/edmonton/oilsands-study-confirms-tailings-found-in-groundwater-river-1.2545089

CBC News (2015). Prime Minister Stephen Harper agrees to G7 'decarbonization' by 2100. CBC News. Retrieved from http://www.cbc.ca/news/politics/prime-minister-stephen-harper-agrees-to-g7-decarbonization-by-2100-1.3104459

Chambers, R. & Conway G.R. (1991). Sustainable rural livelihoods: practical concepts for the 21st century. IDS Discussion Paper 296. Brighton. University of Sussex.

Chambers, R. (1989). Vulnerability, Coping and Policy (Editorial Introduction). *IDS Bulletin 20* (2):1-7. DOI:10.1111/j.1759-5436.1989.mp20002001.x

Cohen, S., & McKay, G. (1984). Social support, stress and the buffering hypothesis: A theoretical analysis. In Baum, A., Taylor, S.E., & Singer, J.E. (Eds.). Handbook of psychology and health, New Jersey: Hillsdale. pp. 253-267.

Cutter, S.L., Boruff, B. J., & Shirley, W. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly 84*(2): 242-261. DOI:10.1111/1540-6237.8402002

Cutter, S. L., J. T. Mitchell, and M. S. Scott. (2000). Revealing the vulnerability of people and places: a case study of Georgetown County, South Carolina. *Annals of the Association of American Geographers 90*(4):713–37. DOI: 10.1111/0004-5608.00219

Daniel, R. (1999).The Spirit and Terms of Treaty 8. In Price, R. (Ed.). *The Spirit of the Alberta Treaties*. pp. 47-100. Alberta: University of Alberta Press.

DesBrisay, D. (1994). The impact of major resource development projects on aboriginal communities: a review of the literature. Ottawa: Royal Commission on Aboriginal Peoples.

Dilley, M., & Boudreau, T.E. (2001). Coming to terms with vulnerability: a critique of the food security definition. *Food Policy 26*(3): 229-247. DOI:10.1016/S0306- 9192(00)00046-4

Davies, S. (1993). Are coping strategies a cop out?. IDS Bulletin 24 (4), 60-72. DOI: 10.1111/j.1759-5436.1993.mp24004007.x

Dow, K. (1992). Exploring the Differences in Our Common Future(s): The Meaning of Vulnerability to Global Environmental Change. *Geoforum 23*(3): 417- 436. DOI:10.1016/0016-7185(92)90052-6

Downing, T.E. (Ed.), (1996). Climate Change and World Food Security. Berlin, Germany: Springer-Verlag.

Dyer, S. (2009, September). Environmental Impacts of Oil Sands Development in Alberta. *Resilience.* Retrieved from http://www.resilience.org/stories/2009-09-22/environmental-impacts-oil-sands-development-alberta

Eriksen, S.H., Brown, K., Kelly, P.M. (2005). The Dynamics of Vulnerability: Locating Coping Strategies in Kenya and Tanzania. *The Geographical Journal 171*(4)*:* 287-305. DOI:10.1111/j.1475-4959.2005.00174.x

Ewart, S. (January, 2015). 10 things we don't know about bitumen toxicity. http://globalnews.ca/news/1808065/10-things-we-dont-know-about-bitumen-toxicity/

Fankhauser, S. & Tol, R.S.J. (1997). The Social Costs of Climate Change: The IPCC Second Assessment Report and Beyond. *Mitigation and Adaptation Strategies for Global Change 1*(4):385-403. DOI:10.1023/B:MITI.0000027387.05917.ae

Ferguson, A. (2007). In Alberta, cocaine easier to buy than pizza. *Edmonton Journal.* Retrieved from http://oilsandstruth.org/alberta-cocaine-easier-buy-pizza.

Ferreira, D. (1992). Oil and Lubicons don't mix: A land claim in northern Alberta in historical perspective. *Canadian Journal of Native Studies 12*(1):1-35. Retrieved from: http://www3.brandonu.ca/library/CJNS/12.1/default.htm

Ferreras, J. (2015). John O'Connor, Fort Chipewyan Doctor, Fired With No Explanation. The Huffington Post Alberta. Retrieved from http://www.huffingtonpost.ca/2015/05/12/john-oconnor-fort-chipewyan-doctor-oilsands_n_7267136.html.

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C.S., & Walker, B. (2002). Resilience and sustainable development: building adaptive capacity in a world of transformations. *Ambio 31*(5):437-440. DOI: http://dx.doi.org/10.1579/0044-7447-31.5.437.

Ford J. D., Smit, B, & Wandel, J. (2006). Vulnerability to climate change in the Arctic: a case study from Arctic Bay, Canada. *Global Environmental Change 16*(2)*:* 145-60. DOI:10.1016/j.gloenvcha.2005.11.007

Forsyth, T. (2003). Critical Political Ecology: The Politics of Environmental Science. pp. 168-201.
London: Routledge.

Freudenburg, W. R. (1984). Boomtown's Youth: The Differential Impacts of Rapid Community Growth on Adolescents and Adults. *American Sociological Review 49*(5): 697-705. Retrieved from http://www.jstor.org/stable/2095426

Gerdes, K. J., & Skone, T. J. (2009).*An Evaluation of the Extraction, Transport and Refining of Imported Crude Oils and the Impact on Life Cycle Greenhouse Gas*

Emissions (U.S. Department of Energy, National Energy Technology Laboratory, 2009), 16, figure 3-3. Retrieved from http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Life20Cycle%20Analysis/PetrRefGHGEmiss_ImportSourceSpecific1.pdf

Gosselin, P., Hrudey, S. E., Naeth, M. A., Plourde, A., Therrien, R., Van Der Kraak, G., & Xu, Z. (2010, December). Environmental and Health Impacts of Canada's Oil Sands Industry. Canada: The Royal Society of Canada.

Government of Canada (December, 2011). Industry Canada. Corporate Social Responsibility. Retrieved from https://www.ic.gc.ca/eic/site/csr-rse.nsf/eng/home

Greenpeace (2010). Tar sands and water. Retrieved from http://www.greenpeace.org/canada/Global/canada/report/2010/4/Watershed_FSfootnote_rev_5.pdf

Greiving, S., Fleischhauer, M., Lindner, C., Lückenkötter, J., Peltonen, L., Juhola, S., ... & Tesliar, J. (2013). ESPON Climate: Climate Change and Territorial Effects on Regions and Local Economies. ESPON. Retrieved from http://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/CLIMATE/ESPON_Climate_Final_Report-Part_B-MainReport.pdf

H. John Heinz III Center for Science, Economics, and the Environment. (2000). The Hidden Costs of Coastal Hazards: Implications for Risk Assessment and Mitigation. Washington, DC. Island Press.

Heckathorn, D. (1997). Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations. *Social Problems 44*(2): 174–199. DOI: http://dx.doi.org/10.2307/3096941

Heckathorn, D., Semaan, S., Broadhead, R. S., & Hughes, J. J. (2002). Extensions of Respondent-Driven Sampling: A New Approach to the Study of Injection Drug Users Aged 18–25. *AIDS and Behaviour 6*(1): 55-67. DOI: 10.1023/A:1014528612685

Hewitt, K. (2000). ‘Safe Place or ‘catastrophic society? Perspectives on hazards and disasters in Canada. *The Canadian Geographer 44*(4): 325-341. DOI:10.1111/j.1541-0064.2000.tb00716.x

Holmes, P., (1996). Building capacity for environmental management in Hong Kong. *International Journal of Water Resources Development 12*(4): 461-472. DOI: 10.1080/07900629650060

Hopkins, R. (2008). Peak oil and climate change: The two great oversights of our time. In Hopkins, R. *The Transition Handbook: From oil dependency to local resilience*. Cambridge, UK. Green Books.

Hurlbert, M. A. (2011). Environmental Injustice. In Hurlbert, M. A., (Ed). *Pursuing Justice: An Introduction to Justice Studies.* pp. 142-162. Nova Scotia: Fernwood Publishing.

Huseman, J., & Short, D. (2012). 'A slow industrial genocide': Tar sands and the indigenous peoples of northern Alberta. *The International Journal of Human Rights 16*(1): 216-237.DOI:10.1080/13642987.2011.649593

International Strategy for Disaster Reduction (ISDR; 2009). 2009 UNISDR Terminology on Disaster Risk Reduction. United Nations Publication. http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

Kasperson, J.X. & Kasperson, R.E. (Eds.), 2001. *Global Environmental Risk*. London. Earthscan and UNU Press.

Kasperson, R. (2001). Vulnerability and global environmental change. *International Human Dimensions Program Update 01 (*2): 2-3. DOI:10.1016/j.gloenvcha.2006.02.006.

Kates, R.W. (2000). Cautionary tales: adaptation and the global poor. *Climatic Change, 45*(1): 5-17. DOI: 10.1007/978-94-017-3010-5_2

Kelly, E.N., Schindler, D.W., Hodson, P.V., Short, J.W., Radmanovich, R., & Nielsen, C. C. (2009). Oil sands development contributes elements toxic at low concentrations to the Athabasca River and its tributaries. *Proceedings of the National Academy of Sciences of the United States 107*(37):16178-16183 .

Kelly, M., & Adger, W.N. (2000). Theory and practice in assessing vulnerability to change and facilitating adaptation. *Climatic Change, 47*(4): 325-352. DOI: 10.1023/A:1005627828199

Kelly, P. & Adger, W.N. (1999). Assessing Vulnerability to Climate Change and Facilitating Adaptation. *Working Paper GEC 99-07, Centre for Social and Economic Research on the Global Environment*, University of East Anglia, Norwich, United Kingdom.

Levy, B. (1995). Health and Social Effects of Worldwide Economic Transformation: Focus on Occupational and Environmental Health, *Social Justice 22*(4): 77-84. Retrieved from: http://www.jstor.org/stable/29766908

Liverman, D.M. (1994). Vulnerability to Global Environmental Change. Chapter 26, pp. 326-342 in S. Cutter, ed., Environmental Risks and Hazards. Prentice Hall: Saddle River, NJ. (Reprint of 1990 report published by Clark University)

Mackenbach, J. P., van den Bos, J., Joung, I. M. A., van de Mheen, H., & Stronks, K. (1994). The Determinants of Excellent Health: Different from the Determinants of Ill-Health?. *International Journal of Epidemiology*, *23*(6): 1273-1281. DOI: 10.1093/ije/23.6.1273

Mair, C. (1908). Through the Mackenzie Basin: A Narrative of the Athabasca and Peace River Treaty Expedition of 1899. Toronto: William Briggs.

Maldonado, J. K. (2014). A multiple knowledge approach for adaptation to environmental change: Lessons learned from coastal Louisiana's tribal communities. *Journal of Political Ecology 21*: 61-82. Retrieved from: http://jpe.library.arizona.edu/volume_21/Maldonado.pdf

Marmot, M., Friel, S., Bell, R., Houweling, T. A., Taylor, S., & Commission on Social Determinants of Health. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. *The Lancet 372*(9650): 1661-1669. DOI:10.1016/S0140-6736(08)61690-6

Mbah, C. E. (2013). Is It Always the Economic Stupid?: Movement for the Emancipation of Niger Delta (MEND) and Petroviolence in the Niger Delta of Nigeria. Retrieved from The Arctic University of Norway Munin open research archive.
Permanent Link: http://hdl.handle.net/10037/5238

McCarthy, J.J., Canziani, O.J., Leary, N.A., Dokken, D.J., & White, K.S. (Eds. 2001). Climate change 2001: impacts, adaptation, and vulnerability: *Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change.* pp.1-1032. Cambridge. University Press.

McLachlan, S.M. (2014). *"Water is a living thing": Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and*

Athabasca Chipewyan First Nation in Northern Alberta. Phase Two Report. Environmental Conservation Laboratory. University of Manitoba.

Mech, M. (2011). A Comprehensive Guide to the Alberta Oil Sands: Understanding the Environmental and Human Impacts, Export Implications and Political, Economic and Industry Influences. Retrieved from: http://www.greenparty.ca/sites/default/files/a_comprehensive_guide_to_the_alberta_oil_sands_-_may_2011_-_last_revised_march_2012.pdf

Melville, E.G.K. (1994). *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico*. Cambridge: Cambridge University Press.

Mileti, D. (1999). *Disasters by design: A Reassessment of Natural Hazards in the United States*. Washington, D.C.: Joseph Henry Press.

Mills, A. J., Durepos, G., & Wiebe, E. (Eds.). (2009). *Encyclopedia of Case Study Research* (Vol. 2). Thousand Oaks, CA. Sage Publications.

Mitchell, V. L. & Zmud, R. W. (1999). The Effects of Coupling IT and Work Process Strategies in Redesign Projects. *Organization Science 10*(4): 424-438. Retrieved from: http://dx.doi.org/10.1287/orsc.10.4.424

Mol, Arthur (1997). Ecological Modernization: Industrial Transformation and Environmental and Reform. In Redclift, Michael and Graham, Woodgate (eds.), *The International Handbook of Environmental Sociology* (pp. 138 – 149). Cheltenham, UK: Edward Elgar Publishing.

Natural Resources Defense Council (November, 2014). Tar Sands: Canada's First Nation Communities Are Paying the Price. Retrieved from https://www.youtube.com/watch?x-yt-cl=85114404&v=sOqjYo3dE8A&x-yt-ts=1422579428#t=76

Neuman, W.L. (2011). *Social Research Method: Qualitative and Quantitative Approaches*. New York: Pearson.

O'Brien, K., Eriksen, S., Nygaard, L. P., & Schjolden, A. (2007). Why different interpretations of vulnerability matter in climate change discourses. *Climate Policy 7*(1): 73-88. DOI: 10.1080/14693062.2007.9685639

Office of the Chief Medical Officer of Health (2012). Chief Medical Officer of Health's Recommendations Concerning Shale Gas Development in New Brunswick. New Brunswick Department of Health. Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/HealthyEnvironments/Recommendations_ShaleGasDevelopment.pdf

Oliver-Smith, A. (2003). Theorizing Vulnerability in a Globalized World: A Political Ecology Perspective in G. Bankoff, G. Frerks, D. Hilhorst (eds), *Mapping Vulnerability: Disasters, Development, and People.*10-24.

Organization for Economic Co-Operation and Development (n.d). What is Social Capital? OECD Insights: Human Capital. Retrieved from http://www.oecd.org/insights/37966934.pdf

Pelling, M., (1997). What determines vulnerability to floods; a case study in Georgetown, Guyana. *Environment and Urbanization, 9*(1), 203-226. DOI: 10.1177/095624789700900116

Peterson, K. (2007). Oil versus Water: Toxic water poses threat to Alberta's Indigenous communities. *The Dominion: A Grassroots News Cooperative 48*. Retrieved from http://www.dominionpaper.ca/articles/1429

Putz, A., Finken, A., & Goreham, G. A. (2011). Sustainability in Natural Resource-Dependent Regions that Experienced Boom-Bust-Recovery Cycles: Lessons Learned from a Review of the Literature. Centre for Community Vitality, North Dakota State University. Retrieved from http://www.visionwestnd.com/pdf/Boom-bust%20communities.pdf

Quarantelli, E.L. (1987). Disaster Studies: An Analysis of the Social Historical Factors Affecting the Development of Research in the Area. *International Journal of Mass Emergencies and Disasters 5*(3): 285-310. Retrieved from: http://www.ijmed.org/articles/145/download/

Rayner, S. & Malone, E.L. (1999). Climate change, poverty and intragenerational equity: the national level. In Munasinghe, M. & Swart, R. (eds). Climate Change and Its Linkages with Development, Equity and Sustainability: Proceedings of the IPCC Expert Meeting. 215-242. Washington, DC. World Bank.

Regional Aquatic Monitoring Program (n.d.). The Oil Sand Regions of Alberta. Retrieved from http://www.ramp-alberta.org/resources/gallery.aspx?

galleryimage=27

Canadian Association of Petroleum Producers (n.d.). Water. Retrieved from http://www.capp.ca/responsible-development/water

Ribot, J.C., Najam, A. & Watson, G. (1996). Climate Variation, Vulnerability and Sustainable Development in the Semi-arid Tropics. In Ribot, J.C., Magalhães, A.R &. Panagides, S.S (Eds.). *Climate Variability, Climate Change and Social Vulnerability in the Semi-Arid Tropics.* pp. 13-54. Cambridge, U.K. Cambridge University Press.

Ruddell, R. (2011). Boomtown Policing: Responding to the Dark Side of Resource Development. *Policing 5*(4): 328–342. DOI: 10.1093/police/par034

Rutherford, S. (2010). Colonialism and the Indigenous Present: An Interview with Bonita Lawrence. *Race & Class 52*(1): 9-18. DOI: 10.1177/0306396810371757

Scheraga, J. & Grambsch, A. (1998). Risks, Opportunities, and Adaptation to Climate Change. *Climate Research 10:* 85-95. DOI: 10.3354/cr011085

Schröter, D., Polsky, C., & Patt, A.G. (2005). Assessing Vulnerabilities to the Effects of Global Change: An Eight Step Approach. Mitigation and Adaptation Strategies for Global Change 10(4): 573-595. DOI: 10.1007/s11027-005-6135-9

Smit, B., Pilifosova, O., Burton, I., B., Huq, S.,Klein, R.J.T., & Yohe,G. (2001). Adaptation to Climate Change in the Context of Sustainable Development and Equity. In McCarthy, J.J., Canziani, O.J., Leary, N.A., Dokken, D.J., & White, K. S (Eds. 2001). Climate change 2001: Impacts, Adaptation, and Vulnerability: Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. pp. 881-912. Cambridge: University Press.

Smith, D.W., Guest, R.K., Svrcek, C.P., & Farahbakhsh, K. (2006). Public health evaluation of drinking water systems for First Nations reserves in Alberta, Canada. *Journal of Environmental Engineering and Science 5*(S1): S1-S17. DOI: 10.1139/s06-023

Smith, J.B. & Lenhart, S.S. (1996). Climate change adaptation policy options. *Climate Research 6*(2): pp. 193–201.

Strydom. P. (2002). Background Theories and Frameworks of Understanding. In P. Strydom. *Risk, Environment and Society: Ongoing Debates, Current Issues and Future Prospects* pp. 36-70, Philadelphia: Open University Press.

Taylor, D. E. (2000). The rise of the environmental justice paradigm injustice framing and the social construction of environmental discourses. *American Behavioral Scientist 43*(4): 508-580.
DOI: 10.1177/0002764200043004003

Tenenbaum, D. J. (2009). Oil Sands Development: A Health Risk Worth Taking? *Environmental Health Perspectives 117*(4), A150-A156.
DOI:10.1289/ehp.117-a150

Thomas-Muller, C. (2008). Tar Sands: Environmental Justice, Treaty Rights and Indigenous Peoples. Retrieved from http://canadiandimension.com/articles/1760.

Thompson, N. (Producer), and Radford, T. (Director), (2011) *To the Last Drop* [Documentary]. Canada. Clearwater.

Timoney, K. P., & Lee, P. (2009). Does the Alberta Tar Sands Industry Pollute? The Scientific Evidence. *The Open Conservation Biology Journal 3:* 65-81.
DOI: 10.2174/1874839200903010065.

TSS Tar Sands Solutions Network (2014). What's the Problem with the Tar Sands? Retrieved from http://tarsandssolutions.org/tar-sands.

Turner B.L., Kasperson R.E., Matson P.A., McCarthy J.J., Corell R.W., Christensen L., … Schiller A. (2003). A Framework for Vulnerability Analysis in Sustainability Science. *Proceeding of the National Academy of Science of the United States of America 100(*14): 8074-8079.
DOI: 10.1073/pnas.1231335100.

Turner, B.L., Kasperson, R.E., Meyer, W.B., Dow, K.M., Golding, D., Kasperson, J.X., Mitchell, R.C. & Ratick, S.J. (1990). Two Types of Global Environmental Change: Definitional and Spatial-Scale Issues in their Human Dimensions. *Global Environmental Change 1*(1): 14-22. DOI:10.1016/0959-3780(90)90004-S

Uechi, B. (2015). Canada's campaign to block NAFTA's oil sands tailings pond probe slammed by critics. *National Observer*. Retrieved from http://www.nationalobserver.com/2015/01/12/news/canadas-campaign-block-naftas-oil-sands-tailings-pond-probe-slammed-critics

Urquhart, I. (2010). Between the Sands and a Hard Place?: Aboriginal Peoples and the Oil Sands. *Buffett Center for International and Comparative Studies Working Paper* 10-005 Retrieved from http://www.bcics.northwestern.edu/documents/workingpapers/Energy_10-005_Urquhart.pdf

Vogel, C., & O'Brien, K. (2004). Vulnerability and Global Environmental Change: Rhetoric and Reality. *Aviso 13*: 1-8. Retrieved from: http://hdl.handle.net/10625/39859

Watts, M.J., & Bohle, H. G. (1993). The Space of Vulnerability: The Causal Structure of Hunger and Famine. *Progress in Human Geography 17*(1)*:* 43–67. DOI: 10.1177/030913259301700103.

Weber, B. (2015). Oilsands Tailings Ponds Emit Pollutants into the Air: Study. *Huffpost Alberta.* Retrieved from http://www.huffingtonpost.ca/2014/11/27/oilsands-pollutants-air_n_6232662.html

Wenzel, G. (2001). "Nunamiut" or "Kabloonamiut": Which 'identity' best fits Inuit (and does it matter)? *Etudes Inuit Studies 25*(1/2): 37-52. Retrieved from: http://www.jstor.org/stable/42870606

Westgate, K.N. & O'Keefe, P. (1976). Some Definitions of Disaster. *Occasional Paper 4*, Disaster Research Unit, University of Bradford, Bradford.

Wisner, B., Blaikie, P., Cannon, T. & Davis, I. (2004). *At Risk : Natural Hazards, People's Vulnerability and Disasters. London:* Routledge.

Wisner, B, Blaikie, P., Cannon, T. and Davis, I. (2005). The Challenge of Disaster and Our Approach. In Wisner, et al (2005). *At Risk: Natural Hazards, People's Vulnerability and Disaster, 2nd edition.* pp. 3-48. London: Routledge.

Woynillowics, D., & Severson-Baker, C. (2006, March). Down to the Last Drop: The Athabasca River and Oilsands .*Oil Sands Issue Paper No 1.* pp. 1-16. Pembina Institute. Retrieved from http://www.pembina.org/reports/LastDrop_Mar1606c.pdf

Young, G., Zavala, H., Wandel, J., Smit, B., Salas, S., Jimenez, E., Cepeda, J., & Diaz, H., (2010). Vulnerability and Adaptation in a Dryland Community of the Elqui Valley, Chile. *Climatic Change*, *98*(1-2): 245-276. DOI: 10.1007/s10584-009-9665-4

Appendix A: Ethical Clearance Letter

University of Regina

Research Ethics Board
Certificate of Approval

PRINCIPAL INVESTIGATOR	DEPARTMENT	REB# 2014-073
Chris Ekene Mbah 1446 Parker Avenue Regina, SK S4S 4R8	Justice Studies	

SUPERVISOR
Professor Margot Hurlbert

FUNDER(S)
Unfunded

TITLE
Sacrificial Zones or Living on borrowed Existence: Issues in Environmental Exploitation, Risk and Vulnerability among the First Nation Communities in Northern Alberta, Canada

APPROVAL OF	APPROVED ON	CURRENT EXPIRY DATE
Consent Forms – Environment Board, Oil Companies, First Nations Communities Interview Questions – Environmental Board, Oil Companies Interview Guide – First Nations Communities Information E-Mails – Environmental Board, Oil Companies, First Nations Communities	June 17, 2014	June 17, 2015

Full Board Meeting ☐

Delegated Review ☒

CERTIFICATION
The University of Regina Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol, consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion.
Please refer to the following website for further instructions: *http://www.uregina.ca/research/REB/main.shtml*

Dr. Larena Hoeber, Chair
University of Regina
Research Ethics Board

Please send all correspondence to:

Office for Research, Innovation and Partnership
University of Regina
Research and Innovation Centre 109
Regina, SK S4S 0A2
Telephone: (306) 585-4775 Fax: (306) 585-4893 research.ethics@uregina.ca

Appendix B: Signed Consent Form
Presented on University of Regina letterhead

Project Title: Sacrificial Zones or Living on Borrowed Time: Oil Exploitation in Northern Alberta and its Impact on the Athabasca Chipewyan First Nation Community.

Researcher(s): Chris Ekene Mbah
Graduate Student
Department of Justice Studies
University of Regina
306-351-9204
mbah200c@uregina.ca

Supervisor: Professor Margot Hurlbert
Department of Justice Studies & Sociology
306-585-4232
margot.hurlbert@uregina.ca

Purpose(s) and Objective(s) of the Research
This study explores environmental exploitation and other impacts of oil extraction activities in northern Alberta on the Athabasca Chipewyan First Nation community.

Procedures
Telephone interviews will be adopted. Interviews will be transcribed when concluded.

Funded by: *Unfunded.*

Potential Risks
Risk was greatly minimized as the researcher conducted the interviews via telephone calls.

- There could be a need for counselling when a participant reacts to emotional discomfort. And the researcher has skills in crisis management and could handle a difficult situation.
- However, I will terminate the interview if I feel or sense it may result in more potential harm for the participant.

Potential Benefits

- The research is for academic purposes to add to body of knowledge. On another hand, it can also be utilized for policy formulation in the area of environmental justice.

Compensation: None

Confidentiality (see consent guidelines section 9)

- Pseudonyms will be used to represent the participants. This is to protect their identity and remove their person from the thesis particularly as this is a very sensitive

topic. There is a need to guard against making them a target or holding them responsible in the future.

- **Storage of Data**
  - The data will be transcribed.
  - After four years, both the electronic and hard copy of the data will be destroyed.

Right to Withdraw

The participant can withdraw from participating if he or she feels the need to discontinue. The researcher won't question his or her reason(s).

- As a researcher, I will also assist in managing any kind of discomfort that arises.

Follow-up

- A copy of the thesis will be sent to the respondents upon request. Meanwhile, the communities concerned will be consulted in respect to data analysis.

Questions or Concerns (see section 12)

- Contact the researcher(s) using the information at the top of page 1;
- This project has been approved on ethical grounds by the University of Regina Research Ethics Board on 17/07/2014. Any questions regarding your rights as a participant may be addressed to the committee at (585-4775 or research.ethics@uregina.ca). Out of town participants may call collect.

Consent

Option 3 - ORAL CONSENT

"I read and explained this Consent Form to the participant before receiving the participant's consent, and the participant had knowledge of its contents and appeared to understand it."

Researcher's Signature
Date: 15/10/14

Appendix C: Interview Guide

Generally, the interviews conducted were aimed at eliciting information on the negative impacts of oil extraction activities on the Athabasca Chipewyan First Nation Community (AFCN) who live in close proximity to oil extraction sites in northern Alberta.

Questions for Respondents

On Oil Extraction activities in northern Alberta

1. What have been your experiences as a result of the oil sands extraction in your community?

On the Health Impact of Oil Extraction Activities in northern Alberta on the ACFN

1. What are your health concerns in regard to the pollution of the environment by oil extraction activities?
2. Can you describe the level of pollution of the Athabasca River and the land?

On the Economic Impact of Oil Extraction Activities in northern Alberta on the ACFN

1. How have oil extraction activities in northern Alberta affected your traditional economic activities?
2. Can you speak on the level of pollution affecting your environment, including the pollution of the Athabasca River and the boreal forest?
3. How has the impact of oil extraction activities affected your community and family?

On Social Disruptions of the ACFN caused by Oil Extraction Activities in northern Alberta.

1. Has your community's social framework been affected by the impacts of oil extraction?
2. How has the influx of oil workers shaped your community's landscape?
3. How has your family been affected by these impacts?

On Adaptive Capacity of the ACFN to the Impacts of Oil Extraction Activities in northern Alberta

1. How does your community respond to the impacts of oil extraction activities in northern Alberta?
2. Are there differences in the levels of response?
3. Are there members of your community who have benefited from the oil companies?

More Reflections on the Impact of Oil Mining Activities

1. What is the future of your community in the face of these changes as a result of oil extraction activities?