

The Impact Of Mining Development On Subsistence Practices Of Indigenous Peoples: Lessons Learned From Northern Quebec And Alaska

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ABSTRACT

The Arctic region is increasingly viewed as an important resource-base, and is being explored for its resource development potential. While many researchers in the 1960s suggested that northern populations would eventually transition from a traditional, subsistence-dominated economy to a modern, wage-based economy, more recent studies reveal that the traditional economy remains important, desirable, and of benefit to northern individuals and communities. In this thesis I explore the relationship between traditional and modern economic activities related to one resource-based sector in the Arctic, the mining sector. Specifically, I explore the relationship between northern mining developments and subsistence activities and values in two Arctic regions, Canada's Nunavik region in the Province of Quebec and the United States' Northwest Arctic Borough in the State of Alaska. The purpose of this study is to answer the following question: does mining development in the Arctic lead to an increase or decrease in the importance of land-based subsistence participation and activities of local indigenous peoples. This study draws upon recent data that was collected in the *Survey of Living Conditions in the Arctic (SLICA)*, an international project that comparatively studies aspects of living conditions for the Inuit, Iñupiat, Saami, and Indigenous peoples of Chukotka. Four mining projects are utilized as case studies in this project, in order to help explain the findings from the results of the SLICA analysis. Two of these projects are currently in full operation, and two are presently in planning and approval phases. In Nunavik, the Raglan Mine and the proposed Raglan South Nickel Project are examined, and in Alaska, the Red Dog Mine, and its proposed Aqqaluk Project expansion are addressed.

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LIST OF ACRONYMS

ANCSA: Alaska Native Lands Settlement Act
ANILCA: Alaska National Interest Lands Conservation Act
ATV: All-terrain Vehicle
CEAA: Canadian Environmental Assessment Act
CRI: Canadian Royalties Incorporated
CWA: Clean Water Act
EIS: Environmental Impact Statement
EQA: Environment Quality Act
ESIA: Environmental and Social Impact Assessment
IBA: Impact and Benefit Agreement
JBEC: James Bay Energy Corporation
JBNQA: James Bay and Northern Quebec Agreement
KEQC: Kativik Environmental Quality Commission
KRG: Kativik Regional Government
KSB: Kativik School Board
NANA: Northwest Alaska Native Association
NPDES: National Pollutant Discharge Elimination System
NRBHSS: Nunavik Regional Board of Health and Social Services
NSB: North Slope Borough
NWAB: Northwest Arctic Borough
PFD: Permanent Fund Dividend
RSNP: Raglan South Nickel Project
SEIS: Supplementary Environmental Impact Statement
SLICA: Survey of Living Conditions in the Arctic
USEPA: United States Environmental Protection Agency

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CHAPTER ONE: INTRODUCTION

The circumpolar Arctic region has undergone significant economic, political, and demographic changes over the past five centuries, largely as a result of integration and interactions with Europeans and people of European descent. This process has gained momentum since the middle of the 20th Century with far-reaching implications for indigenous peoples and communities in the Arctic. Despite this period of dramatic change, indigenous peoples residing in Arctic regions have been successful in retaining many characteristics of their traditional ways of life. Of the four million inhabitants of the Arctic, one-third are indigenous peoples spread amongst over thirty different cultural groups (United Nations Environment Programme, 2006, p. 1). However, because of its extreme climate, lack of arable land and demographic composition, the economic activities and structures existing in many Arctic areas face distinct challenges.

Three distinct sectors comprise the modern economy of the Arctic. First, the largest is a tertiary sector economy typified by public sector employment and services. This economy is supported mainly by monetary transfers from regional or central governments. Second, and growing in significance, is the formal or market economy, which often relies heavily on industrial-scale natural resource development and exploitation, but also includes other forms of production and related activities. The types of activities associated with this market-based economy have resulted in a considerable increase in the relative wealth of many communities. However, most regions of the Arctic remain both socially and economically marginalized. Third is a traditional and family-based hunting, fishing, herding, and food gathering economy. This is commonly referred to as the traditional, domestic or subsistence

economy, and includes associated activities such as equipment construction and resource processing (Kruse, 1991, p. 317).

While there is value in examining these three sectors independently, in the Arctic context it is also helpful to consider the concept of a “mixed” economy. This concept is commonly used to describe the combination or coexistence of a formal, market economy together with an economy based on subsistence production activities (Wolfe and Walker, 1987, p. 57). Although most researchers in the 1960s suggested that most northern populations would ultimately make the transition from subsistence-dominated economic activity to wage employment, at present, the traditional economy and the mixed economy remain important (Buklis, 1999, p. 41; Duhaime et al., 2004, p. 298). An examination of existing conditions in many predominantly indigenous communities in the Arctic reveals that a market economy and a subsistence economy can coexist. In fact, recent academic studies suggest that this combination of economies is desirable, and to the overall benefit of local individuals and communities (Bone, 1992; Berkes et al., 1994, p. 357).

Given the present-day, unprecedented worldwide demand for non-renewable energy and mineral resources, the Arctic region is increasingly being viewed as an important utility-base, and is being explored for its resource potential (Stefansson Arctic Institute [SAI], 2004, p. 69). While the development of natural resources is driven by economic potential and gains, there is also clear evidence suggesting that there are substantial negative socio-economic and environmental implications stemming from these types of activities.

To examine the effect of industrial development on the traditional economy, it is necessary to look at the impact that an increase in wage-based activity, incomes, and shifts in employment patterns have on traditional subsistence economies. Also, because of the

relationship between the natural environment and subsistence activities, it is essential that local source pollution, as well as associated alterations to local ecosystems are examined (Usher, 1986, p. 8; Chance & McBeath, 1990, p. 407).

The purpose of this study is to answer the following question: does mining development in the Arctic lead to an increase or decrease in the importance of land-based subsistence participation and activities of local indigenous peoples? In addition to this main objective, regulatory processes and mining company policies will be examined in order to clarify the complex relationship between mining and subsistence participation and practices. The main hypothesis that is advanced in my study is simple. When large mining projects are developed in remote and northern regions, there will not be a decline in the traditional values and participation in subsistence activities of local indigenous peoples.

The conclusions reached in this thesis differ from those of many other researchers; for instance, Haller et al., (1968), Graburn (1969), and Donaldson (1983). These authors suggest that industrial development, including mining activity, will result in an overall decline in the level of subsistence participation and activity of local indigenous peoples. In contrast, this study finds that there does not appear to be a decline in local subsistence participation as a result of large scale mining projects in nearby areas. However, following the introduction of large scale mining projects and industrial development there is a shift in the way these subsistence activities are carried out. For example, there may be a change in the duration of hunting and fishing trips, the type of equipment used for subsistence activities, and in the ownership of items used for subsistence.

The main research question will be examined using a binational framework. Conditions in Canada's Nunavik region in the Province of Quebec will be compared and

contrasted with those in the State of Alaska's Northwest Arctic Borough (NWAB). However, the study also considers the entire northern circumpolar context, and draws upon survey data collected in regions outside of North America.

Alaska's Northwest Arctic Borough and Canada's Nunavik region were chosen for this study for several reasons. The regions are characterized by similar socio-economic and environmental conditions, and each land area is held under a native land settlement agreement. However, the circumstances under which each region has evolved are not parallel, and today they are each subject to the management and direction of different kinds of regional development corporations, as well as to different political and decision-making regimes. This difference is particularly significant in the planning stages of the proposed industrial projects.

Both Nunavik and the NWAB are home to large-scale mining operations, and are each the focus of project proposals seeking further mineral extraction activities. I examine four mining developments, two of which are currently in full operation, and two of which are currently undergoing mandatory environmental impact assessments (EIAs) and are presently in the planning stage. In Nunavik, I investigated the Raglan Mine and the proposed Raglan South Nickel Project (RSNP), and in Alaska, the Red Dog Mine, and its proposed Aqqaluk Project expansion. The purpose of examining these projects is two-fold. Firstly, using these case studies helped to identify how mining has influenced the subsistence economy and lifestyles of people in the region since operations began, by assessing both pre-project and current conditions. Secondly, they are used to gain insight into how project designs can be tailored for currently proposed and future projects, in order to take into account traditional land-based and subsistence practices. The examination of these case studies includes a

lengthy analysis of the opinions, comments and priorities pertaining to mining and traditional land-use activities, which have been expressed by government consultative agencies, community groups, Inuit organizations, and local indigenous peoples through public environmental impact assessment consultation processes dealing with the expansion of mining.

For the purpose of this study, it is important to have clear and comprehensive definitions for several key concepts. In order to maintain consistency and reliability in their use, these concepts have been developed in accordance with the specific questions that were included in the core international questionnaire used in the *Survey of Living Conditions in the Arctic* (SLICA). This study is an international project that comparatively studies aspects of living conditions for the Inuit, Saami and Indigenous Peoples of Chukotka. The Arctic Council designated the SLICA project as part of its Sustainable Development initiative in 2000 (Arctic Council: Sustainable Development Working Group, 2002, p. 1).

Subsistence activities are defined as land-based harvesting activities including hunting, fishing, trapping, and herding, as well as skinning, butchering, food preparation, and craft-making. These activities are not likely to be cash oriented, but can be.

Subsistence values refer to the importance that people place on being involved in and maintaining subsistence types of activities.

Industrial development involves activities that are based on the extraction of non-renewable resources, such as minerals and hydrocarbons. This form of development is considered to be relatively short-term in nature, lasting for a period of no more than 40-50 years, and sometimes for as little as 10-15 years.

In addition to the concepts developed from the SLICA initiative, the concept of *mining* is defined as the extraction of solid mineral substances from the earth, either near the surface or at some depth. These resources include ores, which contain commercially valuable amounts of metals, such as nickel and zinc; precious stones, such as diamonds or granite for building; and solid fuels such as coal and oil shale. A mining process will typically consist of six main stages including prospecting or exploration, resource estimation, feasibility studies, site development and construction, operation, and reclamation and monitoring.

In an effort to be proactive and provide meaningful findings, this study draws upon recent and relevant data that was collected in SLICA. My study shares the same assumption as that which underlies the SLICA project, namely that it is more important to examine differences in living conditions among peoples with similar cultures and environmental circumstances than to compare living conditions of northern indigenous peoples and southern-based cultures. Additionally, this study shares many of the same broad objectives of the SLICA international project. These objectives include:

- Measuring living conditions in a way which is relevant to Arctic residents
- Documenting and comparing the present state of living conditions among the indigenous peoples of the Arctic
- Improving the understanding of living conditions to the benefit of Arctic residents
- Examining the relationship between industrial development and traditional land-based activities and lifestyles (Arctic Council, 2002).

In order to meet its goals, this study also builds on previously conducted exploratory and descriptive research pertaining to employment, income, subsistence activities, mining, and other forms of industrial activity in the circumpolar northern region. An extensive review of recent and relevant literature is included and is used to support and compare the findings

derived from a quantitative analysis of SLICA survey data. The analysis of SLICA data concentrates on data sets pertaining specifically to income, employment, and the natural environment and how they relate to numerous variables associated with subsistence activity. The overall aim in undertaking this study is to contribute to the decision-making of local, regional, national and international bodies in the circumpolar Arctic, with a particular focus on improving the coexistence of mining and the subsistence economy. In order to effectively achieve this goal a number of research objectives must be addressed:

- a) To briefly survey the historical political, social, and economic evolution that has taken place in both Canada's Nunavik region and Alaska's Northwest Borough. This will provide a framework for understanding the present conditions existing in these regions. These include people's attitudes towards industrial development, subsistence activities and local environmental resources.
- b) To analyze and interpret recent findings from the SLICA survey of Arctic living conditions and apply these results against existing historical data, related literature and common assumptions regarding industrial development and its impact on aspects of living conditions.
- c) To consider the two regions and representative communities and the impact that different levels of industrial activity have on patterns of subsistence activity. By examining this relationship within a bi-national framework, it is anticipated that this study's findings will begin to contribute to a greater understanding of the diverse nature of the circumpolar Arctic, and the impacts and opportunities of different forms of governance.

- d) To enhance the understanding of the importance to Arctic peoples of the balance between subsistence activities, and mining and other industrial activity.
- e) To develop and make recommendations for future mining projects, particularly by addressing those socio-economic and environmental aspects of mining projects which influence peoples' traditional lifestyles and subsistence activities. This will include suggestions pertaining to project development and planning processes in the United States and Canada.

This thesis is divided into eight chapters. Chapter Two presents historical and conceptual themes derived from a review of the literature relevant to income, employment, environmental quality, subsistence and industrial activity, and pays particular attention to Arctic regions and indigenous peoples of North America. Chapter Three outlines the physical, socio-economic and political landscapes of the two study regions. The information outlined in this chapter provides the necessary background for understanding how the relationship between mining development and northern communities is often different than in southern and more developed regions. Chapter Four presents the four main mining case studies, and examines their planning and approval processes. Chapter Five presents the combination of qualitative and quantitative research methodologies that were utilized, and the appropriateness of this research design for this particular study. Chapter Six presents a quantitative analysis of SLICA data, which provides the basis of results in this study. Public comments that were recorded during consultation activities pertaining to the mining projects currently being undertaken in each study region are included in this section. Specific views and comments from the public are included in order to improve the interpretation and understanding of the results from the SLICA data analysis. Chapter Seven discusses the main

findings from the analysis which was presented in Chapter Six. This discussion centres on the issues that were identified in the literature review as being important in influencing subsistence lifestyle practices in the Arctic. Environmental regimes adopted in Canada and the United States, and the consequences of these administrative systems on mining and subsistence practices are also discussed. Chapter Eight summarizes the thesis and suggests areas requiring further research and action.

CHAPTER TWO: INDUSTRIAL DEVELOPMENT AND SUBSISTENCE IN THE NORTH: A REVIEW OF THE LITERATURE

2.0 Introduction

Over the past 40 years, numerous studies have documented social, economic, and environmental impacts related to increasing industrialization in northern regions. Studies range from general overviews which outline the overall effects of introducing industrial activity to remote and northern regions, to more specific studies which focus on the impacts related to one particular development project. Understanding the historical and conceptual context of industrial development in the north, and the discussions and literature surrounding issues related to industrial activity will help provide insight into current conditions, and provide a rationale for undertaking this study at this particular moment in time.

In North America, there has been no shortage of discussion about the socio-economic, cultural, and environmental effects related to non-renewable resource development. The foundation of this discussion was laid in the 1960s and 1970s by researchers such as Graburn (1969), Berger (1977), and Usher (1978). In the mid 1970s, the Government of Canada's commissioning of the *Mackenzie Valley Pipeline Inquiry* to investigate the socio-economic and environmental impacts of a proposed gas pipeline in the Northwest Territories raised the level of attention and discussion on these issues (Berger, 1977). More recently this discussion has been advanced by researchers including Kruse (1991), Huskey (1992), Berkes (1994), Caulfield (2000), Myers (2001), and Duhaime (2003).

This literature review is focused on the two major themes of this study: industrial development and mining, and subsistence lifestyles. Also relevant to this review are the

concepts of income, employment, and environmental quality. These concepts have been identified and documented by many leading researchers in the field as being influenced by the presence of large-scale industrial activities. More importantly, for the purpose of this study, these concepts have been widely recognized as being factors that may potentially induce changes to the nature of subsistence activity in the north. The main hypothesis put forth in this thesis contrasts findings reported in several studies which contend that there would be an erosion of subsistence economies as a result of industrial development and increased opportunities for wage employment (Graburn, 1969; Usher & Wenzel, 1987). Of particular significance is Judge Thomas Berger's *Report of the Mackenzie Valley Pipeline Inquiry*, which asserted that pipeline development would undermine local economies based on hunting, fishing and trapping. Simply stated, my hypothesis is that when large mining projects are undertaken in remote and northern regions, local participation in subsistence activities and peoples' traditional values may change, but there will not be an overall decline.

2.1 History of Mining in the Arctic

The presence of large mining projects in the circumpolar north dates back to the early 20th Century. Fluctuations in gold prices affected the degree and intensity of mining exploration in northern regions of North America from 1920 to 1939. Growing worldwide demand for both precious metals (e.g. gold and silver) and non-precious base metals (e.g. zinc and lead) revitalized exploration activities in the early 1950s after a period of lower demand in the late 1930's and 1940's (Nassichuk, 1987, p. 274).

The legal framework for exploration and development of minerals varies by country, but in the mid-1900s, it was generally open, straightforward, and encouraging in both Canada

and the U.S (McPherson, 2003, p. 24). The common perception at this time was that access to, and exploitation and development of mineral resources would lead to a better world, and the eradication of poverty (Duhaime et al., 2005, p. 268).

Demand for mineral resources remains high today, as a result of the dramatic recent growth of the global economy, and in particular the rapid growth of Asian markets. Consequently, mineral exploitation spans the entire Arctic, from Alaska and Canada in the west, to northern Scandinavia and Finland, and Siberia and the Russian Far East.

The relationship between mining operations and local communities is wide-ranging and complex. In those cases where people inhabit or often use land that borders areas of mineral development, there are numerous effects on the human environment. These effects may include changes in how people move over land in fishing, hunting or trapping areas, and the quality and quantity of available subsistence resources (SAI, 2004, p. 71). Heightened concerns for the welfare of northern communities and the sustainability of renewable resources during the past 30 to 40 years have led to the development of policies and procedures that have necessarily had a direct impact on non-renewable resource exploration and development (Halley & Verrault, 2000, p. 2; Shadian, 2006, p. 251). Regulatory procedures have been developed and introduced to monitor land-use and to assess the environmental and socio-economic impact of resource development. In addition to tightening regulatory regimes, northern residents have taken advantage of the increased opportunity to influence the regulatory process by participating in public consultations and hearings, and by serving as members on review panels and boards. Greater control of land through the signing of land claim agreements has also contributed to more active Aboriginal participation in decisions relating to mining development. This has been important for aboriginal

communities, which are mostly situated in remote, mineral-rich areas. For example, it is estimated that 60% of all mining activity in Canada takes place on Aboriginal lands (Mining Watch, 1999, p. 12).

2.2 The Impact of Industrial Development on Income and Employment

The primary economic sector in many regions of the Arctic is based largely on the development of wildlife resources for subsistence purposes, together with mining exploration and development activities. As the market economy in the north expands, this sector is becoming increasingly important in the region, and has gained significant attention from both academic and non-academic communities in recent years. Mining exploration activities are widespread throughout northern areas of North America, and a significant rise in the price of metals in recent years has encouraged an unprecedented level of growth in this sector. Efforts have not only been made by corporations and extractive industries to enhance development and related profits in northern regions, but in many cases, regional governing bodies have actively encouraged large industry. The Kativik Regional Government in Nunavik and the Northwest Arctic Borough government in Alaska have both backed operations of mining companies, and currently support proposals for the development of new projects. For decades now, the Ifiupiat controlled North Slope Borough has also been an ardent supporter of expanded oil and gas development in the region as a means of providing jobs and income for local residents (Kruse, 1986, p. 6).

The presence of cash and commodity-based economies throughout the Arctic, driven in large part by non-renewable resource activities, has produced fears that subsistence pursuits and traditional values may be threatened. Usher (1982) suggests that a growing wage

economy is a sure index of modernization and development, and that resource development projects in the north will greatly expand the local opportunities for wage employment. In an assessment of the impact of unprecedented oil activity in the Beaufort Sea in the 1970s, he also found that wage employment has increased personal income in the region (Usher, 1982, p. 40). Nevertheless, Usher notes that “one of the advantages of industrial wage employment is said to be that it is the best means of generating the cash now necessary for the operation of the traditional sector” (Usher, 1982, p. 40).

Is wage employment in the north the primary focus of economic life, or rather a means to an end for most indigenous peoples? The hypothesis that wage employment provides a means of financing the harvesting sector is grounded in the income and expenditure estimates that were developed in the course of the *Mackenzie Valley Pipeline Inquiry* (Berger, 1977, p. 123; Usher, 1978, p. 155). There has also been documentation over the past few decades supporting the theory that rising employment and income levels in the north have been accompanied by rising harvest levels (Usher, 1982, p. 42; Hobart, 1982, p. 55). Kruse (1991) notes that in 1977, men who worked 12 months of the year reported fewer subsistence activities, on average, than men who worked for pay fewer months per year. However, follow-up studies conducted in 1988 revealed an opposite situation, where men working 12 months of the year reported slightly more, not less subsistence activity. With data from SLICA available, and a documented increase in the wage economy since 1988, this relationship can now be reexamined (Kruse, 1991, p. 318).

Over 15 years ago, Norman Chance pointed to an emerging class division between Inupiat government and corporate elites, and the rest of the population. This division was generated by the emergence of a competitive market economy, which contrasted with the

longstanding values of sharing and communal activities which characterized traditional Iñupiat culture (Chance & McBeath, 1990, p. 407). While the potential threat to Iñupiat cultural values and subsistence activities resulting from the presence of a market economy, and in some instances, the establishment of socio-economic class divisions has generated a great deal of discussion, economies throughout the north are still predominantly based on subsistence production activities augmented by cash employment and government transfers (Northwest Arctic Borough [NWAB], 2004).

The importance of country food to northern indigenous peoples has also come under assessment by researchers in recent years as a result of greater participation levels in formal employment activity. The terms “country food” and “traditional food” are used synonymously in this paper to refer to “foods that are available from local natural sources and which are culturally acceptable” (Myers et al., 2005, p. 24). Robert Bone notes that many indigenous peoples are “cash poor” but “food rich”. He raises the question of whether or not an increase in wage employment would reverse this relationship, and reduce the consumption of country food (1992, p. 1). While income from wage employment and government transfers enables households to obtain valued country foods like seal, caribou, and fish, money is also essential for the purchasing of modern items used for subsistence activities. Items such as boats, snow machines, and ATV’s have become staple items used for harvesting activities and present a considerable financial cost to households.

Issues pertaining to income, employment, and the expansion of market economies have been central to discussions pertaining to large-scale industrial activity in the Arctic. For the purpose of this study, it was necessary to advance two hypotheses which take into account shifts to employment and income, and how such changes may impact subsistence

lifestyles. Firstly, if there is an increase in personal and household income, then there will be an increase in people's participation in subsistence activities. Secondly, if there is a greater level of employment in the wage economy, then there will be higher rates of participation in subsistence activities.

2.3 The Impact of Industrial Development on Environmental Quality

The circumpolar region is often wrongly assumed to be a pristine and unpolluted area (Bjerregaard et al., 2004, p. 393). This view can be linked to the fact that most sources of contamination are invisible in nature. There may only be a few types of industries present in the Arctic, but there is large-scale industrialization in the form of mineral and petroleum extraction and processing which can have a serious deleterious effect on the immediate environment. These activities are particularly common in northern regions of Canada, Alaska, and Russia. In addition to local sources of pollution, the long distance transport of manufactured chemicals (e.g. PCB's, dioxins, and pesticides) by ocean and atmospheric currents are increasingly responsible for degrading Arctic ecosystems (SAI, 2004, p. 69). Fikret Berkes (1995, p. 82) notes that since the 1970s, land-use studies in the North have been carried out with two main objectives. Firstly, studies aimed to document native land claims, and secondly to assess environmental impacts from development projects. This particular study addresses the latter objective, and aims to advance the understanding of how large-scale mining projects affect the environment, and how environmental changes may influence social change, and examine how these factors impact subsistence practices. Thus, an examination of a fourth hypothesis is necessary. This hypothesis is that there will be a

change in subsistence practices in local communities as a consequence of environmental change from increased industrial activity.

While the environmental impacts from oil activities, such as those at Prudhoe Bay in Alaska's North Slope Borough are often the focus of attention, many of the same types of disturbances occur as a result of mining and mineral development (Halley & Verreault, 2000, p. 2). The key impacts that are most often associated with the extraction and processing of metals include land disturbance, tailings and effluents, and emissions to air from smelting and refining operations. The end uses of some metals (e.g. mercury and lead) are also of concern because of their toxic properties (Natural Resources Canada, 2004, p. 4). Also of significant concern is the prospect of large oil or chemical spills, such as the 1989 Exxon Valdez oil spill, as well as the clean up and monitoring of abandoned or decommissioned mineral exploration and extraction sites (Duhaime et al., 2005, p. 1).

In the 1970s, environmental pollution and issues related to natural resource conservation were commonly raised in response to the apparent imminence of expanded large scale natural resource projects and their potential impacts. Environmental contaminants such as PCBs and other toxic compounds were reported in animal and human tissue during this period, but many of the sources and effects were not well understood at the time (Usher, 1986, p. 34; Duhaime et al, 2005, p. 1). The impact of mining on the natural environment is considerable and is better documented today, in particular by the Arctic Monitoring and Assessment Program (Duhaime et al., 2005, p. 2). However, Duhaime, Bernard and Comtois (2005) note that from an environmental viewpoint, many of the impacts of past and current mining activities in areas such as Nunavik require further research (p. 262).

The social concerns and effects on subsistence lifestyles related to changes to the natural environment also require greater attention according to Duhaime and his colleagues (2003). It is their contention that from a socio-economic and cultural standpoint, the effects of environmental contamination in the region on hunting and fishing activities would be considerable if these areas are extensively used by local populations (Duhaime et al., 2003, p. 4). These statements are echoed in the Arctic Human Development Report (AHDR) which notes that large-scale natural resource exploitation can have a considerable impact on the natural environment, and these effects can force changes in how people travel over land in fishing, hunting and trapping areas. Moreover, the productivity of traditional and commonly used subsistence areas can be diminished when the land is disturbed (SAI, 2004, p. 71). For example, a 2004 report released by the Alaska Community Action on Toxics (2004) identifies that locations used by residents from the village of Kivalina for subsistence gathering of berries and other vegetation have higher than normal levels of lead and cadmium from the Red Dog Mine (ACAT, 2004, p. 1).

2.4 Indigenous Influence over Natural Resources and the Environment

Since the late 1960s, the impact of industrial activity on habitat and organisms has been a central concern of all who depend on or are interested in northern wildlife (Usher, 1986). These concerns have been expressed through public inquiries, public reviews, and even court cases respecting the possible socio-economic and environmental impacts of development since the early 1970s. Indigenous peoples of the north have not been absent from this process. Their views were expressed on record at scientific conferences dating back

to 1969 and 1972, and considerable public attention was gained through their strong opposition to exploration at Sachs Harbour and Coral Harbour in 1970 (Usher, 1986, p. 32).

In more recent times, conflicts have developed with increasing frequency between customary and traditional uses of renewable resources by indigenous peoples and the activities of industries involved in the exploration and development of non-renewable resources (Chance & McBeath, 1990, p. 4; Nuttall, 1998). After years of experiencing the effects of industrial projects, residents of Alaska's northernmost communities appear to have come to terms with some of the tradeoffs associated with the local presence of industrial development (Duhaime et al., 2003; NRC, 2004, p. 2). The formation of regional governments, economic development corporations, and Impact Benefit Agreements (IBA) has contributed to a sense of greater local control by indigenous peoples over their homelands. For instance, the NANA Corporation and Tech Cominco's Red Dog Mine reflects a careful calculus between the risks imposed by potential environmental degradation, new types of employment and higher incomes, and associated social changes. Despite improvements in mitigating risks, there are challenging issues that must be confronted between an industry proponent and a population that has had a close relationship with the land for many generations. Both mandatory and voluntary public consultation activities relating to industrial projects are important forums where contentious issues have surfaced. An examination of the opinions and views expressed during public consultations for two major northern mining projects will provide more specific information and greater insight into the relationship between mining companies and their operations, and subsistence practices and values.

2.5 Subsistence Participation

In most regions of the circumpolar north, economic development through activities such as natural resource extraction is viewed as the best way to promote social advancement and improve living conditions (SAI, 2004, p. 69). In this view, the importance of the traditional economy is undervalued. Heather Myers (2001) notes that although renewable resources such as Arctic fish and wildlife are not acknowledged in economic or employment statistics, traditional harvesting is the most important economic activity undertaken by many northern aboriginal residents. Furthermore, Alaska Natives themselves perceive hunting and fishing to be the most secure economic base (Palinkas, Harris & Peterson, 1985). As a result of this growing realization about the importance of subsistence resources, more and more Natives have become involved in land management schemes since the mid-1970s (Schneider, 1982).

Results from SLICA reveal that participation in subsistence activities across the Arctic varies considerably. Also, there are large differences in participation rates amongst different age cohorts. For example, since the late 1980s in Canada's Northwest Territories, full-time participation rates of males aged 25 and older in harvesting activities have been nearly twice as high as that of 15-24 year olds. Importantly, however, participation in family and community networks remains high in many regions, and ensures a minimum level of subsistence for most members of the population (Bernard, 2005, p. 11). Overall, rates of participation in the traditional sector remain strong, despite much discussion in past decades about its inevitable decline (Wolfe & Walker, 1987; Berkes, 1990).

2.6 Community Life and Education

The *Mackenzie Valley Pipeline Inquiry* was notable because of the voice it gave to the indigenous peoples whose traditional territories would be traversed by the pipeline. In the 1977 release of findings from the inquiry, Berger mentions that “we have never fully recognized that industrial development has, in itself, contributed to social, economic, and geographic dislocation among native people” (1977, p. 123). Although there are notable changes to local economies and the natural environment stemming from resource industry mega-projects, the ideology of subsistence is still an important integrating mechanism within northern communities. As Condon and his colleagues note, subsistence provides social continuity with the past and a sense of self-worth to those struggling with identity as a result of the dramatic economic, political, and demographic changes that have occurred in the past few decades (1995, p. 32). While there is evidence that more young people are seeking formal education and wish to have career oriented jobs, there seems to be little evidence that large numbers of northern people are leaving home communities in search of employment (Myers & Forrest, 1999, p. 135). These findings from studies conducted in the 1980s and 1990s, are echoed in the results from SLICA.

The majority of young people growing up in the Arctic today are exposed to formal educational systems (e.g. secondary and post-secondary), which are characteristic of southern regions, as well as traditional forms of education. Aspects of traditional education include such things as learning native languages, preparing country foods, making traditional clothing, or participating in harvesting expeditions. Both types of education have been documented as having an influence on people’s future participation in subsistence activities

(Stabler et al., 1990; Stevenson, 1996; Dinero, 2007). While the mining industry may employ indigenous peoples, if these cultural values and traditional forms of education are taught when a person is young, it is believed by many that the subsistence culture will remain an important element of life (Kruse, 1991; Bone, 1992; Condon et al., 1995).

2.7 Summary

Usher states that “social impact assessment requires us to know where we are, where we are going, and where we want to go” (1982, p. 76). That means that we require a sound characterization of both the local economy and society, and of the major development project as part of a larger social process. It is also important to understand the values and perspectives of the affected population, and how these values and perspectives relate to their situation and to the processes that they are experiencing (Usher, 1982).

Income, employment, environmental quality, and subsistence were selected as this project’s key variables because they were identified as being the issues most influenced by mining projects in Arctic regions. It is necessary to understand the nature of these four variables and how they interact in this context in order to realize the dynamic relationship between large scale mining operations and Arctic communities characterized by “mixed” economic activity.

The cash generating component of the “mixed” economy is primarily measured in terms of income and employment, while the subsistence component is measured by harvesting and processing activities, traditional education, food consumption, and equipment used or subsistence purposes. An examination of environmental conditions, such as wildlife habitat and water quality, and people’s perceptions, both positive and negative, of their local

environment is important because of the relationship which exists between mining and environmental change, and the significance of the natural environment in the undertaking of many subsistence activities. These indicators allow for an examination of the extent to which individuals and households participate in the “mixed” economy, and reveal factors that are most responsible for influencing participation.

CHAPTER THREE: PHYSICAL, SOCIO-ECONOMIC AND POLITICAL LANDSCAPES

3.0 Introduction: Nunavik

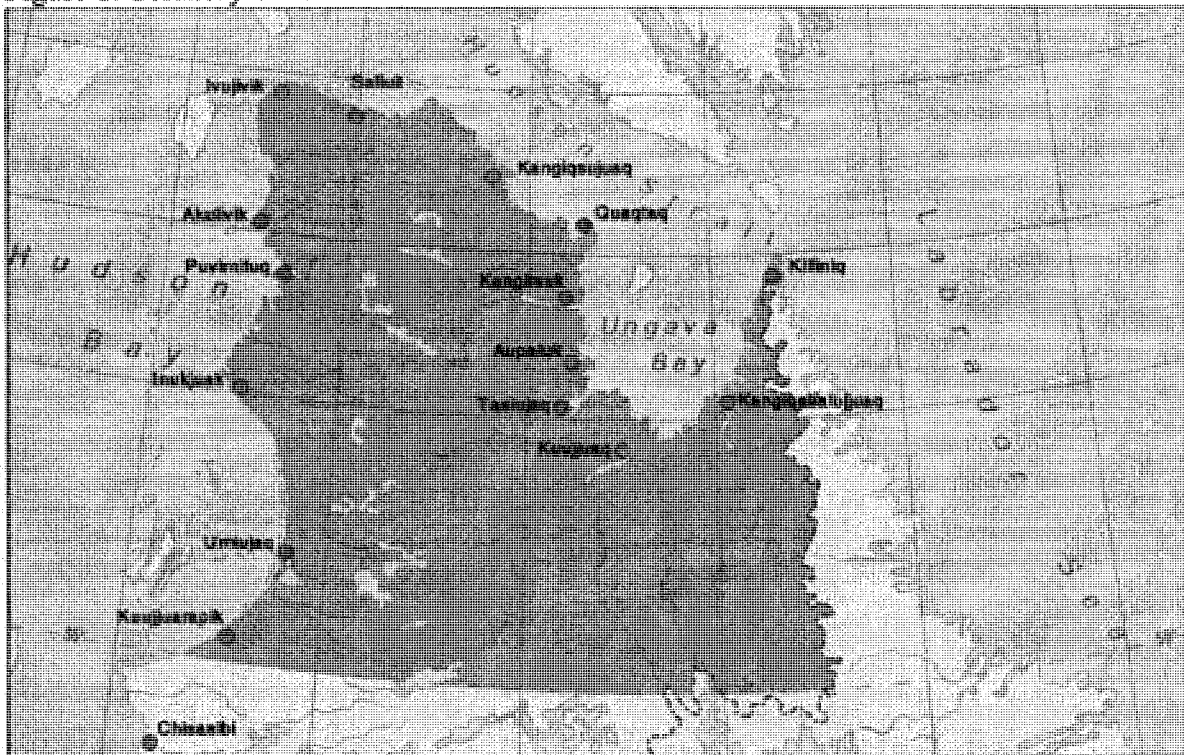
Coates and Morrison (1993) argue that many scholars and writers erroneously define the *North* as those lands lying beyond the 60th parallel. Although this definition is helpful, a more flexible definition is required if one is to undertake a comparative analysis of different Northern regions. Climate is determined by a multitude of factors and the interplay of these factors can result in areas south of the 60th parallel experiencing the same weather patterns as areas north of the 60th parallel. For example, Nunavik comprises the entire portion of Quebec that lies north of the 55th parallel and covers one-third of the province, or approximately 507,000 square km. Although only a small portion of Nunavik lies above the 60th parallel, it is commonly considered a sub-Arctic or Arctic region due to its physical characteristics, climate, socio-economic makeup, and political formation, all of which are consistent with other regions which are usually defined as being “Northern” (Duhaimé et al., 1999).

The regional study area of Nunavik encompasses the area situated to the east, west and south of Ungava Bay as well as the area located to the south west of the Hudson Strait and extending to the eastern shore of Hudson Bay (Figure 1). Included in this vast area are 14 Inuit villages, including Kangiqsualujjuaq, Kuujjuaq, Tasiujaq, Aupaluk, Kangirsuk, Quaqtac, Kangiqsujaq, Salluit, Ivujivik, Akulivik, Puvirnituq, Inukjuak, Umiujaq and Kuujjuarapik.

3.1 Nunavik Region Physical Landscape

The geography of Nunavik is representative of the northern Canadian region referred to as the Canadian Shield (Figure 1). It incorporates a number of bioclimatic and geological zones, ranging from forest-tundra biomes along the coast of Hudson Bay to tundra areas far above the tree line in the northernmost regions. This area of the Canadian Shield ranges from 305 to 610 metres above sea level in plateau regions to almost 1,500 metres above sea level in the Torngat mountain range (Laurentian University, n.d.). Geologically it is composed

Figure 1. Territory of Nunavik



Tivi Galleries. (2007). Inuit story through the art. Retrieved November 12, 2007, from <http://www.tivi-inuit-art.com/inuit-story-through-the-art.html>

mainly of granite and Precambrian rock (igneous and metamorphic rock), and it is rich in metallic minerals such as iron, nickel, copper, zinc, uranium, gold, silver, platinum and molybdenum. Two geological sub-provinces, distinguishable by the wealth of their mining resources, are the Labrador trough and the Cape Smith-Wakeham Bay belt (Kativik Regional Government [KRG], 1998).

Nunavik's climate can perhaps best be described as harsh and very changeable. Its land territory is vast and considerable climatic differences are found from north to south and from inland plateau regions to lower coastal areas. The rugged natural environment has an average winter temperature of -24 degrees Celsius. The short summer season is characterized by average temperatures of 12 degrees Celsius (Nunavik Regional Board of Health and Social Services [NRBHSS], 2003). Precipitation varies in the region and generally diminishes as one moves to the northern areas. Summers are characterized by long hours of sunlight and relatively mild daytime temperatures, while winters are cold with long nights. For example, villages which lie in the northernmost regions of Nunavik experience 20 to 22 hours per day of daylight in the summer months but only roughly five hours per day during the winter months (NRBHSS, 2003).

As a consequence of its harsh climate Nunavik has varying levels of permafrost. Permafrost is defined as any unconsolidated deposit or bedrock that remains at or below 0°C for at least two consecutive years (Harris and the Canadian National Research Council, 1988). This thermal feature is present throughout Northern Quebec over a gradient roughly determined by latitude and altitude. The northernmost regions of Quebec are characterized by continuous permafrost, whereas regions in southern Nunavik are characterized by scattered and discontinuous permafrost. Due to the lack of trees and vegetation the snow is subject to

winds, and snow on exposed slopes and on ridges is quickly blown toward more sheltered areas where it accumulates. Maximum levels of snow on the ground do not typically exceed a metre (Société de la faune et des parcs du Québec, 2000).

As is typical of tundra regions, the many lowland areas across Nunavik host rich, wet, and fairly swampy grasslands. Here, vascular plants provide extensive coverage (up to 80% locally). The areas of permafrost commonly consist of extensive areas of moist sedge tundra. Extensive areas are subject to surface water runoff interspersed with pools of water, as well as lakes (Genivar, 2007). Given the limited productivity of these aquatic ecosystems, combined with the extreme winter conditions, very few aquatic species can survive here. Only four fish species, including Arctic char, lake trout, stickleback and slimy sculpin are found in these inland freshwater bodies. However, coastal salt-water fisheries in the region have higher levels of productivity and diversity, and are important for commercial and subsistence purposes. Coastal resources include dozens of fish species, as well as about ten marine mammals including the walrus and several different species of whale and seal.

In 2006, surveys also identified 30 bird species in the northern portion of Nunavik. The bird community includes seven species of waterfowl, five species of birds of prey, seven species of passerines, the common raven and the rock ptarmigan (Genivar, 2007).

On the land, a relatively homogeneous sub-Arctic environment and harsh winter conditions contribute to a limited diversity of wildlife. Only about a dozen species of land mammals live in the tundra of Nunavik, and their density levels may vary depending on the season. Maintaining an abundance of marine and land mammals is of considerable interest to the Inuit. The barren ground caribou, the mountain caribou and the woodland caribou are

particularly valuable to the Inuit, due to their abundance and nutritional value (Genivar, 2007).

Climate Change

Recent events have highlighted the Earth's growing vulnerability to climate change, and signs consistent with warming temperatures have been even more pronounced in northerly regions. For example, in the Nunavik community of Salluit, the mean annual temperature has increased from -9°C in 1990 to -5.7°C in 2005. A climate forecasting model by the Ouranos Consortium projects a mean rise in temperature in Northern Quebec of roughly 5°C to 10°C in winter and about 2.5°C to 5°C in summer by the year 2050 (Committee on Transport and the Environment, 2007). Warming of this magnitude has the potential to cause a number of changes to both the physical and human environment in this region. These changes may include the increasing frequency and intensity of severe weather and natural disasters, a shift in wildlife patterns, threats to food security, and the overall deterioration of the permafrost. Deterioration of the permafrost results in the ground becoming less stable, due to its lower load bearing capacity. This increases the risks to houses and buildings, and mine and road infrastructure because of the roads becoming unstable or slumping with use (United States Arctic Research Commission, 2003). These changes to the load bearing capacity of the roadways may also affect the capacity of local communities to access the land and resources, and will therefore require adaptation strategies to deal with the new conditions and ensure that subsistence activities can be sustained.

3.1.1 Nunavik's Political Landscape

The Territory of Nunavik is governed by the James Bay and Northern Quebec Agreement (JBNQA), which was signed in 1975 by the Government of Quebec, the Government of Canada, Hydro-Quebec, the James Bay Energy Corporation (JBEC), the Societe de developpement de la Baie-James, the Grand Council of the Crees of Quebec and the Northern Quebec Inuit Association. The signing of this agreement effectively created autonomous Inuit-managed institutions. Notably, this was the first indigenous land claims agreement in Canada, and is often referred to as the first modern treaty (Bone, 1992). The JBNQA is based on two guiding principles; firstly, Quebec must utilize its territorial resources for the benefit of its entire population and, secondly, the Government of Quebec should recognize the needs of all Native people (James Bay Advisory Committee on the Environment, 2005).

Some of the institutions that were established following the ratification of the JBNQA include the Kativik Regional Government, the Kativik School Board (KSB), the Nunavik Regional Board of Health and Social Services and the Makivik Corporation. An important function of these institutions is to improve opportunities for Inuit beneficiaries. Employing close to 300 people in 2004, over 70% of which were Inuit beneficiaries from the land claim settlement, the KRG is the decision-making institution for Nunavik, and is also responsible for all the services that a typical municipal or regional government carries out, e.g. transportation, security, and public works (KRG, 2006). The KSB maintains exclusive jurisdiction in matters of pre-school, elementary, secondary, and adult education. Each school under the KSB adapts its program to local community characteristics and needs and

emphasizes the preservation of the Inuktitut language and Inuit culture. Today, because of increasing opportunities for the Inuit in Nunavik's mining industry, the KSB has become more involved in promoting skill development necessary for many jobs in the mining sector (KRG, 1998).

The Makivik Corporation is an Inuit company based out of Kuujjuaq, and is responsible for the collection and management of compensation funds provided under the JBNQA. It has a wide directive designed to promote the overall socioeconomic development of the region. It carries the following mandate:

- To receive, administer, use and invest the compensation money intended for the Inuit, as provided for under the JBNQA;
- To relieve poverty and to promote the welfare, advancement, and education of the Inuit;
- To foster, promote, protect and assist in preserving the Inuit way of life, values and traditions;
- To initiate, expand and develop opportunities for the Inuit to participate in the economic development of their society;
- To exercise the functions vested in it by other Acts or the Agreement;
- To develop the Inuit communities and to improve their means of action;
- To assist in the creation, financing or developing of businesses, industries, resources and properties of the Inuit (Makivik Corporation, 2006).

3.1.2 Nunavik's Social Landscape

In 2006, the population of Nunavik was approximately 10,100, consisting of an estimated 9,200 Inuit residents and 900 non-Inuit residents (Makivik Corporation, 2006). This population represents only a fraction of Quebec's total population of 7,546,131.

Nunavik residents inhabit 15 different villages, all but four having less than 1,000 people. Kuujuaq is Nunavik's largest community (2,055 inhabitants), and is the transportation hub for the entire region, as well as the centre for political and economic decision-making and activity. It is home to the Kativik Regional Government and the Makivik Corporation. There are no roads connecting the communities of Nunavik, nor connecting the region with the southern portion of the province. Air transport is the only means of year-round transportation linking the communities. The Inuit generally travel by snowmobile in the winter and all-terrain vehicles (ATV's) in the summer.

The past 20 years has witnessed a significantly higher population growth rate in Nunavik than in the rest of Quebec. This has resulted in two different age pyramids in the two regions. The number of children under 15 is twice as high in Nunavik (39%), compared to 18% for the entire Province of Quebec (Duhaime, 2004). Furthermore, as of 2001, 59% of the Nunavik population and 69% of the Quebec population were in the 15-64 age category. Since this latter age grouping comprises the main workforce, Nunavik has a greater percentage of non-working dependents and a smaller share of working-age adults than the rest of the province.

Maintaining the traditional Inuit language and culture remains important throughout Nunavik. The language and culture continues to be taught and practiced in the home, and remains an integral component of both primary and secondary school curricula. Despite the influence of mainstream Western culture, and the widespread use of Canada's two official languages in Nunavik, according to findings in SLICA, Inuktitut remains the first language spoken and is understood by approximately 90% of the resident population.

The organization of people into communities, the establishment of social services, and the opportunities for salaried employment have led to a transition from a nomadic to a sedentary way of life for many Inuit in Nunavik. However, traditional activities and lifestyles have not disappeared. For example, the Inuit continue to value traditional harvesting activities as a means of not only providing food and nutrients, but also as a way of maintaining culture, community identity and local economies (Bone, 1992, p. 2).

Inuit communities have experienced a close relationship with the land for many generations, and hunting, trapping and fishing activities continue to be practiced year-round, ensuring the survival of Inuit culture (Bronson, 2005). Coastal zones throughout the region are the most frequently used areas for subsistence fishing activities, but hunting and fishing is also carried out in the inland areas. The close relationship and dependency on the lands in the coastal areas in this region are reflected in the fact that all villages are situated within short travel distances to the coast.

The KRG's land use master plan (1998) for the Nunavik region suggests that most of the region's residents would benefit from an economy based at least partly on wildlife harvesting. In order to continue longstanding harvesting practices, preserving the quality of the environment and wildlife resources is crucial. It is further noted in the master plan that certain projects, in particular industrial projects, may have serious negative consequences on the natural environment and wildlife, and by extension have the potential to negatively impact the cultural integrity and way of life of the Inuit. The potential impacts to the subsistence economy from industrial development and the recommendations proposed by the KRG closely reflect findings from related research conducted over the past few decades by the likes of Usher (1982), Stabler (1990), Caulfield (2000), and Duhaime (2003).

3.1.3 Nunavik's Economic Landscape

There are many characteristics which distinguish Nunavik's economy from that of the rest of Quebec. In Quebec a wage-earning system has been in existence for centuries and provides the primary source of income for most residents (Bernard, 2005). The Quebec economy is diversified, integrated into national and international markets, and is characterized by a strong private sector. Conversely, the use of money has only become an integral part of economic life in Nunavik during the past 40 years, and the scope of the economy is still quite limited. Nunavik's economy is highly dependent on the provision of services to the public through the public sector. According to Duhaime (2004), government operations are the primary source of employment in Nunavik, accounting for over 50% of the regional gross domestic product, compared to only 7% of Quebec's GDP.

The economies of the 14 villages in Nunavik do not vary significantly from one another in terms of employment characteristics and available opportunities. Outside of the public sector, economic activity is related to mining exploration and development, construction, retail commerce, transportation, tourism, fisheries, and the development of wildlife resources.

Despite some economic diversification, there remain significant challenges to doing business in Nunavik. The Kativik Regional Government (1998) outlines five key issues that confront business, including:

- Limited knowledge regarding certain natural resources, which restricts development opportunities;
- Difficulty in accessing resources, notwithstanding the fact that resources are abundant;

- The high cost of housing and expensive transportation costs which limit the ability to purchase equipment and merchandise which could otherwise contribute to more efficient production. This also makes it more difficult to penetrate the export market;
- A workforce which is not highly skilled; and
- A low population density, which deprives companies of a market for their products.

As a result of these challenges, the secondary economic sector in Nunavik is almost non-existent. There is no employment in manufacturing, and jobs in this sector are almost solely concentrated in the construction industry.

A tertiary sector does exist in Nunavik, and it includes some retailing activities, as well as transportation and tourism industries. Retail commerce is limited, and it continues to be dominated by small, private businesses. These businesses are increasing in number in many of the small villages, providing the inhabitants with food products and other general merchandise (KRG, 1998). The Makivik Corporation has been particularly active in promoting business, and improving services in Nunavik.

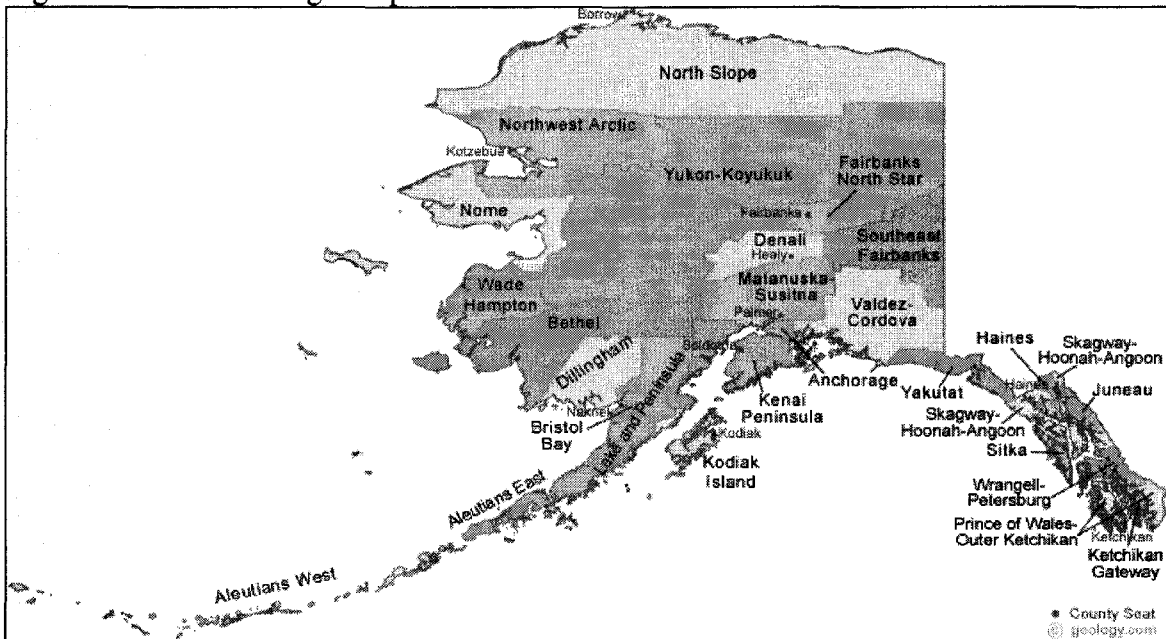
The primary sector in Nunavik is based primarily on the development of wildlife resources for subsistence purposes, together with mining exploration and development activities. This sector is becoming increasingly important in the region, garnering significant attention from both academic and non-academic communities in recent years (KRG, 1998; Halley & Verreault, 2000; Duhaime et al., 2003). Mining exploration activities are widespread throughout the region, and the significant rise in the price of metals has helped this economic activity to experience unprecedented growth in recent years. The Raglan mine has been especially important in providing full-time jobs in the region. In 2005, the Raglan mine employed 562 people, 59 of whom were land claim beneficiaries, and 503 of whom were non-beneficiaries (KRG, 2006). The number of Inuit people working at Raglan

increased in 2006 and 2007, to a total of 96 workers. The full-time jobs for residents of Nunavik that are provided by the Raglan operation are significant since they comprise close to 18% of Nunavik's entire full-time workforce.

3.2 Alaska and the Northwest Arctic Borough

The State of Alaska is home to approximately 621,000 people. Indigenous Alaskans, including the Iñupiat, Yup'ik, Alutiiq, Aleut, Athabascan, Tlingit, Haida, and Tsimshian comprise only about 16 percent of the total population. Over half of the state's population lives in the City of Anchorage and its environs. About 20 percent of Alaska's population or roughly 125,000 people live in rural areas. These rural residents are spread across approximately 225 communities, most of which consist of fewer than 500 residents and are not connected by road to other communities. About half of this rural population is made up of indigenous Alaskans, spread across the state's 16 boroughs (Figure 2).

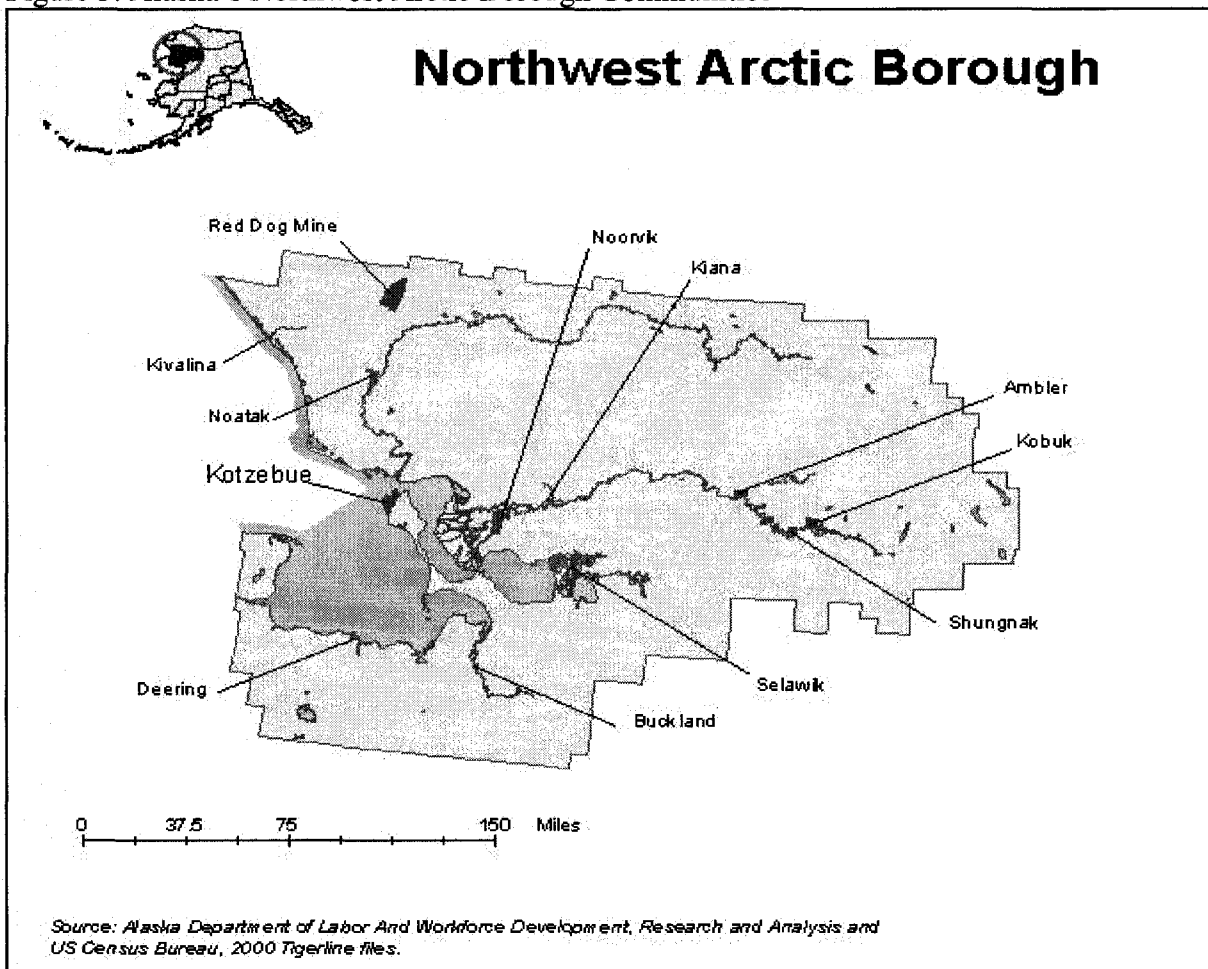
Figure 2. Alaska Borough Map with Administrative Centres



Geology.Com. (2006). Alaska Borough Map with Administrative Cities. Retrieved November 10, 2007, from www.geology.com/county-map/alaska-county-map.gif

This paper focuses primarily on the NWAB region. The NWAB encompasses the eastern coast of the Chukchi Sea, and is bordered by the Yukon-Koyukuk Census Area to the east, the NSB to the north, and the Nome Census Area to the south. Included in the borough are 11 villages, namely, Ambler, Buckland, Deering, Kiana, Kivalina, Kobuk, Kotzebue, Noatak, Noorvik, Selawik and Shungnak. Red Dog Mine is also a census-designated place in the borough, and as of 2004, it maintained a resident population of 44 (Figure 3).

Figure 3. Alaska's Northwest Arctic Borough Communities



Alaska Department of Labor and Workforce Development. (2000). Northwest Arctic Borough Map. Retrieved November 10, 2007, from www.labor.state.ak.us/.../cenmaps/cas/nwa3.jpg

Hub communities of Nome (population 3,706) in the Seward Peninsula/Bering Straits region, Barrow (4,397) in the NSB and Kotzebue (2,964) in the NWAB are the locus of many wage jobs and are regional centers for health services, retail stores, government agencies, and transportation. The communities in the NWAB were selected for this study for several reasons. Like Nunavik, this region is in a sub-Arctic or Arctic region and the

population is predominantly native. Furthermore, it is remote from centres of state or provincial power, and the economy focuses mainly on resource-based activities.

3.2.1 Northwest Arctic Borough Physical Landscape

The Northwest Arctic Borough is the second-largest borough in Alaska, comprising approximately 63,000 square kilometres (NWAB, 2004). Its landmass encompasses the drainage basins of five major rivers, including the Wulik, Noatak, Kobuk, Selawik, and Buckland Rivers. The borough lies north of the Arctic Circle at approximately 66.9° N and -162.5° W.

The NWAB climate is characterized by long, cold winters and mild summers. Temperature ranges are some of the most extreme on earth, from -63°C during the winter to 32°C during the short summer season. However, both of these extremes are very rare, and it is more common that low temperatures in February will average about -23°C degrees and highs in July about 16°C. Snowfall in the region averages 47 cm annually, with total precipitation of 23 cm per year. Also, from June 2 through July 9 of each year, the sun does not fully set and the entire borough is in perpetual sunlight (State of Alaska: Department of Commerce, Community and Economic Development, 2006).

Like Nunavik, the NWAB region is underlain by permafrost. The extent of the permafrost (continuous to scattered discontinuous) depends on the location, and is mainly influenced by the elevation and latitude of the specific area.

Fishing in the NWAB is carried out for commercial, subsistence and sporting purposes. Some of the more important fish species in the rivers include Arctic char, Arctic grayling, slimy sculpin, Bering cisco, Alaska blackfish, two species of whitefish and four

species of salmon. Herring, crab, and Arctic cod are caught offshore. Marine mammals and cetaceans (whales and porpoises) are found in the Eastern Chukchi Sea/Kotzebue Sound region. Four species of seal are present, including the ringed seal, spotted seal, bearded seal and ribbon seal. Cetaceans found in coastal areas of the region include the Beluga or white whale, the gray whale, the bowhead whale and the harbour porpoise. Walrus and polar bear are also found along the coast, but are less common and their numbers vary greatly from year to year. These marine mammals have received considerable attention in the past 40 years because of their importance to subsistence lifestyles as well as their ecological significance (United States Environmental Protection Agency [USEPA], 1984).

There are nine main terrestrial mammal species found in the NWAB, and each plays an important role in the preservation of local subsistence economies. These species include caribou, muskoxen, moose, Dall sheep, brown bear, wolf, wolverine, red fox and Arctic fox. Most notable is the western Arctic caribou herd, which numbers approximately 190,000 and is the largest caribou herd in North America (USEPA, 1984). Wolf, wolverine, and fox are important to local hunters and trappers for their pelts. A variety of bird groups, including waterfowl, shorebirds, and raptors are also present in this study region. Ptarmigan are found throughout the area and are important because of their utilization as a subsistence resource (USEPA, 1984).

There is significant mineralization within the NWAB, especially around the Red Dog Mine site. At this site there are rock outcroppings which contain high concentrations of lead, zinc, silver and barite. Other minerals found in this region include copper, chromium, nickel and chrysotile serpentine (asbestos). Deposits of non-metallic mineral resources include sand

and gravel, which are found along the Kivalina and Wulik Rivers and at the Chukchi Sea coast.

3.2.2 Northwest Arctic Borough Political Landscape

Politically Alaska's northwestern region is governed by three major federal land laws. The *Alaska Statehood Act* of 1958 authorized the state to select federal lands as part of its statehood entitlement.

The *Alaska Native Claims Settlement Act* of 1971 (ANCSA) set out the conditions for resolving Native land claims, addressing issues of ownership and management of state and federal lands in Alaska. In effect, this Act authorized the appropriation of funds and land for the benefit of Alaska Natives in exchange for the settlement and termination of longstanding and unresolved aboriginal land claims (Caulfield, 2000, p. 3). Initially, the administration of the benefits payable pursuant to this act was placed in the hands of a two-tiered structure of private village and regional corporations established pursuant to ANCSA. In the NWAB region, 11 of these village corporations were initially set up, but subsequently all of the village corporations, with the exception of Kotzebue, pooled together land assets and land management functions into the Northwest Arctic Native Association (NANA) Regional Corporation (Caulfield, 2000).

With the passing of ANCSA, aboriginal rights to hunting and fishing were also extinguished as part of the larger land claims agreement. ANCSA also provided for the evaluation of the resource potential of lands for possible inclusion in various national conservation systems.

In 1980, the *Alaska National Interest Lands Conservation Act* (ANILCA) was passed. This act was designed to ensure that certain subsistence activities by “rural residents” of the state would be protected through legislative guarantees and safeguards. ANILCA was crafted as a significant land conservation measure. It authorized the protection of over 100 million acres of federal lands in Alaska. However it has been the subject of considerable debate among development proponents, the environmental community, and native peoples seeking access for subsistence purposes.

The NWAB was officially formed in 1986, and is the local political subdivision for the northwest region in Alaska. Based in Kotzebue, it is the main governing body in the region and exercises authority over education, taxation, planning, and zoning. NANA, which is also centered in Kotzebue, is invested with the responsibility of managing land and money made available through the ANCSA settlement in 1971. NANA has investments in projects ranging from tourism to support services for natural resource development projects. Foremost among its investments is the Red Dog Mine. The profits of the corporation are distributed amongst NANA shareholders (e.g. native status residents), comparable in many ways to Makivik Corporation’s arrangement in Nunavik.

3.2.3 Northwest Arctic Borough Social Landscape

The Northwest Arctic Borough has a population of approximately 7000 people spread throughout its eleven remote communities. Eighty-seven percent of the population is Iñupiat. Today, the largest community is Kotzebue, the regional hub which is located on a peninsula on the Chukchi Sea. Kotzebue has a population of 2,964. This community is home to a

number of regional institutions, including the NANA Regional Corporation, Maniilaq Association, and Northwest Arctic Borough offices. Other communities in the region range in size from nearly 600 in Noorvik to as few as 100 in Kobuk. There are no roads connecting communities to each other or to other regions of the state, so travel between communities is mainly by air or by snow machine in winter. During the summer, boats can navigate the Noatak, Kobuk, Selawik, and Buckland rivers to carry freight, fuel, and people.

Like Nunavik, the NWAB has a very young population and household sizes are large. The median age of the population is 23 years which is nearly 10 years less than the average statewide median age of 32.2 years. The average household size is 3.75 compared with the statewide average of 2.7, and over 32% of the population is school-aged (16 and under), compared with 23 percent statewide (Fried & Windisch-Cole, 1999). Comparatively, the median age of Canada's Inuit population was only 20.6 years in 2001, 17 years below the median of 37.7 years for the non-aboriginal population. Moreover, 39% of the total Inuit population was 14 years old and under (Statistics Canada, 2008). In 2000, 34.1% of the Alaskan native population was 14 years old or younger (Goldsmith et al., 2004)

The Iñupiat people and their ancestors have inhabited this region for more than 10,000 years. Hunting and fishing remain important elements in the way of life of NWAB residents. This is especially true in the Borough's smaller communities, where the harvesting of caribou, seals, salmon, moose, and other species ensures that the nutritional needs of the inhabitants are met. These subsistence activities also contribute to the preservation and enhancement of the social, economic, and cultural fabric of the communities (Caulfield, 2000, p. 1). Subsistence activities are often communal in nature and by their participation in cooperative harvesting and food sharing the inhabitants experience the strengthening of

family and community ties (USEPA, 1984).

In many ways the economies in rural regions of Arctic Alaska resemble the mixed economy which exists in Nunavik. Cash and country food are mutually supportive, and both are a prominent part of the economy and social welfare of residents (Buklis, 1999, p. 41).

3.2.2 Northwest Arctic Borough Economic Landscape

Wage employment opportunities vary greatly within the region, but in general such employment is limited and seasonal. Overall, unemployment rates in this region are approximately twice as high as the state average. In 1996, the NWAB's per capita income was \$18,392, and well below Alaska's average of \$24,597 (Fried & Windisch-Cole, 1999). The notable exception to this relatively high unemployment and low per capita income is found on the North Slope, where wages and tax revenues from the oil industry at Prudhoe Bay contribute to greater job opportunities and higher incomes.

Government transfers and supports are an important source of additional income for rural residents (Caulfield, 2000, p. 3). Eleven percent of this type of income is derived from the Alaska Permanent Fund Dividend (PFD), an annual dividend from the state's oil royalties and other income which is paid to all citizens of the state. In 2007, the PFD consisted of a payment of \$1654.00 for each Alaskan. PFD income is particularly important for larger rural households that have limited access to wage employment (Fried & Windisch-Cole, 1999).

In the NWAB, public sector jobs make up nearly one-third of all employment. The largest of the public sector employers are the Northwest Arctic Borough School District, the City of Kotzebue, and the federal and state governments. The NANA Corporation is a major economic force in the region, and through its investments, it seeks to alleviate unemployment

by creating new jobs for its 10,000 shareholders. Foremost among its investments is the Red Dog Mine, which is located 90 miles north of Kotzebue. The Red Dog Mine is the world's largest producer of zinc concentrate, and is the largest single employer in the NWAB. Over 50 percent of mine employees and contractors are Iñupiat, and in 1997, average wages for mine employees were over \$70,000 per year as compared to about \$33,000 for the rest of the borough. Overall, NANA estimates that its activities provide up to 20% of jobs and 10% of all personal income in the NWAB through its interests in mining, hotels, and other associated businesses (Fried & Windisch-Cole, 1999).

CHAPTER FOUR: LARGE-SCALE MINING PROJECTS IN THE ARCTIC

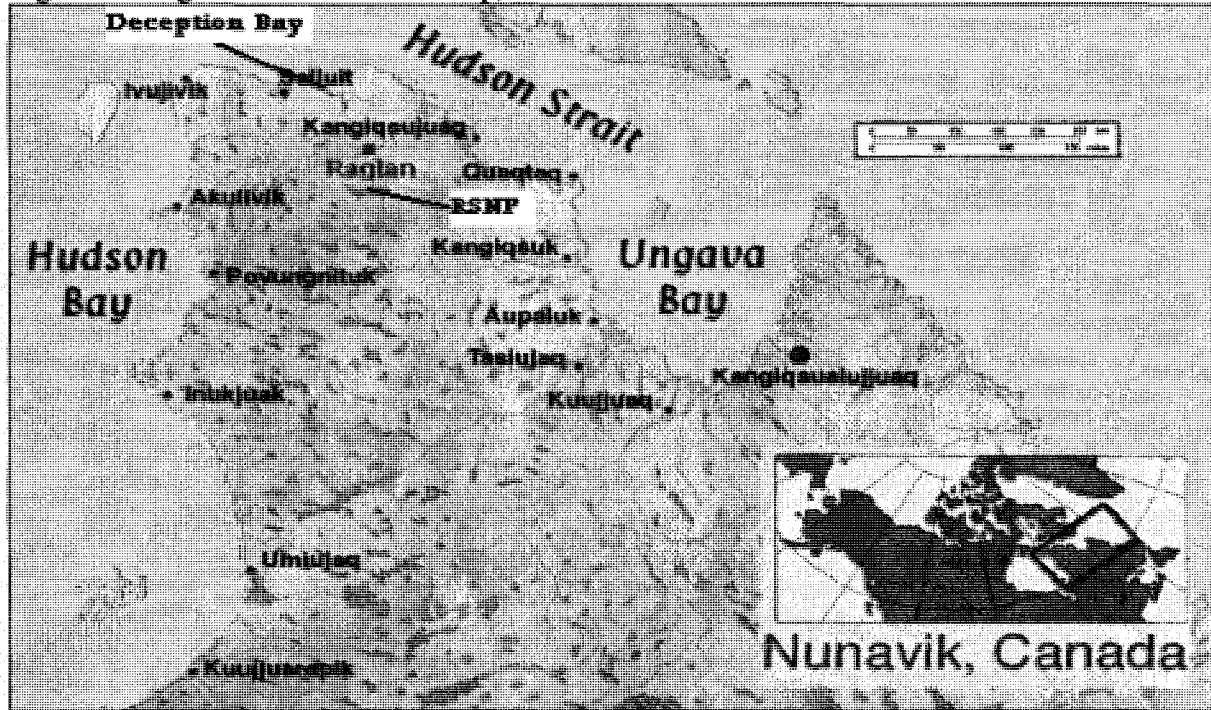
4.0 Raglan Mine

Situated in the uppermost part of the Nunavik region, the Raglan nickel-copper mine is 100% owned by Falconbridge Limited (Figure 4). Falconbridge is one of the world's largest nickel producers and is involved in the exploration, production, and refining of nickel, copper and cobalt throughout the world, including Canadian operations in Timmins and Sudbury. Raglan ore bodies were discovered as early as the 1930s in an area of substantial mineral deposits known as the Ungava Trough. However, commercial production did not begin until 1998 (Duhaime et al., 2005). Falconbridge acquired rights to the ore bodies at the Raglan site in the 1960s, but plans for development did not occur until the 1980s when advances in technology, the discovery of additional ore reserves, and improvements in global metal markets improved the viability of the project (Stackhouse, 2001).

The Raglan Mine is the largest private project ever undertaken in Nunavik, and since 1995 it has provided employment for up to 500 people, of which approximately 15% are Inuit (Duhaime et al., 2003; Five Winds International, 2004). The operation consists of three extensive underground mines, open pits, a concentrator, a power plant, administration facilities, fresh water supply, fuel storage tanks, and accommodations for employees. Today, an estimated 2,400 tonnes of ore are processed each day, for an annual total of almost 900,000 tonnes. This ore is transformed on site into nickel-copper concentrate, and is transported by truck to a sea port at Deception Bay, 100 km from the mine site. Concentrate is shipped by sea vessel to Quebec City, during a navigation season which lasts for roughly

eight months of the year (Duhaime et al, 2003). Falconbridge estimates the life span of the mine to be approximately 30 years (completion in 2028).

Figure 4. Raglan Mine Location Map, Nunavik



Infomine. (2008). Raglan: Summary Report. Retrieved on February 10, 2008, from <http://www.infomine.com/minesite/minesite.asp?site=raglan>

The Raglan nickel-copper operation was made possible in large part through both non-formal and formal consultations between Falconbridge and the two neighbouring communities of Salluit and Kangiqsujaq (formerly known as Wakeham Bay), which are situated 100 km and 60 km from the mine site, respectively. During the early stages of project exploration in the 1980s, Falconbridge hired a local advisor to act as liaison with the two communities in order to acquaint people with the project and listen to their views and concerns. Initiatives included formal meetings with elders and local officials, participation in local radio talk shows, and visits by communities to both the Raglan site and other northern

mines (Five Winds International, 2004). Other more formal consultations with the communities were part of an official approval process set out in the JBNQA. The consultation process brought together personnel from all levels and departments of the company, village residents, mayors and councils, the Kativik Environmental Quality Commission and other KRG officials, Makivik Corporation, the federal Coast Guard and Quebec provincial ministries responsible for mining and the environment. The main concerns raised during this consultative process were centered on the health of the natural environment, the participation by these communities in the income and employment to be generated by the development, and the impact on these northern communities from an influx of southern people (Telewiak, 2001; Five Winds International, 2004). Although there was interest expressed in expanding the wage economy in these northern communities, the importance of maintaining the traditional subsistence economy was noted. Related concerns included the issue of whether economic diversification would be accompanied by detrimental effects on the natural environment (CBSR, 2005).

Several years of consultations between Falconbridge and other interested and affected individuals and organizations eventually led to the signing of the 1995 Raglan Agreement between Falconbridge and the Makivik Corporation. This agreement constituted Canada's first Impact and Benefit Agreement (IBA) between a mining company and the aboriginal people affected by a large scale development project (CBSR, 2005). An IBA is a contract signed by a project proponent, community representatives and often governments. The terms of such a contract specify under what social, economic, and environmental conditions a project will be allowed to operate, and establishes mechanisms and institutions for monitoring and enforcing these provisions (Mining Watch, 1999). In the Raglan Agreement

are clauses that go beyond mere regulatory requirements and include provisions outlining financial compensation for the residents of each community, priority being given to hiring Inuit workers, worker training programs, sub-contracting to Inuit firms, special considerations and provisions to ensure that the Inuit traditional lifestyles are respected, and specifications concerning environmental risks. The Raglan Agreement also created the Raglan Committee. This is a permanent body which meets once every three months and is responsible for overseeing the implementation of the Agreement and resolving any new or outstanding issues. A former Makivik representative on the committee, Robert Lanari, stressed that the environment is the overriding issue in the Raglan Agreement and continues to be the central priority. According to Lanari, “the environment is always the crucial concern for the Inuit. Their lives revolve around the land, sea and air; not just for their own subsistence, but as the heart of their traditional culture. The Inuit see themselves as stewards of their harsh and delicate environment and of the living things that rely on it as habitat – like the hundred thousand Arctic char that depend on the water downstream from Raglan” (CBSR, 2005, p. 68).

4.1 Raglan South Nickel Project

Located 82 km west of the village of Kangiqsujuaq, 140 km southeast of the village of Salluit, and 20 km south of the Raglan Mine, the proposed Raglan South Nickel Project (RSNP) is being undertaken by Canadian Royalties Inc. (CRI). The RSNP entails the development of four open-pit mines. Support structures for the mining operations include the construction of an industrial complex, including a concentrator, a power plant, administrative offices, housing for employees and service buildings. The construction of a new road

network will also be necessary to connect project facilities. However, some existing infrastructure, including some roads, the Deception Bay seaport and Donaldson airport facilities will be shared with Falconbridge's Raglan operation. Construction commenced in the summer of 2008, and mining operations and first shipments are planned to begin by 2010. The lifetime of this project is approximately 15 years; however, an extension is possible if new deposits are discovered or if economic conditions become favourable for the mining of certain currently known deposits which are not yet economically viable (Genivar, 2007).

Proponents and supporters of the project believe that the RSNP will provide a major stimulus to the Nunavik economy, and especially to the economic well-being of the nearby Inuit villages. The project has an estimated total cost of \$400 million for construction and will require 250-400 workers during this phase. It is expected that 220 permanent employment positions and an additional 400 indirect jobs will be generated during the operational phase. It is the intention of CRI to maximize the number of positions held by the Inuit, to secure economic spinoffs for Nunavik, and to recruit first among the residents of the villages of Salluit and Kangiqsujuaq (Genivar, 2007). To help ensure that this goal is met, an IBA will be signed by CRI and Makivik. It too will include clauses on Inuit hiring, procurement of goods and services, and profit sharing with the Inuit villages.

CRI acquired the RSNP mine property in January 2001. From this time to the present, it has carried out intensive exploration activities, economic feasibility reviews, social and environmental impact studies, and has proceeded with applications for permits. Included in the permitting process for this type of mining project is an environmental and social impact assessment and review procedure. The RSNP is bound by the provisions of Quebec's Environmental Quality Act (EQA), and is also subject to assessment under the Canadian

Environmental Assessment Act (CEAA). The Environmental and Social Impact Assessment (ESIA) for the RSNP was deposited with the Quebec Ministry of Sustainable Development, Environment and Parks and the Canadian Environmental Assessment Agency on April 10, 2007 for review.

The RSNP social and environmental impact assessment has benefited from being able to take into account the experiences of other operating metal mines in northern communities which share many similarities with its proposed activity (e.g. Voisey's Bay mines in Labrador and the first Raglan mine). Consultations are an important element of the environmental assessment process, since they act as an avenue for the public to express concerns, provide input, and develop shared solutions with project proponents and ministry officials. With a wealth of local knowledge and traditional knowledge, input from Inuit communities can assist in making informed decisions regarding impacts on traditional territories, water, wildlife, communities and ways of life (NRC, 2007, p. 62). While CRI management has been meeting with the KRG, Makivik Corporation and various other groups and leaders from the Inuit villages most affected by the RSNP since 2002, the official public hearings which comprise part of the ESIA were held from July 31 to August 12, 2006. By the time the public hearings commenced many of the issues and possible solutions had been defined, ensuring that the process could proceed smoothly and expeditiously. These hearings were held in the villages of Puvirnituk, Salluit and Kangiqsujuaq at which time the public was provided with information about the project and discussions were held with the residents concerning the use of the land and resources (Genivar, 2007).

Both the location of the RSNP and the timing of these consultations are important. The RSNP will impact the same communities as those affected by the Raglan Mine, and

many lessons have been learned about how a large-scale mining project can impact the various dimensions of a remote, northern community and region. Over ten years of experience with a mining operation nearby has provided local peoples with valuable knowledge and experience that can be incorporated into the project planning for the RSNP and potentially reduce negative impacts. The content derived from these consultations is examined in much greater detail in the results section in Chapter Five.

4.2 Red Dog Mine

The Red Dog lead and zinc mine is located in Alaska's Northwest Arctic Borough, in the Delong Mountains of Alaska's Brooks Range, approximately 131 km north of Kotzebue, 55 km north of Noatak, and 89 km east-northeast of the Chukchi Sea at the Iñupiat village of Kivalina (Figure 3). Initially explored in 1953, mine development was not initiated until 1986 and by 1989 construction was complete, when the operation earned the title as the world's largest producer of zinc concentrate (SAI, 2004, p. 72). The mine site is operated by Teck Cominco Limited, a Canadian integrated natural resource company based in Vancouver, British Columbia, whose primary activities are mining, smelting and refining. The company was formed in 2001 through the merger of Teck Corporation and Cominco Ltd. These are the two oldest continuously operating mining companies in Canada, with nine mines in Canada, the USA and Peru.

Following major expansions in 1997, 1998 and 2001, The Red Dog Mine now has the capacity to produce more than one million tons of zinc and lead concentrates annually using conventional open-pit mining, milling and flotation technologies (Caulfield, 2000; Alaska Department of Natural Resources, Division of Mining, Land and Water, 2007). Ore is

extracted year-round and exported to world markets via the DeLong Mountain Regional Transportation System, which includes an 83 km long haul road and port facilities on the Chukchi Sea near the community of Kivalina. Given its Arctic location and the very brief summer season of open water (100 days), shipments are generally stored for long periods at the port site. To demonstrate the scale of the operation, every 15 minutes around the clock, a truck carrying up to 100 tons of lead and zinc leaves the mine headed towards the port (ACAT, 2004).

The Red Dog site occupies part of a 120 square mile block of land, which was selected for its development potential in 1980 by the Northwest Alaska Native Association (NANA) Regional Corporation. The interest in the Red Dog Mine in this study, and by policy-makers and other mining companies in recent years is not simply a result of its vast size, worldwide importance as a mineral source, or the sensitivity of the Arctic ecosystem in which it is located. Rather, the interest has been fostered by the relationship which has developed between the proponent Teck Cominco and NANA. In addition to having to address issues related to NANA's control over the area, the company has had to address a climate and culture which was foreign to most of its staff (NRC, 2004, p. 4). The Red Dog partnership and the Red Dog Development and Operating Agreement (1982), which took the form of a lease with wide ranging provisions and commitments that are binding on the parties during the development and life of the mine, represent a melding of socio-cultural, environmental, and economic interests (NRC, 2004, p. 17). The intent of the agreement was to allow development that provided a long-term economic base for NANA, an economic return for the operator, complete reclamation of the area following project completion, and a commitment to develop and operate the project with careful consideration for the existing

subsistence lifestyle in the region. In order to address concerns about maintaining the subsistence culture of the Iñupiat people, the Red Dog operating agreement called for the establishment of a “subsistence committee” comprised of eight NANA shareholders from Noatak and Kivalina. Measures protecting the subsistence economy in the region included: addressing environmental and wildlife management and sustainability; instituting work schedules that accommodate hunting, whaling, fishing and berry picking seasons; powers to shut down the transportation road between the mine and port during caribou migration; and shifting the start of the shipping season based on whale migration patterns in the Chukchi Sea (NRC, 2004, p. 62).

In the early 1980s, prior to mine development, Cominco submitted an application for a permit under the Clean Water Act (CWA), to discharge treated wastewater from the mine. This action triggered the preparation of an Environmental Impact Statement (EIS) on the potential environmental impacts of the proposed Red Dog Mine. The conducting of environmental assessments for development projects, including mining projects was still a very young process in Alaska at this time. However, according to Ron Romoelman, a senior environmental planner with Tetra Tech Inc., the high level of detail and measures taken to include the public in this EIS helped set a precedent and raise standards industry-wide (personal communication, October 2, 2007). Major issues included anticipated changes in water availability and metals loadings, maintaining the quality and quantity of wildlife habitat, protecting subsistence resources, and minimizing the social, cultural, and economic impacts on residents in the region (USEPA, 1993). After a three year process, involving various organizations, as well as a lengthy public consultation process, and nearly 500 pages of documentation, the EIS was accepted and the project was approved to begin construction.

While the emphasis on public involvement in the pre-project phase was exceptional for the early 1980s, it should be noted that the two nearest and likely most impacted Iñupiat communities (Noatak and Kivalina) were overlooked when selecting the locations for the public meetings. Importantly, future environmental impact assessments related to the Red Dog Mine have recognized the value of the contributions of local Iñupiat peoples. For example, public consultations were held in the communities of Kotzebue, Kivalina, and Noatak during the scoping period for the most recently proposed Red Dog Mine expansion.

4.3 Red Dog Mine Extension – Aqqaluk Project

Teck Cominco has been mining ore from the current Main Deposit at the Red Dog site since 1989, and it is expected that it will be mined out between 2010 and 2012 (USEPA, 2007). To ensure continued operations, Teck Cominco is proposing to begin mining from the Aqqaluk Deposit, which lies immediately adjacent to the Main Deposit. The project can be considered an extension of the existing Red Dog Mine since it utilizes the same facilities, infrastructure (e.g. port and road) and human services. If the project is approved, mining of the Aqqaluk ore body will likely occur from 2010 to 2031.

On May 4, 2007, Teck Cominco submitted a request for an NPDES permit modification for the Aqqaluk Project. The 1984 Red Dog Mine EIS did not evaluate potential impacts from developing the Aqqaluk Deposit. Therefore, the United States Environmental Protection Agency (USEPA) determined that a Supplementary Environmental Impact Statement (SEIS) was necessary in order to fully evaluate the environmental impact from the project, and to support any future permitting actions associated with the project extension. A SEIS is more limited in scope than an EIS, but serves several valuable purposes. In the case

of the Aqqaluk Project, it will evaluate impacts associated with the extension of operations, describe current site conditions and the impacts projected in the 1984 EIS, and discuss whether impacts or changes occurred that were not anticipated in 1984. Also carried out in a SEIS is a scoping process, which is intended to provide the public, regional stakeholders, and regulatory agencies with a basic understanding of a proposed project, and a framework for the public to ask questions, raise concerns, identify specific issues, and make recommendations (USEPA, 2007).

Through the scoping process, comment submissions ranged from very supportive of the project to strongly opposing to any continuation of mining activities in the region. Important comments were made identifying the sensitive balance between the economic benefit provided by the operation and concerns about impacts to subsistence resources (water, vegetation, wildlife). Among these comments, many specific examples of how the existing mine has impacted subsistence resources and the overall subsistence economy were articulated, and constructive suggestions were presented. The content derived from these consultations is examined in greater detail in the results section in Chapter Six.

CHAPTER FIVE: METHODOLOGY

5.0 Introduction

The research model adapted for this study is a ‘concurrent triangulation study’ as defined by Creswell (2003). This type of study uses a combination of research methodologies in an attempt to confirm, cross-validate or corroborate findings within a single study (Creswell, 2003). Punch (1998) suggests that both qualitative and quantitative methods have strengths and weaknesses and that an over-reliance on any one method is not appropriate. In this project separate quantitative and qualitative methods were selected as a means to off-set the weaknesses within one set of methods with the strengths of the other set of methods. The interpretation of results from both approaches are used and interpreted to note convergence, lack of convergence, and as a means to strengthen knowledge claims. The hope in linking these methods together was to gain statistical information and an in-depth qualitative understanding of peoples views and concerns about how large scale mining projects can impact local subsistence economies.

The socio-cultural, economic, political and environmental scope of the study focuses on the Northwest Arctic Borough and Nunavik Region, and their respective communities, but it also considers the context of the entire circumpolar region represented in SLICA.

5.1 Finding the Right Methods

At the onset of this study, a quantitative analysis relying heavily on SLICA data was planned, comparing these findings with information obtained through face-to-face, semi-directed interviews with indigenous elders, area specialists, and local officials. Upon the final

selection of the two regional case studies and their respective mining projects, it was realized that current public consultation activities in each region could provide a source of qualitative information in a much more efficient manner. This efficiency was especially important because of the remoteness and technological capacity of the most affected communities, the length of the study period, and the financial costs associated with doing this type of research. Further, it was anticipated that the range of opinions, views and knowledge (scientific and non-scientific) pertaining to the impacts of mining on subsistence that is expressed through the public consultation process would be much wider and more comprehensive, and thus more valuable than what could otherwise be achieved through direct personal contact of a sample of people by an individual researcher.

5.2 Qualitative Methods

5.2.1 Literature Review and Networking

In hopes of selecting the most suitable case studies for this study, it was important to obtain background information on the history, culture, economy, politics and social structures existing in various regions of the circumpolar north. As stated by Pratt and Loizos (1992, p. 49), “historical, ethnographic and other related studies may provide valuable insight into the development of a community and many clues to the characteristics and problems of a group”. This information was acquired through an examination of exploratory and descriptive northern research focused on impacts of industrial development that has been conducted previously, and through several months of networking.

Networking involved consulting government officials, NGOs, native corporations, native tribal organizations, mining company representatives, private sector consultants, and academics. These included, but are not limited to officials from Indian and Northern Affairs Canada, Inuit Tapiriit Kanatami, Makivik Corporation, KRG, USEPA, NANA, Falconbridge Inc., Tetra Tech Inc., and several accomplished scholars dedicated to social research in Alaska and Northern Quebec. This process helped to provide current, accurate information on conditions and projects in regions of the north, and to identify and define the case studies.

5.2.2 Public Consultations

The Raglan Mine and Raglan South Nickel Project in Nunavik, and the Red Dog Mine and its Aqqaluk Deposit project were selected as case studies because of the many interesting differences and similarities that exist between them. The final decision to make use of these case studies was because each region has a relatively long history of mining, and new projects are presently being developed. As a result of new mining development, public consultation processes are currently underway in each region. Regulatory processes are bringing out information about proposed projects and soliciting comments from local, state, and federal agencies; NGOs; and the general public. Transcripts and statement summaries from these meetings are made available to any interested individual or organization after all consultations are completed.

In Northern Quebec public hearings for the RSNP were held from July 31 to August 12, 2006, in the villages of Puvirnituq, Salluit and Kangiqsujaq. The primary objective of the various meetings was to discuss the participants' concerns and expectations about the RSNP, and also to discuss the use of land and resources by villagers from Salluit and

Kangiqsujuaq. The groups that met during these formal hearings were comprised of members of municipal councils, landholding corporations, the administrative council of the cooperatives of the three villages, and other interested members of the public. In order to further engage members of the general public, additional steps were taken. In Salluit, a discussion group comprised of village residents was formed, while some other residents met individually with project consultants. In Kangiqsujuaq, a local radio program was broadcast as a way of presenting the project to the public. Villagers were then invited to call and share their views about the project. All of these forums were organized by the Genivar Ltd. team of consultants who were responsible for conducting the Social and Environmental Impact Assessment on behalf of Canadian Royalties Inc. Upon formal request, I received copies of all public consultation transcripts and RSNP project documents from the Canadian Environmental Assessment Agency in July 2007.

In Alaska, the public comment period for the Red Dog Mine Extension – Aqqaluk Project SEIS began on August 31, 2007 and ran until October 15, 2007. As part of this process, the USEPA and cooperating agencies hosted public open house information sessions followed by formal public hearings to provide information to, and solicit comments from the general public at four separate locations; Anchorage, Kotzebue, Noatak, and Kivalina. In addition to these sessions, the USEPA placed a public notice in the *Arctic Sounder* newspaper, used email to advertise meetings, and conducted a government-to-government consultation with the Kivalina IRA Council.

During the week of October 1-5, 2007, I visited with members of several organizations in Anchorage, Alaska who were either directly involved in the Aqqaluk Project SEIS, or maintained a position of significant interest. These organizations included the

USEPA, Alaska Department of Natural Resources, Alaska Community Action on Toxics, Alaskans for Responsible Mining, the Miniilq Association, and Tetra Tech Inc. who was chosen by the USEPA to assist with the preparation of the SEIS and supporting documents (Appendix C). Also, I attended and participated in the first Aqqaluk Project SEIS open house information session and public hearing in Anchorage, Alaska on October 2, 2007. These visits were an important way to keep informed on what was going on with the project and different organizations involved. It was also a way to feel the atmosphere, understand how interested people were in the project, and gain insight into the types of socio-economic and environmental impacts that were anticipated. The nature of the relationship between the public and the organizations involved was also much better understood by attending this session.

The timing of the Aqqaluk Project SEIS and the RSNP ESIA is important because it provides an opportunity for officials and local peoples to be engaged in a process that evaluates how mining operations have been carried out over the past couple of decades, what expected and unexpected impacts have occurred, and how new projects can most effectively be developed with consideration of the socio-economic and natural environment.

5.2.3 Content Analysis and Public Consultation Transcripts

The scoping period for the Red Dog Mine Extension SEIS resulted in a total of 316 comments. I reviewed each comment submission, along with the transcripts at each hearing in order to identify and catalogue each individual comment. These comments came in the form of letters, emails, written consent forms, and oral testimony by individuals at the public hearings.

In the three Northern Quebec communities, formal meetings were attended by a total of 45 officials representing various local government and non-government organizations. In addition, approximately twelve individuals took part in group discussions and other meetings in the village of Salluit, and in Kangiqsujuaq, thirteen people participated in the radio program. Comments covered a range of areas including employment and economic opportunities, effects of the mine on the environment, use of the territory, and impacts on subsistence resources.

The comments that were received during both public consultation processes in Alaska and Nunavik were examined using content analysis. Content analysis is a type of research method in which patterns within written text, audio, visual, or other communication media are examined for meaning (Neuman, 2007, p. 224). As outlined by Neuman (2007), content analysis was chosen as an analytical tool in this study for three reasons. First, it allows a researcher to measure a large volume of text. Second, it is helpful when a topic must be studied 'at a distance'. Lastly, content analysis can reveal messages in a text that are difficult to see without casual observation. It was also a useful method for condensing and organizing the considerable amount of information included in the comments from the EA consultations.

The unit of analysis in content analysis can vary a great deal. For the purpose of this study, the themes apparent in each individual comment were selected as the unit of analysis. These themes included wildlife and aquatic resources, environmental quality, income and employment, subsistence, public health and other. Also, it is important to note that these themes correspond to the variables selected for the statistical analysis of data from the SLICA initiative. Themes were identified from the comments included in the transcripts, and catalogued into the six pre-selected categories. Within these categories the frequency and

direction of the comments were documented. Frequency simply means counting whether or not a comment was made, and if it did occur, how often. Noting direction involves examining the content and determining whether or not the comment was positive or negative, supportive of or opposed to certain aspects of the project.

5.3 Quantitative Methods

5.3.1 Survey of Living Conditions in the Arctic

Quantitative data for this study have been collected from the SLICA initiative. While the collection of data through questionnaires is still ongoing in some circumpolar regions by the international team of SLICA researchers, the data file that is utilized in this particular study was compiled from the year 2001 to 2005. This consists of close to 4,700 interviews conducted in Canada's north and 700 interviews conducted throughout Alaska. The target population in the SLICA study is defined by three criteria: Inuit individuals (1) aged 16 and over; (2) residing in households; (3) residing in a traditional settlement region (Andersen and Poppel, 2002). It should also be noted that indigenous peoples throughout the circumpolar north were active and critical players in the design of the survey, and in the overall SLICA research effort. This is important because the sample and target population in this study is limited to the Inuit who are present in the circumpolar region.

The SLICA questionnaire involved 90 minute interviews and produced 950 variables per respondent; these variables in the international data set were used to produce 398 analytic variables. Because of scheduling differences and the overall length of interviews conducted

in Canada, the Canadian data set is more limited and only includes 129 of these 398 analytic variables.

The important analytic feature of the SLICA data file is that it is possible to test hypotheses about relationships among variables. For example, it may be hypothesized that higher incomes are related to lower levels of participation in hunting and fishing. In this case, the observed level of co-variation or association between an income level and a particular subsistence activity can be used to test the null hypothesis that there is no relationship between income and subsistence participation. While an observed co-variation does not determine proof of this relationship, it does lend support to the hypothesis that can be tested during further research if desired.

5.3.2 Statistical Analyses

The data that have been collected through SLICA can be utilized in many ways but in this study, the respondents of the questionnaire were aggregated at community, regional, and national levels. Aggregating data at these levels of analysis was done for a number of reasons. Firstly, because this study is focused on two distinct regions, data aggregated to the community, regional, and national level can be used in a direct analysis to reveal differences and commonalities. Secondly, the focus of the study is on how mixed economies are affected by shifting economic and industrial patterns in the regions. Therefore, it is not necessary to make inferences about the circumstances of individuals, but rather, the aim is to reveal a more accurate representation of local and regional circumstances and their human populations. Lastly, it was hoped that by examining these three levels, a better representation of broader Arctic patterns could be achieved.

National and regional level analysis of variables provides a broader and more accurate representation of the relationship between the variables, and reveals dominant patterns that exist. Perhaps most importantly, by revealing dominant patterns at these levels, it is possible to note the communities that differ from more typical patterns. The particular communities selected for analysis were chosen because of their population size and relative proximity to a major mining project. The particular differences existing at the community level then provide insights into how changes to income, employment, and to the natural environment related to the presence of industrial activity may alter the mixed economy.

Data were analyzed using the Statistics Programme for the Social Sciences (SPSS) Version 14.0. Statistical methods and data outputs consisted of frequency distribution tables, descriptive statistics describing numerical data, and bi-variate contingency tables or cross tabulations. The raw count tables produced in this analysis were converted into percentage tables because of the difficulty in interpreting raw counts. This difficulty occurs because rows and columns can have different totals depending upon response rates to different questions. Percentage tables allow for the comparison of the relative size of the cells and can more accurately demonstrate bi-variate relationships (Neuman, 2007).

The cross tabulation method is perhaps the most important analytical tool employed for this study because two or more variables can be examined at the same time. With this technique, a table distributes cases into the categories of multiple variables, “and shows how the cases, by category of one variable, are ‘contingent upon’ the categories of other variables” (Neuman, 2007, p. 259). In the analysis of these cross tabulations a percentage difference of 10% or more across a table was selected as the standard representing that an important relationship occurs between variables. The 10% difference value was selected as

the measure of importance following discussions with Dr. Jack Kruse at a SLICA analysis training course at Laval University in May 2007. Dr. Kruse is the U.S. project team leader for SLICA activities in Alaska.

These analyses concentrated on data sets pertaining to the independent variables of income, employment and the natural environment and how they relate to dependent variables associated with subsistence activity. These particular independent variables were selected for analysis because they were identified through the literature review and in personal networking as being the factors most likely to influence subsistence activities.

To help ensure reliability and validity in SLICA's results a number of measures were taken. Probability sampling procedures were used in each country to ensure that each adult had a known probability of selection. Overall, survey response rates exceeded 80 percent in all regions (84% in Alaska, 83% in Canada). The initial study conducted by the SLICA survey team did observe a bias in favour of female respondents, and this was addressed as a final sampling weight. Regional comparisons have sampling errors of one to four percentage points.

CHAPTER SIX: RESULTS

6.0 Introduction

The main objective of the study is to explore the connection between mining development in the Arctic and its impact on people's subsistence values and activities. For my research on the possible changes to subsistence values and activities that may occur as a result of mining, my hypothesis was simple. As large mining projects are established in remote and northern regions, local participation in subsistence activities and people's traditional values would not decline. My study draws upon recent statistical information from the SLICA initiative, as well as qualitative information from two regional case studies and their respective mining projects. The results of this study are presented so that the analyzed SLICA data forms the basis of results. In many of the results that are presented, both Canadian and Alaskan data is provided for comparative purposes. However, as noted in Chapter Four, because the Canadian SLICA data set is much more limited than the file for Alaska, in some cases results are only presented for one region. In other instances, they cover the entire international population covered in SLICA. The comments that were recorded during the public consultation processes in each region, and the interpretation of this documented material are then used to add a deeper understanding of the survey responses from SLICA.

It should also be noted that although the SLICA results provide an important foundation for this study, the information obtained through the community consultations is of no less significance. In many respects, the views and opinions expressed through the latter process provide more detailed and specific information pertaining to the study's main

variables. These variables include income, employment, environmental quality, and subsistence. It is necessary to understand the nature of these four variables and how they interact in this context in order to realize the dynamic relationship between large scale mining operations and Arctic communities characterized by “mixed” economic activity.

The results presented in this chapter are divided into two main sections. First, the results of the content analysis that was conducted on the public and other comments received during the RSNP and the Red Dog Mine, Aqqaluk Project public consultation. The results of the particular projects are addressed both individually, as well as jointly in order to reveal similarities and differences between the regions and mining projects. These give a qualitative understanding of issues experienced and anticipated as a result of mine development.

Second, frequency distribution tables, descriptive statistics, and bivariate contingency tables derived from SLICA data are presented and interpreted. These analytical results are separated into four subsections, which include (1) income, (2) employment, (3) environmental quality and (4) subsistence. Some relevant findings and more specific comments from the RSNP and the Red Dog Mine, Aqqaluk Project consultation activities are included in this section in order to support or explain the statistical results from SLICA. These give a quantitative measure of relationships between variables that are affected by mine development.

6.1 Results: Environmental Impact Assessment Studies in Alaska and Northern Quebec

The public statements that were generated during the environmental impact assessment studies in Alaska and Northern Quebec in 2006 and 2007 generally pertained to peoples concerns, expectations, and hopes regarding the proposed projects, but also included

lessons learned about the impacts stemming from past and present mining activity in their regions. After analyzing the content in each public statement, six broad themes were identified, and individual comments were organized according to these themes. These themes include wildlife and aquatic resources, environmental quality, income and employment, subsistence, public health, and others. Comments categorized as “other” were primarily related to technical issues such as engineering and design, or concerns regarding public consultation and coordination with the mining company. A summary of the types of comments and their sources is presented in Tables 1 and 2 below.

Table 1. Matrix of comments received from Aqqaluk Project scoping period (Fall 2007).

Comment Theme	Individual	NGO	Government Agency	Native Corporation	Native Tribal Organization	Professional or Trade Organization	Total Comments
Wildlife and Aquatic Resources	14	4	11	0	2	0	31
Environmental Quality	42	21	32	0	14	2	111
Income and Employment	11	2	7	4	2	3	29
Subsistence	17	0	19	0	6	0	42
Public Health	16	2	3	3	13	2	39
Others	23	13	9	0	2	7	54
Total	123	42	81	7	39	14	306

Table 2. Matrix of comments received from the RSNP Social and Environmental Impact Assessment (Summer 2006).

Comment Theme	Individuals, NGO's, Unidentified	Government Agency	Native Corporation	Professional or Trade Organization	Total Comments
Wildlife and Aquatic Resources	10	7	8	8	33
Environmental Quality	12	15	20	6	53
Income and Employment	28	9	30	5	72
Subsistence	14	13	18	6	51
Public Health	1	0	1	1	3
Others	15	11	29	3	58
Total	80	55	106	29	270

6.1.1 Red Dog Mine – Aqqaluk Project Supplementary Environmental Impact Statement

The majority of comments received during the Red Dog Mine SEIS scoping period came from individuals and government officials representing several different agencies. NGOs, native corporations, professional and trade organizations, and a native tribal organization (Maniilaq Association) also made submissions¹. Out of the 306 total comments, over one-third pertained to issues related to environmental quality and impacts related to mining. Other statements were spread relatively evenly amongst the other themes. In terms of subsistence-related comments, individuals, NGOs and government officials were most vocal. In the analysis presented in Chapter Seven, the content from many of these comments are addressed more specifically.

While there was a vast range of issues covered in the comments that were received, most comments expressed concerns about specific economic and environmental resources,

¹ The Maniilaq Association provides health, tribal, and social services to Native residents of rural Northwest Alaska.

and in some cases, they provided recommendations for specific types of analyses to be conducted in the near future. Comments identified as being the most relevant to this study, and which focused on the general relationship between mining and subsistence are summarized and presented in Appendix D. Many of these statements, opinions and ideas are also addressed in Chapter Six.

6.1.2 Raglan South Nickel Project – Public Hearings and Consultations

During the public hearings for the RSNP, native corporations provided a significant contribution to the process. Over one-third of identified statements came from the Makivik Corporation and other local landholding corporations which represent the most affected communities in the region located near the proposed RSNP. Comments were more evenly distributed amongst the six dominant themes, in comparison to those regarding the Red Dog Mine. Notably, there was far greater emphasis on social and economic issues, and subsistence resources in these hearings, than in Alaska. However, in contrast, public health issues related to mining were almost completely absent from these discussions.

The participants in the public consultation process are overall in favour of development, but they are also aware of the potential impact that projects of this nature can have on the physical and human environment. According to some people in Nunavik, mining projects in the past did cause considerable damage to the environment, but it is also believed that if the permitting process is respected, the environment should be reasonably protected. In general, the potential impact of mining activities on caribou and fish population was noted as the primary concern related to the preservation of environmental resources, and sustainability of the subsistence activities.

In terms of overall regional socio-economic development, people trusted that the impact of a new mine could be widely beneficial to current economic conditions, and even supportive of traditional lifestyles. For example, if there is infrastructure enhancement, such as the building of a new haul road, it could: (1) facilitate the supply of food, construction materials, etc., for the village, since maritime transportation is much less costly than air transportation; (2) enable people to travel more easily to hunting and fishing areas; (3) boost tourism by facilitating access to the village; (4) encourage people to work by enabling them to get to their jobs more easily; (5) increase opportunities for creating new businesses. A greater examination and discussion of the peoples input from the RSNP Social and Environmental Impact Assessment is included in the following chapter.

6.2 Overview of the SLICA Population

The indigenous peoples represented by the SLICA data include Inuit in Canada, Greenland, and Alaska. The Inuit represent 76% of the population in SLICA. Chukchi peoples who reside in the Chukotka region of north-east Russia constitute 18% of the population, while the Yukagir, Even, and Chuvan peoples who also reside in Chukotka represent the remaining six percent of the SLICA population. Throughout this section, the combined indigenous population represented by SLICA will be generalized as Inuit adults.

Much of the SLICA data analysis presented in this chapter is limited to specific communities and regions in the Arctic. However, many of the results communicated are taken from an analysis of the entire population surveyed in SLICA. As Usher and his colleagues noted in 2003, the concept of a “mixed” economy has rarely been examined on a broad geographical scale. SLICA provides the opportunity to overcome some of the

limitations inherent in the substantial literature documenting subsistence patterns, which consists largely of case studies involving no more than a few communities (Usher et al., 2003).

6.2.1 Income

Income is already an important ingredient in the lives of the vast majority of households throughout the Canadian north and Alaska. The economies of these regions already have major components of wage income and government transfer payments. In the six regions presented in Table 3, an average of 65% of all households maintain an annual income above \$23,000. As a reflection of the economic conditions existing in northern Alaska, this annual income figure is substantially higher than the federal poverty line for Alaska (2008), which is \$13,000 for an individual (U.S. Department of Health and Human Services, 2008). Similarly, the after tax low income cut-off in Nunavik was \$11,745 in 2007 (Statistics Canada, 2007). While these income figures demonstrate the existence of strong cash economies, there are notable disparities between regions. For example, 19% of households in Nunavik earn less than \$12,000 annually, while only 4% earn less than \$12,000 per year in the NANA region.

Table 3. Total household income adjusted for purchasing power by region.

	Nunavik	NANA	Total
5000 or under	7%	1%	4%
5001 to 12000	12%	3%	8%
12001 to 23000	21%	11%	16%
23001 to 37000	22%	18%	20%
37000 to 70000	24%	36%	30%
above 70000	13%	30%	22%
Total	100%	100%	100%

Income and Subsistence activities

In the Canadian Arctic, higher employment incomes are associated with greater involvement in subsistence harvesting activities. In terms of hunting, fishing, and food gathering, a minimum difference of 8% exists between the highest and lowest income cohorts (Table 4). The only exception is in the participation of trapping activities, where findings are reversed. However, trapping is not widely practiced as a subsistence activity in most regions of the Canadian Arctic and represents only a very small proportion of total harvesting activities. For example, in the village of Kuujjuaq in Nunavik, people earning more than \$15,000 annually from employment sources are much more likely to hunt, fish, and gather wild plants in the past year than those who earn less than \$15,000. Disparities in the levels of participation by each activity are 25%, 27%, and 18%, respectively (Table 5).

Table 4. Employment income by participation in subsistence activities in past year in the Canadian Arctic.

Participated in subsistence activities in past year					
	Hunting	Fishing	Trapping	Gathering	Total
15000 or less	55.2%	64.7%	13.7%	52.0%	46.4%
15001 - 30000	60.1%	73.8%	11.4%	51.7%	49.3%
30001 - 45000	67.9%	73.1%	13.2%	58.7%	53.2%
45001 or higher	65.8%	73.5%	8.1%	67.0%	53.6%
Total Average	57.9%	67.4%	12.9%	53.9%	48.0%

Table 5. Employment income in Kuujuaq by participation in subsistence activities in past year.

Participated in subsistence activities in past year				
	hunting	Fishing	Gathering	Total
15000 or less	57.4%	62.6%	55.8%	58.6%
15000 or more	82.9%	89.3%	73.6%	81.9%
Total average	70.2%	76.0%	64.7%	70.3%

Income and Subsistence Values

As defined in SLICA's international core questionnaire, traditional values refer to 20 different values, including but not limited to values related to subsistence such as respect for nature, hard work, and hunter/herder knowledge (Appendix D). There is a significant decrease in how important people consider subsistence values to be when they are making \$25 or more per hour. However, those in a middle income range (\$13-24/hr) are likely to consider subsistence values as being "very important" even more than Inuit adults in lower income ranges (Table 6). These findings sharply contrast with the relationship examined between participation in subsistence activities and income levels, where high wages correspond to high rates of participation. Interestingly, this suggests that the practice of

subsistence activities does not necessarily reflect the existence of a strong “traditional value” system.

Table 6. US PPP dollar per hour wages by importance of subsistence values.

	Not important at all	Not very important	Important	Very Important
6 or less	75.0%	25.5%	30.0%	28.4%
7 – 12	25.0%	27.3%	28.0%	28.2%
13 – 24	0.0%	30.9%	31.5%	30.3%
25 or more	0.0%	16.4%	10.4%	13.1%
Total	100.0%	100.0%	100.0%	100.0%

Income and the Sale, Exchange, and Purchasing of Country Food

Country food is a very important component of most people’s diets, constituting similar proportions of people’s total diet across northern Canadian communities. It represents “about half” or “more than half” of diets for upwards of 75% to 80% of people living in Nunavik, and for more than 65% of people in the rest of the Canadian Arctic (Table 7).

Table 7. Country food as a proportion of total diet by community/region.

	Kuujuuaq	Inukjuak	Quaqtaq	Kangiqsujuaq	Canadian Arctic
Less than half	19.6%	26.8%	14.8%	24.2%	32.3%
About half	56.0%	37.1%	54.1%	53.8%	32.6%
More than half	24.4%	36.1%	31.1%	22.0%	35.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table 8 reveals that in the Canadian Arctic, top incomes parallel higher rates of purchasing country food. Roughly 10% more individuals in the highest income grouping purchase country food compared to those individuals representing the lowest income group. Not only are people with higher incomes more likely to be involved in more subsistence

activities, but they also purchase more country food. Moreover, in smaller communities, people are less likely to buy country food than in larger communities (Table 11).

Consequently, in smaller communities, harvesting by family members to meet their own needs is particularly important. It can also be suggested that the higher rate of purchasing country food in some areas may facilitate the promotion of harvesting activities since larger supplies of country food are necessary in response to the greater demand.

Table 8. Personal employment income by country food purchased in the past year throughout the Canadian Arctic.

	Purchased country food in the past year	
	Yes	No
15000 or less	18.0%	75.8%
15001 – 30000	16.4%	80.9%
30001 – 45000	21.3%	74.5%
45001 or higher	27.1%	67.9%
Total average	18.9%	75.7%

While people in lower income ranges are less likely to purchase country food than those with higher incomes, they are much more involved in both the sale of country food to provide a source of income, as well as the exchange of country food for other items. For example, in the village of Kangiqsujuaq in Nunavik, Inuit adults with lower incomes are 20% more likely to sell country food than others in higher income brackets (Table 9). The use of country food as a medium of exchange by lower income Inuit adults is also nearly three times as common as it is for people earning more than \$15,000 annually from employment (see Table 9).

Table 9. The sale of country food, and exchange of country food for other goods by employment income - Kangiqsujuaq, Nunavik.

	15000 or less	15001 or more	Total average
Sold country food	33.0%	13.4%	23.2%
Did not sell country food	63.9%	76.4%	70.2%
Country food given in exchange	23.2%	8.6%	18.0%
Did not give country food in exchange	73.7%	81.0%	76.3%

A divide in the importance of country food for Inuit Adults also exists by location. The Canadian SLICA data presented in Table 10 reveals that the sale of country food is particularly important in smaller, remote communities such as Quaqtac and Kangiqsujuaq, opposed to a larger hub community like Kuujjuaq, where economic activity is much more diversified.

Table 10. Country food bought and sold in the past year in Nunavik communities.

	Kuujjuaq	Quaqtac	Kangiqsujuaq	Canadian Arctic
Country food bought in past year				
Yes	48.3%	15.9%	20.2%	18.9%
No	51.7%	84.1%	79.8%	75.7%
Country food sold in past year				
Yes	8.9%	26.3%	27.3%	6.9%
No	91.1%	73.7%	72.7%	93.1%
Total	100.00%	100.00%	100.00%	100.00%

Income and Ownership and Use of Subsistence Items

While income from wage employment and government transfers enables households to obtain valued country foods like seal, caribou, and fish, money is also essential for the purchasing of modern items used for subsistence activities. Items such as boats, snow

machines, and ATVs have become staple items used for harvesting activities and present a considerable financial cost to households (Condon et al., 1995; Dinero, 2007). These types of harvesting equipment are used by a majority of Inuit adults in Alaska and Nunavik, and rates of use are highest in the smallest and most remote communities. For example in Nunavik, 87.9% of people in Kangiqsujuaq use a 4-wheeler or ATV for harvesting purposes, whereas in larger communities like Inukjuak and Kuujjuaq, only 63.9% and 68.4% use these items (Appendix A). Similarly in Alaska, there is a 10-20% disparity in the use of subsistence items such as rifles, outboard motors, snow machines, chain saws, and ice augers in Kotzebue, compared to the dozen smaller communities in the NANA region, including Noatak and Kivalina (Table 11).

It is also evident that people throughout the Arctic are embracing the introduction of new technologies, such as GPS units, and using them to improve the efficiency and effectiveness of subsistence activities (Table 11 and Appendix A). The possession and ownership of subsistence items maintains a strong association with the level in which people harvest. Results from the international SLICA data set shows that people who harvest the most are also those who have access to the most subsistence items. Households that do not possess any subsistence items are very unlikely to even harvest any of the meat and fish that they consume (Table 12).

Table 11. Equipment used in household production in past 12 months by region/place size.

	Nunavik	Kuujuuaq	Other Nunavik	NANA	Kotzebue	Other NW Alaska
Freezer	*	*	*	78%	74%	80%
Rifle or shotgun	73%	84%	65%	86%	77%	91%
Camping tent	70%	84%	60%	64%	55%	69%
Outboard motor	58%	74%	46%	68%	56%	75%
Other boat	43%	33%	50%	80%	71%	85%
Sewing machine	59%	*	*	44%	52%	92%
Fishnets	55%	75%	48%	67%	39%	46%
Snowmachine	80%	64%	48%	83%	53%	74%
GPS, VHF, or CB	34%	90%	72%	78%	70%	90%
Sled	68%	71%	65%	52%	43%	56%
4-wheeler or ATV	53%	52%	50%	71%	24%	30%
Float suit	50%	*	*	28%	62%	76%
Chain saw	7%	*	*	58%	43%	66%
Ice auger	46%	55%	39%	46%	38%	49%
Truck	36%	52%	25%	24%	52%	10%
Canoe or kayak	24%	*	*	9%	5%	5%
Generator	16%	*	*	28%	25%	30%
Dog team	*	*	*	5%	5%	11%

* data not available

Table 12. Proportion of all meat and fish harvested by household by number of items used for subsistence.

	None	1 - 4	5 - 8	9 or more	Total
None	49.4%	35.8%	8.0%	4.1%	23.3%
Less than half	33.9%	38.9%	47.2%	29.0%	37.7%
About half	8.0%	15.5%	18.3%	27.4%	18.0%
More than half	8.8%	9.9%	26.5%	39.4%	21.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Income and Perceptions about the Future of the Subsistence Economy

In a survey of the entire Canadian Arctic population, a significantly higher percentage of people who earned above \$45,000 per year believed that there would be an increase in hunting, fishing, trapping, and gathering activities five years from now, compared to those earning less than \$15,000 annually (Table 13). These views are relatively consistent across both central and non-central communities alike. For example, in the village of Quaqtac in Nunavik, which maintains a relatively small population and is not a regional centre for activity, people with higher incomes were much more confident than people with lower incomes that in 5 years hunting, fishing, trapping and gathering activities would be carried out in the same way as they were at the present time (Appendix A).

Table 13. Personal employment income by changes to subsistence activities five years from now.

	Change in hunting, fishing, trapping, and gathering 5 years from now		
	Increase	Decrease	Remain the same
15000 or less	18.8%	12.5%	44.9%
15001 - 30000	20.4%	14.9%	45.8%
30001 - 45000	20.2%	12.7%	53.2%
45001 or higher	27.7%	13.7%	45.1%
Total average	19.9%	12.9%	45.7%

6.2.2 Employment

The extent to which individuals participate in traditional subsistence harvesting activities is also impacted by their level of involvement in the wage economy. Throughout the circumpolar north, 65.4% of Inuit adults that worked full-time jobs provided either “less than half” or “none” of all the meat harvested by their household. In contrast, in households

where no members are employed full-time, “about half” or “more than half” of their meat and fish is harvested by over 45% of the households themselves (Table 14). Therefore, when fully employed, subsistence activities and harvesting will often still take place, but not quite to the same participation levels.

Table 14. Proportion of all meat and fish harvested by household by the number of adults who worked full-time per adult household member.

		Number of adults who worked full time per adult household member				
		0 Adults	Less than 0.5	Less than 1	1 or greater	Total
Proportion of all meat and fish harvested by household	None	26.1%	14.8%	13.5%	21.0%	19.4%
	Less than half	28.8%	34.1%	34.3%	44.4%	37.1%
	About half	21.2%	25.7%	27.8%	19.0%	22.4%
	More than half	23.9%	25.4%	24.5%	15.5%	21.1%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%

Preferred Ways of Earning a Living

Although employment in the wage economy has steadily increased over the past several decades in many northern regions of Canada and Alaska, people still strongly prefer involvement in a combination of activities in order to make a living. In regional hub communities where there is greater economic diversification and generally more opportunities for employment, such as in Barrow, Kotzebue, and Nome, individuals are more likely to prefer working a wage job to make a living, than people living in smaller, more remote communities. For example, 21% of people in Kotzebue prefer working a wage job opposed to only 11% in the rest of the NANA region (Table 15). In smaller non-hub communities throughout Alaska’s Arctic region, a vast majority of people surveyed preferred the combination of wage and harvesting, herding, or processing activities as a means of providing a living. Overall, a majority of people living in hub communities also show a

preference towards mixed economic activities, but not to the same extent as in smaller communities. Also, twice as many Inuit adults in remote, smaller communities view an economy consisting only of harvesting, herding and processing as preferable. Although only a small proportion of people noted a preference towards harvesting, herding or processing as a sole means of providing a living, a significant divide existed between the community of Kotzebue and the other less populated communities in the Northwest Arctic Borough, such as Noatak and Kivalina. Also, throughout the entire SLICA population, subsistence activities as a preferred livelihood increases substantially as people get older (Table 16).

An examination of the comments from the RSNP meetings in 2006 reveals that the majority of participants believe that the arrival of a new mine is beneficial. The proposed activity is viewed as being supportive to the creation of jobs and businesses in Nunavik, and that it will offer good opportunities to the local population, especially for young people. Furthermore, it was noted that education and training programs geared towards jobs in the mining field are important for young people in the region, and this should begin in elementary school.

Table 15. Preferred ways for making a living in Alaska's northern regions.

	Barrow	Other North Slope	Kotzebue	Other NW Arctic	Nome	Other Bering Strait	Total
Working on a wage job	35%	19%	21%	11%	25%	5%	19%
Both wage and harvesting, herding, or processing	57%	73%	72%	75%	67%	89%	72%
Harvesting, herding, or processing	8%	8%	7%	14%	8%	6%	9%

Table 16. Preferred ways of making a living by age.

	16-24	25-34	35-44	45-54	55-64	65 and over	Total
Working on a wage job	49%	47%	50%	37%	44%	30%	45%
Both wage and harvesting, herding or processing	37%	34%	24%	30%	18%	22%	28%
Harvesting, herding or processing	14%	18%	26%	33%	38%	48%	27%
	100%	100%	100%	100%	100%	100%	100%

Inuit Perceptions of Employment

While a significant majority of people in Alaska claim a preference towards mixed economic activity or even a total absence of wage employment as a livelihood, in all SLICA countries, an average of 88% of people still perceive unemployment as a problem for indigenous peoples (Table 17). In Canada's north, the issue of high unemployment has been well documented over the past few decades (Berger, 1977; Caulfield, 2000; Duhaime et al., 2004). Data from SLICA helps confirm the prevalence of this problem, and also reveals discrepancies in employment characteristics between central and non-central communities. For example in Nunavik, average employment income, number of hours worked last week, and the total number of weeks worked annually in a small community such as Kangiqsujuaq is significantly less than in a larger community such as Kuujjuaq (Table 18).

In terms of increasing employment and economic opportunities in Nunavik, despite some concerns about impacts from expanded mineral development, participants in the RSNP public meetings highly supported the proposed project. Participants also claimed that since the Raglan Mine set the precedent of giving priority to job candidates from Salluit and Kangiqsujuaq, this should also be the case with the RSNP. Furthermore, residents and

organizations believe that it is in the best interest of Canadian Royalties Inc. to hire Inuit employees, because they are more adapted to the challenging northern environment.

The findings presented in this section help demonstrate that traditional activities are often preferred, but there is also broad acceptance that cash production through formal wage employment is fundamental to the continuation of peoples present lifestyles, including their subsistence activities.

Table 17. Perception of unemployment as a problem for Indigenous people by country.

	Canada	Greenland	Chukotka	Alaska	Total
Yes	87%	84%	100%	83%	88%
No	13%	16%	0%	17%	12%
	100%	100%	100%	100%	100%

Table 18. Mean employment characteristics.

	Kangiqsujuaq	Kuujuuaq	Canadian Arctic
Number of hours worked in the past week	13.7	20.9	12.8
Total number of weeks worked in the past year	23.5	34.4	23.9
Total employment income (\$ USD)	23,695.70	29,016.50	23,582.40

6.2.3 Environmental Quality

Perceptions of the Natural Environment in Northern Alaska

Approximately 41% of people living in Alaska’s three northernmost boroughs think that fish or animals in their community may be unsafe to eat. Nearly half of the surveyed population in these regions is also concerned about pollution in local lakes and watercourses,

and the contamination of other sites located near their villages. However, an average of only 24% of people believes that pollution from industrial development is an environmental problem. Pollution from other countries and climate change are also perceived to be environmental problems for Arctic Alaska. In general, there does not appear to be a significant divide between central and non-central communities in terms of how people view the state of their environment, and the factors influencing it. However, a notable exception exists in Northwestern Alaska, where the Red Dog Mine and port site are located. People in the smaller, more remote communities in NW Alaska are more likely to perceive pollution of local watercourses, pollution from other countries, pollution from industrial development, and the existence of locally contaminated sites as environmental problems, than people in the hub community of Kotzebue (Table 19).

At Red Dog Mine SEIS public consultation activities in Noatak and Kivalina, for example, the communities expressed concerns about the effect that dust, traffic, and the port are causing on water quality, vegetation and caribou herds. Furthermore, residents from Kivalina recommended that operations and issues that were assessed in the 1984 Red Dog Mine EIS should be analyzed in order to reveal what was described at the time versus the present situation and what has occurred since development began.

Many similar concerns were expressed during the RSNP public consultations by people in Nunavik who have had close to 10 years of experience with mining in the region. The primary environmental concerns expressed by participants related to changes in water quality, the potential contamination of fish, changes to air quality, the potential contamination of caribou meat, and overall changes to the population's hunting and fishing activities. People from both Salluit and Kangiqsujuaq fear that mining activities will affect

hunting and fishing in the area, and that an agreement should be negotiated in order to compensate for any loss of areas that are commonly used for subsistence. Furthermore, there are concerns that the transporting of minerals by truck, and the increased use of helicopters could lead to shifts in caribou migration patterns. The Nunavik Landholding Corporations Association noted that at the Red Dog Mine in Alaska, transporting of minerals along haul roads is halted while caribou migrate through the region, and that the same policies should be established for both the Raglan Mine and the RSNP.

Table 19. Perceived environmental problems by region/place in Arctic Alaska.

	Barrow	Other North Slope	Kotzebue	Other NW Arctic	Nome	Other Bering Strait	Total
Climate change	68%	47%	54%	51%	47%	75%	57%
Local contaminated sites	46%	45%	45%	51%	42%	53%	47%
Pollution of local lakes and streams	49%	35%	50%	60%	30%	44%	45%
Pollution from other countries	28%	25%	14%	22%	24%	29%	24%
Pollution from industrial development	34%	22%	22%	29%	17%	21%	24%
Fish or animals that may be unsafe to eat	32%	44%	43%	40%	39%	50%	41%
Erosion of coastal areas or riverbanks	73%	56%	66%	66%	33%	55%	58%

Although people in Northern Alaska have widely expressed that a number of environmental concerns exist in their respective regions, a considerable majority of people (68%) in these regions continue to be either “somewhat satisfied” or “very satisfied” with the health of their local environment. Even in regions where the economy is highly dependent on mineral extraction and processing activities (e.g. NWAB) or oil and gas development (e.g.

North Slope), people are generally satisfied with the state of the natural environment (Table 20). Peoples level of satisfaction with the natural environment is also reflected in the fact that a vast majority of SLICA respondents are at least “somewhat satisfied”, and in most instances “very satisfied” with opportunities to hunt and fish (Table 20). This satisfaction exists in NANA and other nearby areas of Northwestern Alaska despite the fact the Red Dog Mine has been operating in the region for over 15 years.

Issues related to subsistence resources were also a central topic of discussion at the Red Dog Mine, Aqqaluk Project public hearings. Many comments identified the sensitive balance between the economic benefits provided by the mine, and the concerns about impacts to subsistence resources, which are critical to the physical and cultural well-being of villagers in the region. Residents understood during the planning phase for the Red Dog Mine in 1984 that subsistence resources would be minimally affected by mining operations, but not to the extent that they would have to adjust to resources not being readily available. For example, the Kivalina IRA Council mentioned in the SEIS scoping session that subsistence hunters have had to travel farther, and spend more time and money to continue hunting caribou. However, since caribou are important to people’s cultural identity and existence, hunters will go as far as necessary to hunt and fish regardless of the expense.

Table 20. Satisfaction with the health of the local natural environment, and with opportunities to hunt and fish by region and place in Northwestern Alaska.

	NANA	Kotzebue	Other NW Alaska
Satisfaction with the health of the local environment			
Very satisfied	*	20%	22%
Somewhat satisfied	*	47%	55%
Not satisfied or neither	*	33%	23%
Satisfaction with opportunities to hunt and fish			
Very satisfied	66%	55%	71%
Somewhat satisfied	30%	37%	27%
Not satisfied or neither	4%	8%	2%
	100%	100%	100%

* data not available

Indigenous Peoples Influence over Natural Resources and the Environment

In Alaska as a whole, 64% of Inuit adults are either “somewhat” or “very satisfied” with their influence in reducing environmental problems in their own area (68% in NANA, 61% in Kotzebue, 71% in NW Arctic) (Table 23). This sense of control and influence in reducing environmental problems is relatively consistent across the communities representing Northern Alaska. With respect to the management of environmental resources, such as fish and game which have long been the foundation of local subsistence economies, an even higher proportion (74%) of individuals are satisfied with their influence. This level of satisfaction is particularly notable when compared to results from Greenland and Chukotka where only 54% and 29% of people are either “somewhat” or “very satisfied”, respectively. Moreover, only 6% in Greenland and 3% in Chukotka are “very satisfied” with their influence over the management of fish and game resources (Table 22). Unfortunately, this question was not included in the Canadian version of SLICA.

Table 21. Satisfaction with influence of Indigenous people to reduce environmental problems in their own area by community/region.

	Alaska	NANA	Kotzebue	Other NW Arctic	Barrow	Other North Slope
Very satisfied	19%	19%	19%	19%	23%	20%
Somewhat satisfied	45%	49%	42%	52%	47%	50%
Not satisfied or neither	36%	32%	38%	29%	30%	30%
	100%	100%	100%	100%	100%	100%

Table 22. Satisfaction with influence Indigenous people have on the management of natural resources like fish and game by country/region/community.

	Canada	Greenland	Chukotka	Alaska	NANA	Kotzebue	Other NW Arctic
Very satisfied	*	6%	3%	35%	43%	36%	46%
Somewhat satisfied	*	48%	26%	39%	36%	42%	33%
Not satisfied or neither	*	46%	70%	26%	21%	23%	20%
	*	100%	100%	100%	100%	100%	100%

* data not available

Since natural resource extraction activities provide such an important stimulus to many local economies throughout the Arctic, the amount of influence that indigenous people feel they have over the management of minerals and hydrocarbons is important. In Alaska, over half (53%) of individuals surveyed are either “somewhat” or “very satisfied” with the level of indigenous influence over the management of natural resources like oil, natural gas and minerals. Comparable to the high level of satisfaction with indigenous influence over fish and game resources, people in Alaska are also generally much more satisfied with their influence over resources such as oil, gas and minerals, than people in Greenland and Chukotka. Furthermore, people living in the northern, most remote communities in the State

of Alaska are generally more satisfied with their influence over the management of these types of non-renewable natural resources than in Alaska as a whole (Table 23).

Table 23. Satisfaction with influence Indigenous people have on management of natural resources like oil, gas and minerals by country/region/community.

	Canada	Greenland	Chukotka	Alaska	NANA	Kotzebue	Other NW Arctic
Very satisfied	*	3%	2%	18%	21%	36%	46%
Somewhat satisfied	*	41%	11%	35%	40%	42%	33%
Not satisfied or neither	*	56%	87%	47%	39%	23%	20%
	*	100%	100%	100%	100%	100%	100%

* data not available

6.2.4 Subsistence

In the village of Kuujjuaq, there is a higher rate of participation in every type of subsistence activity referred to in the Canadian SLICA questionnaire, compared to the rest of Nunavik's smaller communities. The difference ranges from 9% to 15% depending on the activity. In contrast, those inhabiting the smaller, rural communities in NW Alaska are more likely to be involved in subsistence activities than those in Kotzebue, which is the largest population centre in the region, and is the hub for government and business. Overall, throughout Nunavik and the NWAB, over 50% of people who took part in SLICA participated in subsistence activities, suggesting that these traditional activities remain an important element of life. Particularly high rates of participation are noted in food harvesting activities, and in other activities related to harvesting (Table 24).

Table 24. Participation in subsistence activities by region/place size.

	Nunavik	Kuujuuaq	Other Nunavik	NANA	Kotzebue	Other NW Alaska	Total Average
Fish	71%	77%	66%	86%	77%	90%	78%
Prepare or pack for hunting, fishing , camping trip	75%	84%	69%	72%	65%	76%	74%
Make and repair equipment or do household repairs	54%	59%	50%	52%	52%	51%	53%
Hunt caribou, moose, sheep	62%	71%	56%	61%	50%	66%	61%
Manufacture native crafts for sale	19%	*	*	15%	9%	18%	15%
Trap	9%	*	*	9%	4%	12%	9%

* data not available

Throughout the Arctic in general, there are differences in levels of subsistence participation by both gender and age. While the involvement of men and women in subsistence activities is almost equal at a rate of over 80% each, men tend to carry out more types of these activities than women (Table 25). People between the ages of 35-54 are the most heavily involved in subsistence activities, and roughly 50% of people in this age range practice more than six different types of activities. Indigenous adults in the 25 to 34 age grouping and those who are 65 years or older have the lowest rates of subsistence participation (Table 26). People in this age range are still capable of working in wage jobs, and were also quite young when larger industrial projects were in construction and operational phases.

Table 25. Level of subsistence participation by gender.

		Male	Female	Total
Subsistence level	0 activities	17.9%	18.3%	18.1%
	1 thru 5 activities	28.9%	45.5%	38.1%
	6 thru 16 activities	53.3%	36.2%	43.8%
Total		100.0%	100.0%	100.0%

Table 26. Level of subsistence participation by age of respondent.

		Age of respondent					65 and older	Total
		18-24	25-34	35-44	45-54	55-64		
Subsistence level	0 activities	19.1%	24.4%	11.8%	12.6%	18.1%	36.3%	18.4%
	1 thru 5 activities	36.4%	38.9%	39.2%	36.0%	40.3%	35.7%	37.9%
	6 thru 16 activities	44.5%	36.7%	49.1%	51.4%	41.5%	28.0%	43.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Subsistence Participation and Traditional and Formal Systems of Education

An analysis of the entire international population represented in SLICA, reveals that high educational attainment in formal educational institutions corresponds to lower levels of subsistence participation. For example, those with a post-secondary education are less likely to be involved in a very high level of subsistence activities, compared to those with just a high school diploma (13.7%) (Table 27). In contrast, a high level of traditional education is related to higher subsistence levels. A strong correlation exists between the highest level of traditional education and values, and those that engage in the highest number of subsistence activities (Table 28).

Table 27. Level of subsistence participation by education level.

		Education level				Total
		Elementary or less	Some high school	High School	Vocational or college	
Subsistence level	0 activities	18.1%	15.3%	12.4%	19.6%	17.5%
	1 thru 5 activities	39.4%	45.9%	32.1%	38.6%	37.7%
	6 thru 16 activities	42.5%	38.8%	55.5%	41.8%	44.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Table 28. Participation in subsistence activities by level of traditional education.

		Grouped values of traditional education index				Total
		1 to 7	8 to 11	12 to 15	16 to 20	
Subsistence level	0 activities	31.4%	15.3%	8.8%	8.2%	16.6%
	1 thru 5 activities	51.0%	47.0%	28.9%	14.9%	37.4%
	6 thru 16 activities	17.6%	37.7%	62.3%	77.0%	46.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Subsistence and Community Life

The Alaskan and Canadian version of the SLICA questionnaire asked respondents if they considered moving away from their community at any time in the past five years. At the national level, in Canada and Alaska, 29% and 42% of people considered moving, respectively. At the regional level, indigenous peoples in the smaller communities of Northwestern Alaska and Nunavik had roughly the same rates. However, at the local level considerable differences exist between central and non-central communities. In the past five years 21% fewer people in Kuujjuaq considered moving to other communities in Nunavik (15% versus 36%). In contrast, 57% of people in Kotzebue, and only 34% in other NW

Arctic communities considered leaving their community in the past five years. The differences in data presented in Table 29 raises the question of what factors may motivate people’s decision to stay or leave the community they are living in. In an open-ended question in SLICA, which asks for reasons why people would stay in their community, only 18% in the NANA region and 10% in Nunavik mentioned that subsistence activities influenced their decision (Appendix A).

Table 29. Considered moving away from community in the past five years by country/region/place size.

	Canada	Nunavik	Kuujuuaq	Other Nunavik	Alaska	NANA	Kotzebue	Other NW Alaska
Yes	29%	27%	15%	36%	42%	42%	57%	34%
No	71%	73%	85%	64%	58%	58%	43%	66%

An important relationship also exists between a person’s level of subsistence participation and how well traditional values are emphasized and promoted in the community. Table 30 shows that when people are satisfied with how well traditional values are promoted in their community, they may be more likely to engage in a higher number of subsistence activities. Communities can play a prominent role in promoting these values through various types of functions, such as native sporting events and festivals, community potlucks, accessible educational resources, local media, and political events. It could be suggested that although forms of industrial activity may be introduced in or near a community, the community itself is a very important agent in promoting and supporting the continuation of subsistence practices. If the values inherent in subsistence lifestyles have been deeply rooted in people through long-time participation in traditional activities, and an

exposure to traditional education, the subsistence base of the “mixed” economy could very likely remain strong.

Table 30. Level of subsistence participation by satisfaction with promotion of traditional values in community.

		Promotion of traditional values in community				
		Somewhat dissatisfied	Neither	Somewhat satisfied	Very satisfied	Total
	0 activities	16.3%	21.2%	19.1%	10.0%	18.4%
Subsistence level	1 thru 5 activities	36.2%	38.5%	39.6%	32.0%	38.0%
	6 thru 16 activities	47.5%	40.4%	41.3%	58.0%	43.6%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%

6.3 Summary

This chapter has provided a quantitative analysis of SLICA data, and more briefly has discussed qualitative information from two regional mining case studies. The focus of this analysis and presentation of results is on the study’s four main variables and how they interact in order to realize the complex relationship between large scale mining projects and North American Arctic communities characterized by “mixed” economic activity. These main variables, as outlined throughout the paper include income, employment, environmental quality, and subsistence. An analysis of the public comments that were received during consultation activities in Alaska and Northern Quebec reveals that in the face of prospective mining development, there is a wide range of concerns held by the public. However, it is evident that the predominant issues of importance centre on potential impacts related to environmental quality and subsistence resources.

The examination of SLICA data reveals the existence of strong cash economies in Alaska and Northern Quebec, and that higher employment levels and incomes are associated with greater involvement in subsistence harvesting activities. Higher incomes also relate positively to peoples ownership of items used for subsistence, as well as to peoples perceptions about the sustainability of the subsistence economy in the future. Furthermore, results show that indigenous people in these two regions have a preference towards an economy consisting of a combination of formal, market economic activity together with an economy based on subsistence production activities.

In terms of environmental quality, despite widespread concern about the environment, a considerable majority (68%) of people remain at least somewhat satisfied with the overall health of their local natural environment, and their opportunities to continue hunting and fishing. Moreover, the environmental impacts related to local industrial development are not viewed by many as a problem. Importantly, this is case even in regions where large-scale projects are in operation.

Overall, an analysis of community, regional, and national level data from the SLICA initiative in this chapter reveals that the subsistence economy remains important in many regions of the Arctic. Its significance has been maintained despite often rapid and multi-dimensional changes that result from the introduction of large-scale industrial development. However, it is important to note that considerable shifts have occurred in how subsistence activities are carried out by individuals and households. Chapter Seven will discuss changes to subsistence economies and the factors responsible for these shifts in greater detail.

CHAPTER SEVEN: ANALYSIS

7.0 Introduction

The social implications that have resulted from the shift to “mixed” economic activity and the development of the mining industry in the Arctic have been considerable over the past several decades. As the social stakes of development become more widely recognized, policy makers and mining companies will increasingly face the challenge of ensuring that the positive impacts of mining do not have detrimental social impacts. As stated by Huskey and Morehouse (1992, p. 135):

The current mixed economy of northern villages is the result of a long period of adjustment by the indigenous population to the opportunities offered and constraints imposed by contact with external political and economic forces. Natives have responded to opportunities to earn income and have made significant adjustments in their way of life. The contemporary village resident takes advantage of opportunities offered by both traditional and modern economies to create a livelihood.

Recent results from the SLICA initiative confirm that participation in subsistence harvesting and associated traditional activities remains strong throughout the entire Arctic. These findings are reflected in the emphasis that was placed on issues related to subsistence by participants in community consultations in Alaska and Northern Quebec in 2006 and 2007. Participation has been found to be especially high among men, and rates of participation in subsistence economic activity also increase with age, as middle-aged people (35-54) are the most heavily involved. Participation rates do begin to decline when people are 55 and older.

7.1 Discussion: Mining and Subsistence Activity

7.1.1 Income and Subsistence

Economic and employment data reveal the existence of strong cash economies in many Arctic communities. However, there are notable disparities between Alaska and Nunavik. This can be attributed at least in part to a longer history of formal market based economic activity in Alaska. This economic activity has mainly been driven by large industrial projects, including oil activities at Prudhoe Bay, and zinc mining at the Red Dog Mine.

Today, money and commodities are an integral part of the resources of contemporary Inuit economies. Subsistence pursuits alone require substantial monetary investments since movement on the land is done almost exclusively by truck, snowmobile, four-wheeler, and on the water by motorboat. Income attained from direct employment in the mining sector or from jobs that indirectly support the mining industry is critical in providing the financial resources necessary to support a high level of participation in the modern subsistence economy. While residents in the village of Salluit have noted that mining activities could affect hunting in areas near the project site, they also mentioned that people are now better equipped and willing to travel to new areas that are farther away and not traditionally used (Genivar, 2007).

An analysis of SLICA data from across the Arctic reveals that high employment incomes relate positively to a greater level of participation in subsistence activities, more purchasing of traditional foods, and greater confidence that local harvesting economies will be sustained in coming years. Moreover, people who have the ability to purchase items used

for subsistence, instead of having to borrow them are likely to have greater involvement in the harvesting economy.

These findings are quite consistent across the Arctic, and between smaller and larger indigenous communities alike. Despite often being situated considerable distances from northern economic centres (e.g. Kuujuaq and Kotzebue), many of the smallest and most remote communities have shown a reliance on modern subsistence items (e.g. GPS units) that is consistent with that of larger centres. Furthermore, country food tends to provide a larger and more important proportion of peoples' diets in smaller communities. However, people in more remote communities typically earn significantly less money, and there are fewer opportunities for wage employment. In mineral-rich regions of the north, mining exploration and development activities can provide an important influx of money that will help support the "mixed" economic activity.

Recent academic research conducted in the Gwich'in village of Vashraii K'oo in northern Alaska also suggests that those who were better able to access the benefits of education and economic wealth were also more likely to pursue subsistence activities (Dinero, 2007). The findings in Dinero's study are reaffirmed by results in SLICA, which demonstrated that both formal education and traditional forms of education are a factor in promoting involvement in the subsistence economy. The role of education in promoting subsistence lifestyles, as well as Inuit employment in the mining sector was a prominent discussion theme raised by the Kangiqsujaq Landholding Corporation during the public consultation process for the RSNP in 2006. The corporation made the following recommendations:

1. Schools should sponsor student visits to the mine, in order to provide students with an idea about their potential job opportunities.
2. In-school training programs should be shorter, since young people may be more motivated if training is done in a workplace environment rather than in a school classroom.
3. Canadian Royalties Inc. should reach an agreement with the Kativik School Board so that mining topics can be integrated into the high school curriculum.

Residents of the neighbouring village of Salluit also suggested that Canadian Royalties Inc. could offer training programs jointly with the Kativik School Board.

7.1.2 Employment and Subsistence

Common social and economic indicator research reveals that overall economic growth in northern regions is typically slower and narrower in scope than in southern, developed areas (Duhaime et al., 2004, p. 298). This situation has been a factor in the high rates of unemployment characteristic of many Arctic communities. The issue of high unemployment and low economic development in northern regions has gained considerable attention in recent decades. However, the problem may be exaggerated since much of the value of the traditional sector is “invisible” to conventional economic analysis (Berkes et al., 1994, p. 357). Since the products gained through harvesting do not pass through formal markets, government statistics are unable to take into account subsistence activities, and full-time harvesters are technically defined as “unemployed”.

An analysis of SLICA results show that northern indigenous peoples have a preference for an economy consisting of a combination of formal, market economic activity together with subsistence production activities. These preferences are even more pronounced in smaller communities, and as people grow older. These results also reflect the findings of studies that were carried out in the Copper Inuit community of Holman in Canada's Northwest Territories in the early 1990s. In Holman, Condon and et al (1995) noted that a general decrease in subsistence hunting involvement is characteristic of the younger generation (ages 20 to 35). This generation feels it must accommodate their harvesting activities to the demands of the workplace. It is often not until they have children of their own, or their parents die or become increasingly unable to pursue subsistence activities that they begin to express interest in subsistence activities (Oakes & Riewe, 1997, p. 107).

The results of this analysis echo the findings in Kruse's examination (1991) of the relationship between labour force participation, incomes and traditional subsistence activities among North Slope Inupiat in the 1980s. His assessment of conditions revealed that despite intense wage employment related to oil development in the region, a high level of participation in subsistence activities continued. A similar pattern was exposed in Bone's study (1992) on country food purchasing and consumption by the Dene and Metis peoples during the Norman Wells pipeline project in Canada's Northwest Territories during the mid-1980s; despite an increase in wage employment, there was no significant decline in the consumption of country food (Bone, 1992, p. 75). It appears that this pattern has been maintained or strengthened.

7.1.3 Environmental Quality and Subsistence

In recent years, there has been a tremendous amount of interest and effort focused on assessing contaminants, environmental change, and the potential impacts of climate change in Arctic regions. An increase in the identification and appearance of contaminants in northern regions in the past few decades has gained widespread attention because of the potential social, environmental and human health consequences. In the face of growing concern about the decline in the quality of the natural environment and its resources, the vast majority of indigenous people in Alaska do not believe that pollution from industrial development is a problem. Also, close to 60% of people are not concerned about contamination in their subsistence resources. This is even the case in the NWAB where the Red Dog Mine has been operating for over 20 years, and is often considered to be among the largest individual industrial polluters in the entire United States (Pemberton, 2008, p. 1).

The dominant message conveyed during the recent public hearings held in Alaska and Nunavik was that indigenous peoples are in favour of mining activities as long as the local natural environment is not negatively impacted. For example, at the Kotzebue scoping session for the Red Dog Mine SEIS, Siikauruq Whiting of the NWAB government stated that the Borough supports the extension of the Red Dog Mine, as long as it continues supporting local subsistence, and moves forward in a clean and environmentally friendly way (personal communication, October 2, 2007). It is unreasonable to suggest that mining developments will have no negative impact on the natural environment. However, if mining practices can minimize the extent to which they pollute, or if projects can be designed in such a way that environmental impacts and changes are either “invisible”, or do not alter access to, or

degrade the quality of resources used for subsistence while providing local benefits, people are likely to continue their support of mining activities. As it stands today in the NWAB, despite two decades of experience with mineral extraction and hauling, and related shipping activities at a seaport, a strong majority of people in the region are satisfied with both the health of the natural environment, and the opportunities that they have to hunt and fish.

Studies in Nunavik demonstrate a similar relationship between mining exploration and development activities, and the continuation of longstanding traditional lifestyle practices. Although the regulatory regime for mining exploration and exploitation has tightened significantly in the past 30 years, a considerable amount of effort must be undertaken to redress the negligence of the past. For example, Duhaime and his colleagues (2005) suggest that there are 595 potential mining exploration sites in Nunavik which contain equipment, dwellings, vehicles or other items that might have been abandoned during works conducted before 1976. Many of these sites pose a moderate or major environmental risk (Duhaime et al., 2005, p. 270). Over the years, local populations using the territory have discovered abandoned sites when travelling between their hunting and fishing areas. Duhaime states that, “from an environmental viewpoint, the scope of the problem is as yet largely unknown. However, from a social, economic and cultural viewpoint, the effects of environmental contamination on hunting and fishing activities would be considerable if the territory affected is extensively used by the local population” (Duhaime et al., 2005, p. 262).

There also appears to be growing confidence amongst northern peoples that the legal context for mining, as well as mining companies themselves are increasingly effective in mitigating the level of harm to the natural environment from mining activities. In a *Nunatsiaq News* report from May 17, 1996, prior to the commencement of operations at the

Raglan Mine, Jimmy Kakayuk, an Elder in Salluit notes that at first he was concerned about environmental damage from the opening of the mine, but now he is convinced of the company's desire to exercise an adequate level of care in its operations (George, 1996, p. 1).

7.2 Short-Term Versus Long-Term Impacts

Because of the vastness of the circumpolar north, and the fact that most major industrial developments are often situated in remote and sparsely populated areas where no previous industrial activity has ever existed, it can be difficult to predict how short-term uses of resources like minerals relate to the long-term effects on the productivity of resources such as wildlife. Short-term uses are those which occur during the lifetime of the project. Long-term effects generally refer to the time beyond the life of a project. The most significant short-term impacts to subsistence resources generally occur during the initial construction and early operational phases of a project (USEPA, 1984; Genivar, 2007). It is reasonable to suggest that if potential impacts can be properly mitigated at the beginning of a project, effects on the natural resources would be minimal. Environmental impact studies can play an important role in the early identification of potential problem areas, and enhance the potential for effective mitigation. Long-term environmental disturbances can be more difficult to predict, but they generally involve consequences to fish and wildlife. Depending upon the magnitude of a disturbance from mining activities, behaviour and movement patterns of wildlife could be significantly affected. For example, dating back to the early 1980s, there have been concerns expressed in both Alaska and Nunavik about the interruption to major seasonal caribou migrations as a consequence of nearby development activities. Major shifts in herd locations could have a very definite long-term subsistence impact on local residents.

7.3 Environmental Impact Assessment

The environmental regimes adopted in Canada and the United States call for studies that evaluate the potential impacts of proposed mining projects. One of the key purposes of conducting an environmental impact assessment prior to any project development is to recognize potential socio-economic and environmental consequences, and to identify and evaluate alternative ways to carry out a project (Halley & Verreault, 2000, p. 5). Impact studies for major industrial projects are still relatively young in existence (approximately 30 years), and their effectiveness in mitigating negative effects is constantly being evaluated and examined for potential areas of improvement. According to Stevenson, including local knowledge of indigenous people in an EIA can only lead to improved decision-making in the assessment and mitigation of negative environmental impacts, and increased benefits for northern communities (1996, p. 279). In northern Canada, in the past few decades, indigenous knowledge has had a variety of applications, particularly in resource management and land-use planning (Usher, 2000; Peters, 2003).

In the case of the Red Dog Mine Environmental Impact Statement (1984), potential subsistence impacts were evaluated primarily on the bases of interference with traditional harvest activities and increased nonresident harvest of fish and wildlife resources along the road corridors, port sites and mineral transfer facilities. The proposed mine site was located on the fringe of subsistence areas used by Kivalina and Noatak residents. Several alternatives were considered and they focused on lowering the risk of interference with subsistence harvesting activities. For example, it was suggested by a resident of Kivalina that the haul road should run parallel to the primary winter caribou range rather than cut across it. Also,

the road corridor should take a route that traverses fewer streams which are important for subsistence use. With respect to potential adverse effects on the continuation of traditional subsistence patterns from employment at the mine, it was also noted that work schedules and commuting patterns could be adapted to minimize conflicts with subsistence patterns (USEPA, 1984).

CHAPTER EIGHT: CONCLUSION

8.0 Introduction

The findings in this study share many similarities with those presented by Berkes et al (1994), when they asserted that despite the predictions of many economic planners to the contrary, the land-based economy has remained the cornerstone of the mixed economies of many northern communities. The shifts in income and employment, and the environmental changes that often result from large-scale mining projects do not appear to instigate a decline in people's participation in subsistence activities. An assessment of how the Raglan Mine in Northern Quebec and the Red Dog Mine in Alaska's Northwest Arctic Borough have influenced longstanding traditional practices of local indigenous peoples reveals strong community integrity². Even in the face of rapid and multi-dimensional changes in these Arctic regions, longstanding cultural practices have remained viable.

8.1 Summary of Study Findings

Public consultation processes included as part of regulatory environmental impact assessments in Alaska and Northern Quebec were important in the identification of specific concerns about past and current mining projects in each region, and expectations in the advancement of future developments. The analysis of hundreds of public comments indicates that people's main concerns regarding mining are focused on impacts to environmental quality and subsistence resources, and more specifically on issues related to caribou and fish

² "Community integrity" as defined in the 2004 Arctic Human Development Report (SAI, 2004): cultures can remain viable in the face of rapid and multi-dimensional changes. The experience of the Arctic demonstrates this is possible.

populations, as well as water quality. Overall, people are in favour of industrial development in their local region, and believe that this type of development may even be supportive of traditional lifestyles.

The examination of SLICA data reveals the existence of strong cash economies in Alaska and Northern Quebec, and that higher employment levels and incomes are associated with greater involvement in subsistence harvesting activities. Higher incomes also relate positively to peoples ownership of items used for subsistence, consumption of country food, as well as to peoples perceptions about the sustainability of the subsistence economy in the future. In a survey of the entire Canadian Arctic population, a significantly higher percentage of people who earned above \$45,000 per year believed that there would be an increase in hunting, fishing, trapping, and gathering activities five years from now, compared to those earning less than \$15,000 annually (Table 13). These findings are quite consistent across the Arctic region, and between smaller and larger indigenous communities alike. In contrast, there is a significant decrease in the importance that people place on subsistence values when they are making \$25 or more per hour. This suggests that the practice of subsistence activities does not necessarily reflect a strong “traditional value” system.

Results show that indigenous peoples in these two regions have a preference for an economy consisting of a combination of formal, market economic activity together with an economy based on subsistence production activities. These preferences are strongest in smaller communities. In regional hub communities where there is greater economic diversification and generally more opportunities for employment, such as in Kotzebue and Kuujjuaq, individuals are more likely to prefer working a wage job to make a living, than people living in smaller, more remote communities. In terms of harvesting or processing as a

sole means of providing a living, a relatively small proportion of people noted this as a preferred lifestyle. However, as people grow older, this proportion increases considerably. These patterns are consistent with findings from studies which examined the relationship between labour force participation and subsistence activities in the 1980s and 1990s (Kruse, 1990; Bone, 1992; Condon et al., 1995).

Despite widespread concern about the environmental issues in many northern communities, a considerable majority (68%) of people remain at least somewhat satisfied with the overall health of their local natural environment, and their opportunities to continue hunting and fishing. Moreover, the environmental impacts related to local industrial development are not viewed by many people as a problem, and the majority of people are not concerned about contamination in their subsistence resources. Importantly, this is even the case in regions where large-scale projects are in operation. In general, there does not appear to be a significant divide between central and non-central communities in terms of how people view the state of their environment, and the factors influencing it.

The sense of control and influence in reducing environmental problems, as well as in managing renewable and non-renewable natural resources is also notable. With respect to environmental resources, such as fish and game which have long been the foundation of local subsistence economies, a significant majority (74%) of people in the NWAB are satisfied with their influence. In Alaska, a small majority (53%) of people surveyed felt “somewhat” or “very satisfied” with their influence over the management of natural resources like oil, natural gas and minerals.

Results from SLICA reveal that participation in subsistence activities across the Arctic varies considerably. Also, there are large differences in participation rates amongst

different age cohorts, as well as by gender. Importantly, however, participation in family and community networks remains high in many regions, and this helps to ensure a minimum level of subsistence for most members of the population.

An analysis of the entire international population represented in SLICA, reveals that high educational attainment in formal educational institutions corresponds to lower levels of subsistence participation. In contrast, a high level of traditional education is related to higher subsistence levels. A strong correlation exists between the highest level of traditional education and values, and those that engage in the highest number of subsistence activities (Table 28). It appears that if the values inherent in subsistence lifestyles have been deeply rooted in people through long-time participation in traditional activities, and an exposure to traditional education, the subsistence base of the “mixed” economy could very likely remain strong.

An analysis of community, regional, and national level data from the SLICA initiative suggests that the subsistence economy remains important in many regions of the Arctic. Its significance has been maintained despite often rapid and multi-dimensional changes that can result from the introduction of large-scale industrial development. The findings in this thesis support the hypothesis, that while facing large-scale mining development in remote and northern regions, the participation of indigenous peoples in subsistence activities and their traditional values can be maintained. However, it is important to note that considerable shifts have occurred in how subsistence activities are carried out by individuals and households. For example, there have been tremendous changes to the equipment used for subsistence in recent years, and the duration of trips are often shortened as a result of more efficient and effective technologies, as well as competing work schedules (Condon et al., 1995, p. 38;

Buklis, 1999, p. 45). Furthermore, traditional hunting and fishing areas may have to be abandoned because of mining activities. This has occurred at the Red Dog Mine site, for example, because local hunters are no longer permitted on the land leased by Teck Cominco Inc.

8.2 Regional Economic Development and Mining Development in the Arctic

The reality of energy and mineral resource development in the north is that there is little permanence and eventually non-renewable resource exploitation must end because the oil or ore body is exhausted. Bone contends that this type of development cannot be sustained in the long-term and is not effective in promoting regional development (1992, p. 33). Berkes and his colleagues (1994) note that for “comprehensive regional economic planning, cultural sustainability, ecological sustainability, and economic sustainability need to be considered together” (p. 358). In this consideration, the northern economy must be structured in such a way that economic benefits from industrial development are channeled to enhance long-term and environmentally compatible economic activities (Duerden, 1992, p. 223). In the Arctic context, this means continuing traditional land-based activities, while exploring new and long-term opportunities for generating revenue. At the same time, the integrity of the natural environment must be kept intact. Therefore, it is necessary that wildlife populations used in the subsistence economy are conserved. Preserving natural capital also includes the goods and services that are provided by the biophysical environment (Jansson et al., 1994). For example, land and marine transportation networks must be sustained, and water quality should not be degraded.

Economic development tied to non-renewable resource extraction such as mining can potentially result in two problems. Firstly, there is the risk that local economies may become dependent on the income and employment that a mine may provide. Secondly, large projects run the risk of environmental losses through land-use changes and disturbances, and the release of contaminants. Alternative models for development are needed to provide a more sustainable economic balance. In many areas, renewable resource developments can be a viable means of creating more balanced development (Myers & Forrest, 1999).

The results of this study support the alternative development view advocated by Berger (1977), Wolfe and Walker (1989) and others who favour an economy consisting of both wage employment and traditional activities. Thus, a viable development strategy for mineral rich regions in the north may involve the sustainable use of land-based resources, while also exploring and carefully developing resource-based industries and the local services necessary to support resource development projects. Mining projects have the potential to strengthen indigenous lifestyles by providing indigenous people with the necessary income and time off to pursue their traditional land-based activities. Furthermore, they can support the skills required to live off the land and help ensure the transfer of indigenous knowledge, customs, values, and traditions to future generations (Stevenson, 1996). As Berkes argues, wildlife continues to be the major produce of the land, and it makes sense to use this renewable resource as the foundation of a culturally and environmentally sustainable economy (1995, p. 92).

8.3 Mining Projects and the Public

It is important that the information being presented by mining companies and other cooperating agencies at public hearings is comprehensive, and does not simply inform the public about the positive impacts from a project. This project information should also be made available well before formal public hearings so that the public has time to examine project details, internalize the information and not be confused by new information. It would also be helpful for affected communities to organize their own meetings prior to formal meetings in order for people to have an opportunity to hear each other's opinions, experiences and thoughts on the issues (Genivar, 2007). Elders' opinions and guidance on these issues could play a particularly important role in these types of meetings. Wherever possible, public consultation related to large scale projects should also be widened to involve more communities that could potentially feel the impacts from development.

It is also important that the public is given a clear indication of the duration of a proposed project, and an indication of the types of long-term implications that may follow decommissioning. Although shifts in commodity prices and market conditions can influence the viability of a project, and in some cases extend a project when known reserves can be extracted at a profit, project lengths are generally forecasted quite accurately (USEPA, 1984).

8.4 Further Research and Action

The analysis of SLICA data, as well as the comments that were received during public consultation processes in Alaska and Northern Quebec has provided important insights into how industrial activity and more specifically, large-scale mining projects relate

to factors associated with subsistence activity. The quantitative and qualitative information gathered from these sources, combined with related research that has been conducted over the past few decades, and which has been presented throughout this paper provide a basis for the identification of areas requiring action.

Issues requiring consideration:

1. Because of their intimate knowledge of the land and its resources, indigenous peoples could play a particularly important role in environmental monitoring and distinguishing mining project-related changes from natural changes in the environment (Stevenson, 1996, p. 278).
2. An increased emphasis on the practice of co-management of wildlife, where local indigenous users and wildlife managers cooperate to pool their expertise and knowledge, may be helpful in the development of strategies that aim to sustain wildlife supplies despite increased pressures on the natural environment stemming from polluting industrial activities (Collings, 1997, p. 41).
3. To encourage the integration of a maximum number of Inuit employees at a mine, a shorter work schedule rotation consisting of two weeks of work and two weeks off should be established. This will allow employees to spend more time in their communities and with their families, and makes available significant periods of time for involvement in subsistence activities. Where possible, it would also be beneficial to design work schedules that take into account harvesting seasons when people are most likely to engage in subsistence activities.

4. Monitoring of a mining project's influence on subsistence harvesting could be conducted by a special committee (e.g. Red Dog Mine Subsistence Committee) mandated to minimize potential subsistence problems. This type of committee could provide additional mitigation and monitoring of the environment that stretches beyond regulatory requirements.
5. Cross-cultural training for both Inuit and non-Inuit employees could be offered to help ensure that Inuit's traditional lifestyles are respected and protected.
6. Where applicable, infrastructure necessary for mining activities (e.g. roads and ports) should be developed in such a way that enables local people to travel more easily to hunting and fishing areas.

Taking into account the vast scale and complexity of large mining projects, the suggestions outlined in this section are anything but comprehensive, but rather are a starting point for improving the relationship between subsistence economies and mining projects. It is important to note that the conclusions reached in this study should not be generalized to include all large mining projects and communities in the Circumpolar North. Although SLICA consists of a large population sample which spans regions across the Arctic, the sample and results for this particular study were mainly limited to communities and regions in Alaska and Northern Quebec. Because of historical, political, and socio-economic differences between Arctic regions, it cannot be assumed that the relationship between mining development and "mixed" economies will be the same in all regions. For instance, the regions and projects that have been addressed in this study are subject to land claim agreements and Native development corporations, whereas in Greenland or the Russian

Arctic, the management regimes responsible for mineral development are much different. The size and scale, as well as the location of the particular mining project relative to communities are also factors that do not allow for a broad generalization of the study's findings. To fill some of the gaps in this study, future research could address the impact of smaller mining projects and mineral exploration activities, as well as projects that are located closer to communities. Furthermore, a study that similarly addresses the relationship between large-scale mining development and "mixed" economies, but instead looks at Arctic regions outside of North America could provide a better understanding of this relationship and a broader test of the study's main hypothesis.

Although the regulatory context for mineral exploration and development has gone development in remote, northern regions must continue to enhance its ability to accurately calculate the socio-economic and environmental consequences of large-scale mineral development. Mandatory public consultation activities included in the environmental impact assessment regimes in both Canada and the United States are important forums that help facilitate the exchange of conflicting ideas, interests and parties at the same discussion table. Having an opportunity to raise a wide range of concerns, expectations and hopes pertaining to a proposed industrial development project allows for setting goals that are acceptable to all parties. For instance, the importance of sustaining the quality of the natural environment for subsistence purposes was expressed during public consultation activities for the Red Dog Mine in the early 1980s. This issue was ultimately included in the Red Dog Development and Operating Agreement (1982), and eventually led to the establishment of the Red Dog Mine "subsistence committee".

Sustained contact with a dominant southern society and persistent demands to develop Arctic resources have inevitably altered northern subsistence economies. Despite these pressures, indigenous peoples have revealed how resilient traditional land-based economic activity can be in the face of continued industrial economic expansion. Throughout Alaska and the Canadian North, subsistence activities remain at the core of most village economies. By being aware of the issues and influences affecting the subsistence economy, and how many of the issues are interrelated, policy makers, regulatory bodies, third-party planners and consultants, and natural resource-based industries have the opportunity to be proactive, and better equipped to constructively approach subsistence-related needs.

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APPENDIX A: SUPPORTING TABLES FROM ANALYSIS OF SLICA DATA

4-wheeler and ATV use for subsistence activities in Nunavik communities

	Uses 4-wheeler or ATV for subsistence activities	
	Yes	No
Kuujuuaq	68.4%	31.6%
Quaqtac	74.1%	25.9%
Inukjuak	63.9%	36.1%
Kangiqsuuaq	87.9%	12.1%
Total Average	73.6%	26.4%

Use of GPS unit for subsistence activities in Nunavik communities

	Uses GPS unit for subsistence activities	
	Yes	No
Kuujuuaq	22.1%	77.9%
Quaqtac	29.3%	70.7%
Inukjuak	25.4%	74.6%
Kangiqsuuaq	16.3%	83.7%
Total Average	23.3%	76.7%

The subsistence economy five years from now by personal income – Quaqtac, Nunavik

	15000 or less	15001 or more	Total average
Hunting, Fishing, Trapping and gathering will be the same 5 years from now	31.5%	50.6%	39.3%

Subsistence activities as a reason for staying in the community

	Region	
	Nunavik	NANA
Subsistence activities mentioned as a reason for staying in the community on an open-ended question in SLICA	10%	18%
Not mentioned	90%	82%

* Age data is for Canada and Alaska as a whole

APPENDIX B: CONTACTS FROM ALASKA FIELD WORK (FALL 2007)

<u>Name</u>	<u>Affiliation</u>
Patty McGrath (SEIS Project Manager)	U.S. Environmental Protection Agency
Bob Tsigonis	Alaska Department of Natural Resources
Ron Romoelman	Tetra Tech Inc.
George Helfrich	U.S. National Park Service
Nina Shestakovich	Maniilaq Association
David Van den Berg	Northern Alaska Environmental Center
Pamela Miller	Alaska Community Action on Toxics
Vanessa Salinas	Alaskans for Responsible Mining

APPENDIX C: SLICA - TRADITIONAL VALUES INDICATORS

Use of traditional language
Sharing and helping
Respect for others
Cooperation
Respect for elders
Love for children
Hard work
Knowledge of family tree
Avoidance of conflict
Respect for nature
Spirituality
Humor
Family Roles
Teaching girls traditional roles
Teaching boys traditional roles
Hunter & herder knowledge
Domestic (homemaking) skills
Humility
Responsibility to the Ifupiat community
Community self-determination

**APPENDIX D: SUBSISTENCE RELATED COMMENTS FROM RED DOG MINE
SEIS SCOPING SESSIONS**

Wildlife and Aquatic Resources	Comment
<p>Comment Date: 10/15/2007 Source: Email Commenter: Myra Wesley Affiliation: None Type of Organization: Individual</p>	<p>Migration patterns are changing for the fall caribou herd, which used to number in the thousands and would graze for days within a mile of Kivalina. In current years the much smaller herd grazes 10-15 miles from Kivalina and the animals do not stay in the area throughout the winter.</p>
<p>Comment Date: 10/15/2007 Source: Email Commenter: Myra Wesley Affiliation: None Type of Organization: Individual</p>	<p>NANA and Teck Cominco have been informed that caribou are afraid to cross the haul road. Someone in authority needs to stop trucks from driving on the haul road for a few days or a week during the fall crossing.</p>
<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>Policies related to stopping truck traffic during caribou migrations to allow caribou to cross the road are inadequate. The trucks only stop when the caribou are close to the road. Caribou sense the trucks from a longer distance away do not approach the road due to the trucks. The caribou stay on the Kotzebue side of the road due to the constant truck traffic. The mine needs to stop transportation of ore during the fall caribou migration.</p>
Environmental Quality	Comment
<p>Comment Date: 10/14/2007 Source: Letter Commenter: George Helfrich Affiliation: National Park Service Type of Organization: Agency</p>	<p>The 1984 EIS identified potential issues associated with dust and identified monitoring as part of EPA's PSD permit. However, little physical or biological monitoring of dust has occurred. The SEIS should describe the extent of fugitive dust, its impacts and include practical alternatives that would mitigate the effects presented in the analysis.</p>
<p>Comment Date: 10/17/2007 Source: Letter Commenter: Joan Frankevich Affiliation: National Parks Conservation Association Type of Organization: NGO</p>	<p>Climate change may severely affect the operations and safety of the Red Dog Mine. It is imperative the SEIS address issues such as the effect of melting permafrost on the tailings impoundment and other potential changes caused by global warming.</p>

<p>Comment Date: 10/4/2007 Source: Testimony Commenter: Unidentified Noatak Resident Affiliation: None Type of Organization: Individual</p>	<p>Global warming could affect permafrost and allow new pathways for pollutants to get into the ground.</p>
<p>Employment and Income</p>	<p>Comment</p>
<p>Comment Date: 10/8/2007 Source: Letter Commenter: Pamela Miller, Colleen Keane Affiliation: Alaska Community Action on Toxics Type of Organization: NGO</p> <p>Comment Date: 10/15/2007 Source: Email Commenter: Roland Booth Affiliation: None Type of Organization: Individual</p> <p>Comment Date: 10/5/2007 Source: Testimony Commenter: Joe Swan Sr. (through interpreter) Affiliation: None Type of Organization: Individual</p> <p>Comment Date: 10/5/2007 Source: Testimony Commenter: Millie Hawley Affiliation: None Type of Organization: Individual</p>	<p>The SEIS should include a comprehensive examination of how the project has affected the social structure, leadership, economics, and culture of the communities in the region.</p> <p>The government has created a welfare mentality in the villages where not many want to work or they only work long enough to get what they want.</p> <p>We recognize that TCAK is providing income to NANA and the Borough and we don't want to force TCAK to stop. But we are concerned about the effects of the operation on our livelihood, our health, our lives, our business and water. TCAK should have proper rules to operate under if they are to open the new deposit.</p> <p>I have relatives that work at the port and don't want to see the mine close down but I want them to be careful mining. Red Dog started out being careless and got better over time because we voiced our concerns. We need to keep voicing our concerns.</p>

Subsistence	Comment
<p>Comment Date: 10/5/2007 Source: Email Commenter: Myra Wesley Affiliation: None Type of Organization: Individual</p>	<p>Because trucks travel on the haul road every 7 minutes, caribou are afraid of crossing the road. The few caribou that do cross the road no longer graze near Kivalina and most of the animals are not 'hunnable' (fawns, pregnant females).</p>
<p>Comment Date: 10/3/2007 Source: Testimony Commenter: Siikauraq Whiting Affiliation: Northwest Arctic Borough Type of Organization: Government</p>	<p>Subsistence is critical to our region and it is the lifeblood of who we are. Hunting and camping grounds in the Red Dog Mine area are critical for people</p>
<p>Comment Date: 10/3/2007 Source: Testimony Commenter: Siikauraq Whiting Affiliation: Northwest Arctic Borough Type of Organization: Government</p>	<p>The Borough supports the work on subsistence and clean air recognizing the mine is the primary source of revenue for the Borough. The Borough supports opening the Aqqaluk Deposit provided its done in an clean and environmentally friendly way.</p>
<p>Comment Date: 10/4/2007 Source: Testimony Commenter: Michael Sherman Sr. Affiliation: None Type of Organization: Individual</p>	<p>It's important not to leave our children behind as Teck Cominco expands the mine. It's important to be able to pursue the subsistence lifestyle but also get an education.</p>
<p>Comment Date: 10/4/2007 Source: Testimony Commenter: Unidentified Noatak Resident Affiliation: None Type of Organization: Individual</p>	<p>The subsistence committee should be consulted in developing the SEIS.</p>

<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>Migrations of caribou and beluga whale have changed since the mine has been in operation. Before the port was built, beluga traveled closer to shore. Prior to the road, residents of Kivalina were able to hunt caribou in the fall and winter across the lagoon from the village. These were unexpected changes.</p>
<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>Subsistence hunters from Kivalina have had to travel farther, spending more time and money to hunt caribou.</p>
<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>Due to mine operation impacts, life is not only harder for the hunters, for also for elders who rely on hunters who share their catch with them. Elders rely on Native food, and it is hard when they cannot get it from harvesters (e.g., caribou and fish the year of the fish kill).</p>
<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>The three important subsistence resources are caribou, fish and bearded seal and if any one of these is affected, life is hard. Residents understood resources would be minimally affected by the mining operations but not to the point that they had to adjust to resources not being readily available.</p>
<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>Subsistence foods are important to cultural identity and existence. Hunters will go as far as necessary to hunt and fish regardless of the expense.</p>

<p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p> <p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p> <p>Comment Date: 10/5/2007 Source: Testimony Commenter: Becky Norton Affiliation: None Type of Organization: Individual</p>	<p>A trained observer knowledgeable in both mining operations and subsistence activities should be located at the mine and port to monitor activities on a day to day basis and notify villagers in the event of a spill or other environmental issue. While Native employees at the mine may try to alert villagers of incidents at the mine, whistle blowers may be punished for reporting such incidents.</p> <p>The mine was responsible for at least one fish kill (1991), which made that year difficult in terms of subsistence resources. Kivalina residents are dependent on a variety of subsistence resources and disruption of any one makes the subsistence lifestyle more difficult.</p> <p>It would be good to do a subsistence study that looked at uses before Red Dog, now, and after Red Dog to see what changes have occurred.</p>
Public Health	Comment
<p>Comment Date: 9/28/2007 Source: Letter Commenter: None Affiliation: Maniilaq Association Type of Organization: Agency</p>	<p>Subsistence-related health effects should be included in the SEIS. Subsistence is integral to the nutritional, metabolic, emotional, and spiritual health of our communities. The short-term and long-term potential impacts to subsistence resources, subsistence practices and intake, and the risk of health problems pursuant to these impacts should be considered in the context of the available public health data, and the disturbances predicted under the proposed action, and appropriately mitigated.</p>

<p>Comment Date: 9/28/2007 Source: Letter Commenter: None Affiliation: Maniilaq Association Type of Organization: Agency</p> <p>Comment Date: 10/5/2007 Source: Consultation Commenter: Kivalina IRA Council Affiliation: Kivalina IRA Council Type of Organization: Government</p>	<p>The Alaska Department of Health and Human Services has completed excellent studies on contaminants and human health at Red Dog Mine in the past, with assistance from the U.S. Centers for Disease Control, National Center for Environmental Health. Input from these entities should be viewed as essential to a complete evaluation of potential contaminant-related concerns that may arise over the life cycle of the mine, including abandonment. Mitigation, however, might include a reasonable program of monitoring in subsistence resources and the human population, if found to be warranted.</p> <p>We have concerns about air quality including that dust from the road may be contaminating subsistence resources.</p>
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APPENDIX E: SUBSISTENCE RELATED COMMENTS FROM RSNP SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT PUBLIC CONSULTATIONS

Wildlife and Aquatic Resources	Comment
<p>Comment Date: 8/3/2006 Source: Consultation Affiliation: Resident Population of Salluit Type of Organization: Individuals</p>	<p>Mine activities could potentially affect the caribou that are found in the area. Caribou are usually more bothered by sounds and human activities when they are in smaller groups than when they are in a herd.</p>
<p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Board of Directors of the Kanqisujuaq Co-operative Type of Organization: Business</p>	<p>People are concerned that mining activities will have an impact on fish populations. In the last few years, dead fish have been found in Wakeham Bay River.</p>
<p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Kangisujuaq Landholding Corporation Type of Organization: Corporation</p>	<p>The caribou migration paths have changed since mining activities began near the study area. The new mine could lead to more changes to caribou migration paths.</p> <p>The coming and going of helicopters could have an impact on caribou that are present in or near the study area.</p> <p>At Wakeham Beach, dead crustaceans have been found on the shore. Is this related to mining activities?</p>
<p>Comment Date: 8/10/2006 Source: Consultation Affiliation: Nunavik Landholding Corporations Association Type of Organization: Professional Organization</p>	<p>The transporting of minerals could be halted while the caribou migrate though the study area, as is done at Red Dog mine in Alaska.</p>

Environmental Quality	Comment
<p>Comment Date: 7/31/2006 Source: Consultation Affiliation: Municipal Council/Directors of the Puvirtuq Co-operative Type of Organization: Government</p>	<p>The mine could affect the water quality and aquatic wildlife since the mine deposits are located in close proximity to the Puvirnituk River. This river is the village's source of drinking water and it is also a fishing site. Given that the project is located at the head of the Puvirnituk River watershed, the entire watershed could be affected by the mine.</p> <p>The mineral excavation projects will lead to a rise in the dust level, which could affect the people who live in the surrounding areas. Dust could also fall in the water courses and affect the water quality. An increase in dust content could also potentially contaminate the natural environment, depending on the mineral composition of the dust.</p> <p>Mine tailings could contain contaminants that may affect the environment.</p>
<p>Comment Date: 8/2/2006 Source: Consultation Affiliation: Municipal Council and Landholding Corporation of Salluit Type of Organization: Government/Corporation</p>	<p>Potential contaminations of caribou flesh because the migration route passes through the study area.</p> <p>Potential contamination of fish that migrate in the rivers located in the study area.</p> <p>Based on past mining experiences, the people are worried that mine tailings may be scattered by the wind and snow and that they will affect the surrounding natural environment. In order to limit the dispersal of mine tailings, they should be covered with gravel, layer by layer.</p> <p>Based on past mining experiences, the people are concerned that the water will be contaminated by accidental spills of waste water into the water courses and that overflow from the water treatment plant may end up in the water courses.</p> <p>Impacts on the landscape must be minimized by restoring the affected areas as much as possible.</p> <p>There must be environmental monitoring of the water quality and of the fish populations in water courses affected by the project.</p>

<p>Comment Date: 8/3/2006 Source: Consultation Affiliation: Resident Population of Salluit Type of Organization: Individuals</p>	<p>The use of the road in the Deception Bay and Watts Lake area will increase the dust content, which may affect the surrounding environment.</p> <p>Mining projects of the past did cause considerable damage to the environment (fox den habitats, archaeological sites, etc.). Today, mining projects must respect the environment if they want to pursue their activities.</p>
<p>Comment Date: 8/3/2006 and 8/4/2006 Source: Individual Meetings Affiliation: Population of Salluit Type of Organization: Individuals</p>	<p>Fear of pollution to the surface water caused by acid rock drainage flowing from the open pit mine.</p> <p>In order to limit the spread of mine tailings, the tailings should be covered with sand and gravel.</p> <p>The mining sites must be rehabilitated when the mine is closed so that the landscape is restored to its original state.</p>
<p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Board of Directors of the Kanqisujuaq Co-operative Type of Organization: Business</p>	<p>The people are concerned about air pollution; yellow-brown clouds have been observed around the bay.</p>
<p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Municipal Council of Kangisujuaq Type of Organization: Government</p>	<p>The mayor raised questions about the Raglan mine and would like to know more about the environmental impacts of the Raglan mine.</p>
<p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Kangisujuaq Landholding Corporation Type of Organization: Corporation</p>	<p>Mine waste should be concentrated in a strategic location, based on the direction of the dominant winds. This will prevent the scattering of fine dust particles that could easily end up in the surrounding environment.</p>

<p>Comment Date: 8/9/2006 Source: Radio Program Affiliation: Resident population of Kangiqsujaq Type of Organization: Individuals</p> <p>Comment Date: 8/10/2006 Source: Consultation Affiliation: Nunavik Landholding Corporations Association Type of Organization: Professional Organization</p> <p>Comment Date: 8/10/2006 Source: Consultation Affiliation: Makivik Corporation Type of Organization: Corporation</p>	<p>The mine could have negative effects on fish populations in the lakes. The mine could also affect the river flow velocity. Some water courses seem to have a reduced flow velocity, which may be due to the presence of the Raglan mine.</p> <p>Minerals should be transported in closed trucks; the canvas that covers trucks is not sufficient.</p> <p>In the context of the impact study, it is important to take into account the existence of nearly 600 mining exploration sites that have been abandoned and continue to pollute the environment.</p>
Employment and Income	Comment
<p>Comment Date: 7/31/2006 Source: Consultation Affiliation: Municipal Council/Directors of the Puvirtuq Co-operative Type of Organization: Government</p>	<p>There is concern that the majority of contracts will be awarded to companies from the south, that money will not stay in the Inuit communities and that Rouyn-Noranda will be the one to profit (as is the case currently with Raglan).</p> <p>Creation of companies that could fill the mine's various needs (diesel supply, construction of employee camps and maintenance buildings, hydro- or wind-power supply, air transportation, etc.), in addition to jobs at the mine, maintenance services (cleaning and machine repairs), and food services.</p> <p>The people want to be involved and want to be given the opportunity to invest in the project (corporate and private investments).</p> <p>They are also worried about discrimination against the Inuit. Cultural differences lead to a variety of conflicts.</p>

<p>Comment Date: 8/2/2006 Source: Consultation Affiliation: Municipal Council and Landholding Corporation of Salluit Type of Organization: Government/Corporation</p> <p>Comment Date: 8/3/2006 Source: Consultation Affiliation: Resident Population of Salluit Type of Organization: Individuals</p> <p>Comment Date: 8/3/2006 and 8/4/2006 Source: Individual Meetings Affiliation: Population of Salluit Type of Organization: Individuals</p> <p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Kangiqsujaq Landholding Corporation Type of Organization: Corporation</p>	<p>Cultural exchange program for employees to teach them about Inuit values and to provide information about the Inuit way of life. This type of program was implemented (but is no longer running) at Raglan and was considered to be very positive.</p> <p>Based on past mining experience, the people of Salluit are worried that the mine will only offer them service jobs, such as maintenance, cleaning, cooking, etc.</p> <p>Canadian Royalties must offer training programs jointly with the Kativik School Board and other partners.</p> <p>The village of Salluit would like a road to be built between Salluit and Deception Bay. This road would: 1) facilitate the supply of food, construction materials, etc., for the village, since maritime transportation is much less costly than air transportation; 2) enable people to travel more easily to hunting and fishing areas; 3) boost tourism by facilitating access to the village; 4) encourage people to work by enabling them to get to their jobs more easily; 5) increase opportunities for creating new businesses.</p> <p>Support local companies for the awarding of contracts at the mine, especially those companies that are 100% Inuit-owned. All services that are provided to the mine should come from Salluit rather than from southern towns.</p> <p>Canadian Royalties should reach an agreement with the school board so that mining topics can be integrated into high-school courses.</p> <p>Training programs should be shorter. Young people will stay motivated if there is more on-the-job training.</p> <p>Students should visit the mine with school. This will give them an idea about their potential job opportunities.</p>
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<p>Comment Date: 8/10/2006 Source: Consultation Affiliation: Nunavik Landholding Corporations Association Type of Organization: Professional Organization</p> <p>Comment Date: 8/10/2006 Source: Consultation Affiliation: Makivik Corporation Type of Organization: Corporation</p>	<p>The people of Nunavik are in favour of development but they are also aware of the potential environmental and social impacts.</p> <p>The Raglan mine created a precedent by giving priority to villages that are most affected by the mine (i.e., Salluit and Kangiqsujaq). It would be very difficult to proceed otherwise and to fairly involve all the communities of Nunavik in the new mining project.</p>
Subsistence	Comment
<p>Comment Date: 8/2/2006 Source: Consultation Affiliation: Municipal Council and Landholding Corporation of Salluit Type of Organization: Government/Corporation</p> <p>Comment Date: 8/3/2006 Source: Consultation Affiliation: Resident Population of Salluit Type of Organization: Individuals</p>	<p>There are several people from Salluit who hunt and fish in traditional sites located west of the study area (between the study area and the Puvirnituk hunting and fishing area). According to them, the people from Puvirnituk should not be asking to be involved in the project because they are less affected than the people from Salluit.</p> <p>Nearly 90% of fishermen from Salluit fish in the Deception Bay area. Increased port activities in this area could disrupt the fishermen.</p> <p>An agreement should be signed between Canadian Royalties and the village concerning the passage of boats in Deception Bay in order to compensate for or minimize the impacts on users of the bay.</p> <p>The population is increasingly using new areas for hunting and fishing. The population is growing and people are now better equipped with snowmobiles and ATVs so they can travel to areas that are farther away and not traditionally used. Mining activities could affect hunting in the study area.</p> <p>It would be preferable to prohibit the arrival of boats in Deception Bay in April (and in March if possible), because the passage of boats breaks the ice and prevents snowmobiles from crossing the bay.</p>

<p>Comment Date: 8/3/2006 and 8/4/2006 Source: Individual Meetings Affiliation: Population of Salluit Type of Organization: Individuals</p> <p>Comment Date: 8/3/2006 Source: Consultation Affiliation: Directors of Salluit Co-operative Type of Organization: Business</p> <p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Board of Directors of the Kangiqsujuaq Co-operative Type of Organization: Business</p> <p>Comment Date: 8/8/2006 Source: Consultation Affiliation: Kangiqsujuaq Landholding Corporation Type of Organization: Corporation</p>	<p>The use of existing roads in the Deception Bay area will result in an increase in activities, which could affect hunting in the area.</p> <p>Canadian Royalties should compensate the population of Salluit for the use of Deception Bay because this area is used frequently for hunting and fishing.</p> <p>The road from Deception Bay should be paved because otherwise there would be a large amount of dust and this would affect the villagers' hunting and fishing activities.</p> <p>An agreement will have to be negotiated to adequately compensate for the loss of hunting and fishing areas. This agreement must entail significant royalties.</p> <p>There should be no mineral extraction near Mequillon Lake. Is it possible to continue fishing in this lake if there are mining activities at the Mequillon deposit? If not, there must be compensation for this loss.</p> <p>People are concerned about a future regulation that would prohibit the carrying of rifles in the mining area and they are worried that they will no longer be able to hunt in the areas that are in close proximity to the mine. The study area is an important hunting and fishing area for the population of Kangiqsujuaq.</p> <p>The project area is an important fishing area for the population of Kangiqsujuaq. When the mine opens, it is possible that the population will no longer be able to access certain fishing areas.</p>
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<p>Comment Date: 8/9/2006 Source: Radio Program Affiliation: Resident population of Kangiqsujaq Type of Organization: Individuals</p>	<p>The project area is an important hunting area for the population of Kangiqsujaq. The presence of the new mine may cause the animals to move and may lead to a change in the present hunting areas. It is possible that the population will not be able to access certain hunting areas due to the presence of the mine.</p>
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