VARIABILITY, CHANGE AND CONTINUITY IN SOCIAL-ECOLOGICAL SYSTEMS: INSIGHTS FROM JAMES BAY CREE CULTURAL ECOLOGY

By Claude Peloquin

A Thesis
Submitted to the Faculty of Graduate Studies of
The University of Manitoba
in Partial Fulfillment of the Requirements
For the Degree of

Master of Natural Resources Management

Natural Resources Institute
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THE UNIVERSITY OF MANITOBA
FACULTY OF GRADUATE STUDIES
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Abstract

This thesis looks at how the Cree people of Wemindji, James Bay, Québec, understand and live with ecological complexity and dynamism. The focus is on the interplay between variability, change, and continuity in the Canada goose (*Branta canadensis*) hunt. I interviewed Wemindji hunters, and accompanied them to their hunting territories, learning from their knowledge and practices as these pertain to resource harvesting. Looking at Cree goose-hunting in the light of cultural ecology and resilience thinking, the research suggests that Cree hunters are attentive and responsive to ecological fluctuations, fine-tuning local arrangements to local environmental conditions. Ecological variability and unpredictability, such as weather, goose population dynamics and migration patterns, are mediated by local management strategies in which goose hunting areas shift in space and time. However, whereas these strategies are still practiced nowadays, they are (to some extent) overwhelmed by changes occurring at larger scales. Some of these are related to climate change and anthropogenic disturbances; others are related to social-cultural changes that influence resource-use patterns. I discuss how these different drivers interact among themselves and impact the goose-hunt, and how the Wemindji Cree respond to these changes.

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Chapter I

Introduction

Ecological systems are increasingly seen by ecologists as complex, dynamic assemblages of processes taking place at multiple scales (Picket et al. 1994; Levin 1999). It is assumed that under the right conditions, societies can – and do – develop social arrangements for resource-use that are attuned to this complexity and dynamism (Berkes and Folke 1998). This involves, among other things the ability to grasp and to live with uncertainty and unpredictability (Folke et al. 1998). Such adaptiveness is seen as a prerequisite for sustainability (Levin 1999).

The social processes underpinning human-environment relations, such as resource-use, are often grounded in epistemological frameworks that differ markedly from one society to another (Feit 1988; Freeman 1989; Escobar 1998). This invites inquiry on how these processes develop and evolve, and on how to account for the interconnectedness between social and ecological patterns (Davidson-Hunt and Berkes 2003a; Walker et al. 2004). In what ways do ecological phenomena elicit human responses, and in return, how do human practices influence ecosystems (Davidson-Hunt and Berkes 2003b)? Looking at how resource-users deal with, adapt to, and shape change is an important starting point to understand these relationships, especially in the light of developments in non-equilibrium ecology (Berkes et al. 2003). At the same time, such an exercise provides opportunities to explore the complex synergy of social and ecological changes as they manifest themselves at the local level: what do these large-scale changes mean at the level of the individual resource user (Gibson et al. 2000; Cash et al. 2006)?

Plate 1. The community of Wemindji, QC **Photo C. Peloquin**

Plate 2. Freighter canoes by the bank of the Maquatua River **Photo C. Peloquin**

To address these themes, this thesis explores the interplay between variability, change, and continuity in an indigenous, community-based, resource management system. The main focus is on a subsistence hunt in northern Canada; the Canada goose (*Branta canadensis*) hunt of the Cree people of Wemindji in James Bay, Quebec.

The James Bay-Hudson Bay acts as a funnel for migratory waterfowl as they travel north to their breeding grounds in the spring and back south in the fall (Reed et al. 1996). Canada geese (*Branta canadensis*), Atlantic Brant (*Branta bernicla hrota)*, snow geese (*Chen carulescens*) and other waterfowls stop in coastal ponds, inlets and islands for staging, feeding and resting (Reed et al. 1996). For the coastal James Bay Cree, the bi-annual goose harvest is among the most important subsistence activities and the one requiring the most social coordination (Craik 1975; Preston 1978; Berkes 1982; Scott 1983; 1986, 1996; Belinsky 2000). This goose hunt is a resource harvest that is highly attuned to the ever-fluctuating conditions influencing the behaviour and availability of these migratory birds as they travel through subarctic environments (Scott 1996). On the one hand, this harvesting system is flexible in providing appropriate responses to natural dynamics, on the other hand, it ensures that human disturbances do not overwhelm the geese while still providing a catch that is sufficient and socially acceptable for the hunters (Berkes 1982; Scott 1983). The practices entailed by this harvest are grounded in an ethos of respect to the geese, which are seen as sentient beings that may respond negatively to inappropriate practices and thus become unavailable for harvest (Preston 1978; Tanner 1979; Scott 1996). For example, the Cree intercept some of the geese as they fly from one site to another, allowing them to avoid disturbing the main goose congregations (Berkes 1982; Scott 1983). They also practice a rotation of hunting sites according to factors such

as winds, tides, goose behaviour and prior hunting pressure (Berkes 1982; Scott 1983, 1996). This is a prime example of resource use practices that are attuned to unpredictable fluctuations and responses within ecosystems (Berkes 1998; Emlqvist et al. 2004). This has implications from the standpoints of cultural ecology and social-ecological resilience. There are striking similarities between these harvesting practices and the adaptive approaches to environmental management that are increasingly prescribed by 'Western' ecologists in the light of the non-equilibrium view in ecology (Walters 1986; Berkes et al. 2000). I discuss some of these convergences.

At the same time, the goose hunt – and the conditions surrounding it – is reported to have been changing tremendously over the past decades (Scott 1983, 1996; Benessaiah et al 2003; CRA 2005). Hunters have been mentioning that the geese are adopting behaviours that make them difficult if not impossible to catch. Increasingly, geese fly inland, whereas the hunt is customarily developed as a coastal activity. Or they fly higher than before, they fly at night, or sometimes don't land at all. Hunters suggest a broad range of possible factors that may or may not be responsible for these changes. Some of these factors are related to 'normal' ecological fluctuations such as animals' demographic cycles, biophysical processes such as vegetative succession induced by land uplift, or manifestations of global climate change such as unsafe ice-travel conditions. Others emphasize the role of social-cultural trends that influence Cree values, outlooks and resource-use patterns, which in turn have repercussions on the relationship between hunters and their prey.

There is no strong consensus as to what exactly is behind the decline in success of goose harvest. Many hunters stress different and sometimes conflicting explanations. But

there is a consensus that all these changes do interact in ways that result in a reduction of the availability of geese to hunters.

This provides an interesting starting point for studying how change occurs in a dynamic and resilient setting, and on the mechanisms for continuity in a complex and changing world (Holling 2001; Walker et al. 2006). At the same time, the implications of shifts in ecosystems are often specific to the social settings in which they occur, and they are known in ways that are culturally specific (Berkes 1999; Kendrick 2003; Cruikshank 2005). Moreover, just as the complex myriad of trends and events that shape ecological processes is grasped through specific ways of knowing, it is out of this understanding that adequate responses and adaptations are most likely to emerge, since these are based on local assessments of the situation that account for what matters most to resource-users themselves (Bennett 1969; Ridington 1982; Berkes and Jolly 2001).

1.1. Purpose and objectives

This thesis explores the implications of Cree goose-hunting from the standpoints of cultural ecology and of social-ecological systems thinking. Specific attention is paid to the changes impacting this harvest; what they are, how they take place, and what they mean in the social-cultural context of Wemindji.

The broad objective of this thesis is to understand how social-ecological changes manifest themselves in a local, customary, community-based resource management system. This requires first and foremost a good grasp of how people apprehend, and interact with their environment (Ingold 2000: Berkes and Davidson-Hunt 2003b). In this context, what insights do Cree hunters' ways of knowing and ways of doing provide for

resource management in the face of uncertainty, change and complexity (Berkes et al. 2000)?

To this aim, this thesis addresses the following questions:

1. How do Cree hunters perceive, talk about and mediate the variability, unpredictability and change characterizing the goose hunt?
2. What are the factors - or drivers - of change identified by the Cree as impacting the goose hunt?
3. How are the Cree responding to these changes?

I explore the two-way relationship between people and their environment as a set of processes occurring at multiple scales and shaped by factors that are both bio-physical and social-cultural (Davidson-Hunt and Berkes 2003b). I deal with human-environment relationships by focusing on interlinked social-ecological systems – rather than social systems or ecological systems per se (Berkes and Folke 1998; Westley et al. 2002). From a complex systems perspective, social-ecological systems are self-organized, dynamic assemblages of fluid relations among components (Holland 1995; Lansing 2003). These systems are characterized by non-linear processes and interactions across scales (Holland 1995; Levin 1999). They change all the time, often in ways that cannot be predicted or controlled (Holland 1995; Lindley 2007).

Given the complex and dynamic nature of environmental processes, humans, as resource-users and managers, must live with a high degree of uncertainty and unpredictability, and they must be able to adapt to and shape change (Botkins 1990; Folke et al. 2003). Understanding the mechanisms leading to social-ecological adaptiveness is important. In a complex and dynamic world, how can societies manage

for flexibility and resilience as opposed to mere 'brittle' stability (Holling and Meffe 1996; Folke et al. 2003)? Before going any further, some key concepts should be defined.

The following concepts of change and variability are used throughout the thesis. Change here refers to a temporal and spatial deviation from a norm that exceeds normally expected variation, i.e. fluctuations in ecosystems that are beyond the scope of natural variability, such as surprise, crisis and re-organization (Holling 1986; Levin 1999). Variability refers to the range of fluctuations that is usually expected within a given system, or historic variations (Landres et al. 1999; Parlee 2006). Change and variability are not qualitatively different one from another *a priori*, but treating them as such allows distinguishing between fluctuations that are 'normally' expected, and those that are not (Landres et al. 1999). Given the arbitrary nature of such a distinction, value judgments, scales of observation and other aspects of perspective largely define what is 'normal variability' versus 'abnormal change' (Landres et al. 1999; Parlee 2006; Reid et al. 2006).

The complex, dynamic and non-linear nature of system processes lead to a great degree of unpredictability and uncertainty, or indeterminacy (Holland 1995; Lindley 2007). What this means is that patterns can be observed but not accurately predicted (Levin 1999). The outcome of a system can not be precisely predicted through deterministic models. At best, the outcome can be estimated by a probability distribution. Uncertainty is then a function of probability (Lindley 2007). The underlying mechanisms of complex systems often remain poorly understood. In the context of environmental management, uncertainty and unpredictability mean that unforeseeable consequences may emerge from any management decision (Holling 1986; Ludwig et al. 1993). This often leads to 'surprises' where the perceived reality differs qualitatively from what is

expected (Holling 1986; Gunderson et al. 1995). The interplay between change and complexity, and the surprises it generates, amounts to some degree of turbulence in social-ecological systems (Berkes et al. 2003).

Throughout the thesis, the concept of scale is refers to the "spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon", and "levels" as the units of analysis that are located at different positions on a scale" (Cash et al. 2006, after Gibson et al. 2000). A spatial scale may include levels such as species, patch, habitat, and so on (Jentsh et al. 2002), whereas a temporal scale may be divided in time frames "related to rates, durations, or frequencies" (Cash et al. 2006; Reid et al. 2006). Cross-scale and cross-level interactions are processes that span over one or more unit or level of organization (Cash et al. 2006). Wemindji hunters do not speak in terms of 'scale' *per se*, and as such this concept may not offer a symmetrical counterpart to how the Cree view their environment. However, speaking in terms of 'scale' remains one of the ways in which one can grasp and express the complexity of life on the land. It is in this quality that scale is of interest for this thesis, but it is important to note that this concept is not a Cree one, and therefore provides a translation of Cree ecological understanding that is incomplete at best.

'Resource management' is looked at as the broad set of institutions, practices and environmental processes that frame human access to and procurement of natural resources (Folke et al. 1998). This differs from the narrower, utilitarian definition of the 'command-and-control' approach to natural resource management (Holling and Meffe 1996). That conventional notion of natural resource management is seen by many as problematic, as it is based on faulty assumptions, on over-simplification of ecological

processes, and it is grounded in approaches that value short-term gains by human to the detriment of other outcomes (Ludwig 2001). Furthermore, that historic approach to natural resource management is inappropriate when explaining the ways in which indigenous hunters interact with the animals. For the Eastern Cree, animals are sentient beings engaged in relationship of reciprocity with other persons, be they human-persons or animal-persons (Speck 1935; Tanner 1979).

Hunting societies largely operate on a system that has similarities to common-pool resources management, in which institutional arrangements are based on rules-in-practice as opposed to codified rules as law (Berkes 1986; Ostrom 1990; Parlee et al. 2006). Throughout this thesis, I use the concepts of practices, rules, and ways of doing to address the Cree institutional arrangement as it pertains to resource-use, but what 'rules' mean in this context is specific to Cree culture, which will be addressed in further detail in the next chapter.

To explore how Cree hunters respond and shape the change occurring in the goose hunt, I draw upon Bennett (1969), favouring and emphasis on the "problem-solving, creative or coping elements in human behaviour that permits a dynamic approach to environment" (Bennett 1969, p. 19). McCay distinguishes between coping mechanisms and adaptive strategies (1978). Coping mechanisms are the short-term, day-to-day choices and decisions consciously made when choosing between alternatives (Bennett 1969; McCay 1978). These decisions could be understood as informed by their 'opportunity cost', which is the value of a given option relative to its alternative. Economic, ecological, and cultural factors combine and influence the "behaviour of choice, decision and coping". This combination amounts to an adaptive behaviour, often

at the level of the individual or of small groups (Bennett 1969, p. 16). Adaptive strategies are more profound modifications of the ways of doing that result from the combination of coping mechanisms over time (McCay 1978, Berkes and Jolly 2001). These may include changes at the level of the community or larger groups, and that span over periods of years and decades (McCay 1978).

The theoretical significance of the study is related to three main themes: 1) understanding social-ecological processes in northern environments that are undergoing bio-physical as well as social-cultural changes at multiple scales (Chapin et al. 2004a, 2004b; Olsson et al. 2004; Berkes et al. 2005); 2) evaluating how change occurs within a dynamic but resilient social-ecological setting, with a focus on how resource users themselves understand and navigate this complexity (Davidson-Hunt and Berkes 2003a; Folke et al. 2003); and 3) the roles of cultural factors and agency in adaptation to environmental change (Bourdieu 2000; Folke et al. 1998).

At a more practical level, for indigenous societies whose cultural identity is intimately tied to the relationships with the land supporting them, the ways in which ecological knowledge and practices develop and evolve is at the core of cultural continuity and renewal. By looking at the Wemindji goose hunt and understanding how it is changing provides a good context to exploring how customary land stewardship navigates in a complex and changing environment.

1.2. Research approach, theory, and conceptual framework

This research is qualitative, informed by a pragmatic perspective that seeks "truth merely as consensus reached through dialogue and conversation" (Demeritt and Dyer

2002, p.238). The research orientation and methods employed are largely borrowed from the ethnographic tradition in cultural anthropology (Marcus and Fischer 1986; Bernard 1994; Wolcott 1999). I favoured a grounded theory approach, making a liberal use of theoretical constructs as heuristics, as 'ways of thinking' through iterative combinations of both inductive and deductive reasoning (Glaser 1992). To this aim, I draw mainly from two strands of theory and approach: 1) cultural ecology, ethnoecology and traditional ecological knowledge (Steward 1955; Cox 1973; Toledo 1992; Berkes 1999), especially as these pertain to the Eastern Cree knowledge and values (Tanner 1979; Preston 2002; Feit 1995, 2004; Scott 1996), and 2) non-equilibrium ecological science, including theories of ecological system resilience and adaptive management (Holling 2001; Gunderson and Holling 2002; Walker et al. 2006); consistent with an understanding of ecosystems that go beyond the precepts of stable equilibrium systems (Pickett et al. 1994; Scoones 1999) and that sees ecosystems as complex adaptive systems (Levin 1999). I expand on these two strands.

Cultural ecology looks at the relations between culture and social arrangements and the environmental settings of various groups (Steward 1955, Cox 1973, p.7; Zimmerer 2007). It overlaps with ecological anthropology, ethnoecology and the study of traditional ecological knowledge (Cox 1973; Netting 1977; Freeman 1992; Toledo 1992; Berkes 1999). This thesis explores how Cree hunters 'make sense of' and 'deal with' the complexity and unpredictability intrinsic to their environment. To this effect, it seeks to provide a locus for dialogue in which both Cree and 'western' perspectives can combine. That is, it is assumed that Cree and non-Cree traditions of knowledge are not separated by impermeable boundaries and differences (Agrawal 1995), but at the same time it

recognizes that Cree values and knowledge are built upon ontologies and epistemologies that do differ radically from the ones of the non-indigenous segment of the Canadian society (Scott 2004, after Freeman 1989 and Berkes 1999).

Non-equilibrium ecology emphasizes, among other things, the importance of non-linear processes, the effects of complex feedback loops among different processes, and the importance of disturbances as part of renewal cycles that are essential to ecosystem functions (Botkins 1990; Levin 1999).[1] These developments point out to the shortcomings in the 'conventional' approach to ecological thinking that emphasize stability, balance and equilibrium (Pimm 1984; Pickett et al. 1994; Levin 1999).

Systems theory provides conceptual tools that facilitate understanding how change occurs in complex and dynamic arrangements. According to this thinking, such an assemblage should be understood as characterized by relations of relations among elements rather than by the elements themselves (Holland 1995). In systems that are complex and adaptive, these relations are responsible for the self-organizing properties of an arrangement are understood through the notion of complex adaptive systems. Complex adaptive systems are webs of relationships from which homeostatic patterns emerge under given conditions (Holland 1995; Levin 1999; Lansing 2003).

The property of systems that pertains to their ability to remain assembled in a given state has been termed resilience. This refers to "the magnitude of disturbance that can be absorbed or accommodated before the system changes its structure by changing the variables and processes that control system behaviour" (Holling 1996, p.330). Following the recognition that change and complexity are intrinsic to ecosystems,

[1] Disturbance is here defined as "any relatively discrete event in time that disrupts ecosystem, community, or population structure and change resource, substrate availability, or the physical environment" (White and Pickett 1985, p.8). In this context, it is a relative concept that is scale-specific.

resilience theory offers a way of thinking on how these systems change, remain the same, or both (Holling 1973, 2001; Walker et al. 2006).

Resilience thinking has expanded from its initial ecological application (Holling 1973) to include the role of social and cultural attributes in understanding the interplay between change and persistence in human-environment relations (Berkes and Folke 1998; Gunderson and Holling 2002; Berkes et al. 2003). This is also consistent with the recognition that the complex patterns of change and persistence observed in ecological systems are also found in social systems, including institutional and cultural arrangements (Gunderson et al. 1995; Gunderson and Holling 2002; Westley et al. 2002).

Both cultural ecology and resilience thinking emphasize the interconnectedness between social and ecological processes. The definition of 'society' and 'nature' as separate entities, which is at the core of 'Western' ontology, has not arisen in indigenous worldviews worldwide. Many of these societies instead favour worldviews better explained as webs of relationships linking both human and non-human beings (Latour 1991; Ingold 2000). In Algonquian cosmology, including the Eastern Cree, there is no fundamental separation between human and non-human entities (Hallowell 1960; Preston 2002). These exist on similar levels, within a web that has been described as a 'community of beings', within which they engage in relationships of mutual respect and reciprocity (Hallowell 1960; Preston 2002; Berkes 1999; Adelson 2001).

Such a view is of interest to those from within Western cultures who are questioning the validity and desirability of the nature-society dualism (Descola and Palsson 1996). This questioning arises partly from ecological crises resulting from industrial developments, the recognition that human activity largely contributes to the

shaping of the ecosystems on which it relies, and the post-modern critique of 'nature' as socially constructed (Latour 1991; Gomez-Pompa and Kaus 1992; Norgaard 1994). At the same time, the development of the non-equilibrium view in ecology, as it challenges the notion of 'balance of nature', allows for human societies to be seen as intrinsic parts of the ecosystems they inhabit, and even as key drivers of ecosystem dynamics (Pimm 1991; Norgaard 1994; Scoones 1999).

These strands of theory and approach are combined through a view of interlinked social systems and ecological systems as complex adaptive systems, which provides the conceptual framework of this research, following Berkes and Folke (1998). The social-ecological systems approach provides a good way of looking at the two-way relationship between humans and their environment (Descola and Palsson 1996). It highlights the interrelatedness between social and ecological processes (Adger et al. 2000; Gunderson and Holling 2002; Berkes et al. 2003), and it provides a way of looking at the role of humans in their environment that seem closer to the cultural ecology of many indigenous societies (Alcorn and Toledo 1998; Berkes and Folke 1998), including the James Bay Cree (Berkes 1998; Berkes and Folke 2002).

1.3. Study Area and Setting

The research takes place in the territory of the Cree Nation of Wemindji, a coastal community on the eastern seaboard of James Bay, in Mid-Northern Quebec, latitude 52 degrees North, with an approximate population of 1200.

The Eastern Cree constitute a population of 13,000, grouped in nine communities, five of which are coastal, all on the western side of sub-arctic Quebec (GCC 2007). Their

occupation of the area in the larger Eastern James Bay Area is thought to date from at least 3500 years ago, and their collective territory covers approximately 375,000 square kilometres of land and water to the east and southeast of the James and Hudson Bays (Denton 2001; Feit 2004). They are part of the larger Algonquian linguistic group, which roughly spans from Labrador to the Western Prairies (Speck 1935; Preston 2002). Different sub-groups within this linguistic group share many crucial characteristics in addition to similar languages, which are mutually intelligible in many instances (Speck 1935; Hallowell 1960). These groups also share similar histories of being largely autonomous, loose-knit, kinship-based groups living in the sub-Arctic boreal ecosystem, traditionally organized around a subsistence mode of production. This consists mostly of hunting and gathering livelihoods with a strong emphasis on notions of exchange, reciprocity, as opposed to one on accumulation of material goods (Speck 1935; Tanner 1979).

The eastern James Bay area has been impacted by large-scale hydroelectric development starting in the 1970s, which brought massive social, economic and environmental changes to the Cree societies (Richardson 1976; Niezen 1998). The Cree then had to negotiate their lifeways with the provincial government of Quebec. These negotiations led to the Northern James Bay and Quebec Agreement (JBNQA) (Quebec 1976), which was signed in 1975, as the first 'modern' comprehensive land claim in Canada (LaRusic 1979). This negotiation aimed at fulfilling a commitment to deal with land issues dating back to the late 1800s. These issues include aboriginal land claims, financial compensation, aboriginal rights and regimes for future relations between aboriginal and non-aboriginal peoples (LaRusic 1979). While the hydro-driven industrial

developments brought with them tremendous economic, social and cultural change, a high level of cultural autonomy and continuity has been observed among the Cree (Preston 2002; Scott 2001; Feit 2004). In present-day James Bay, hunting and fishing remain central to Cree culture and economy. A substantial proportion of the Crees remain full time occupational hunters and fishers, supported by an income security program, and a larger proportion continues to engage in part-time hunting and fishing, often during the weekend. These practices, and the Cree lifeways in which they are embedded, remain largely influenced by traditional notions of respect and reciprocity as crucial goals within this 'community of beings' (Feit 2000; 2004).

Biogeographically, this area is described as Taiga forest, part of the Hudson and James Bay lowlands. This ecosystem is characterized by relatively low ecological productivity and high variability (Henri 2002; Chapin et al. 2004a). The animal populations include migratory species such as geese, ducks and caribou, and animals that are not necessarily migratory but cover very large ranges, such as moose, wolves, bears, and wolverines (Bider 1976; Bearskin et al. 1989; Reed et al. 1996). Both these groups of animals tend to be characterized by low density and/or high variability of abundance (Danell et al. 1998). The fish species (e.g. cisco, whitefish, trout) also are of high importance to the Cree, as more reliable, 'staple' sources of food (Berkes 1998, 1999). The high level of dynamism in this ecosystem is also linked to large, infrequent disturbances such as fire, as well as gradual change, such as isostatic uplift of the coast, vegetative succession and climate change (Dale et al. 1998). Isostatic uplift is the 'rise' of the land following the removal of the downward pressure caused by the glaciers, which retreated from the area about 5000 years ago (Dionne 1980). The rate of uplift in the area

is of approximately one metre per century, which contributes to significant change in the configuration of the coastline (Dionne 1980). The Bay itself is of brackish water that freezes for 4-6 months of the year. The coast is sinuous and relatively flat and characterized by sloping shoreline, emerging rocky outline and a number of shallow bays and salt marshes (Dionne 1980).

The present community of Wemindji (see Figure 1.2) was established in 1959, when the Cree associated with the Old Factory trading post of the Hudson Bay Company moved to this new location, about 65 kilometres north of the Old Factory post site (Morantz 2002). The community is situated at about 1200 kilometres northwest of Montréal, accessible by a permanent gravel road connecting to the James Bay Highway since 1995, as well as through daily service provided by Air Creebec. The economic development of the community is largely linked to Wemindji's Tawich Development Corporation, an umbrella organization that aims at the self-reliance of the local economy,

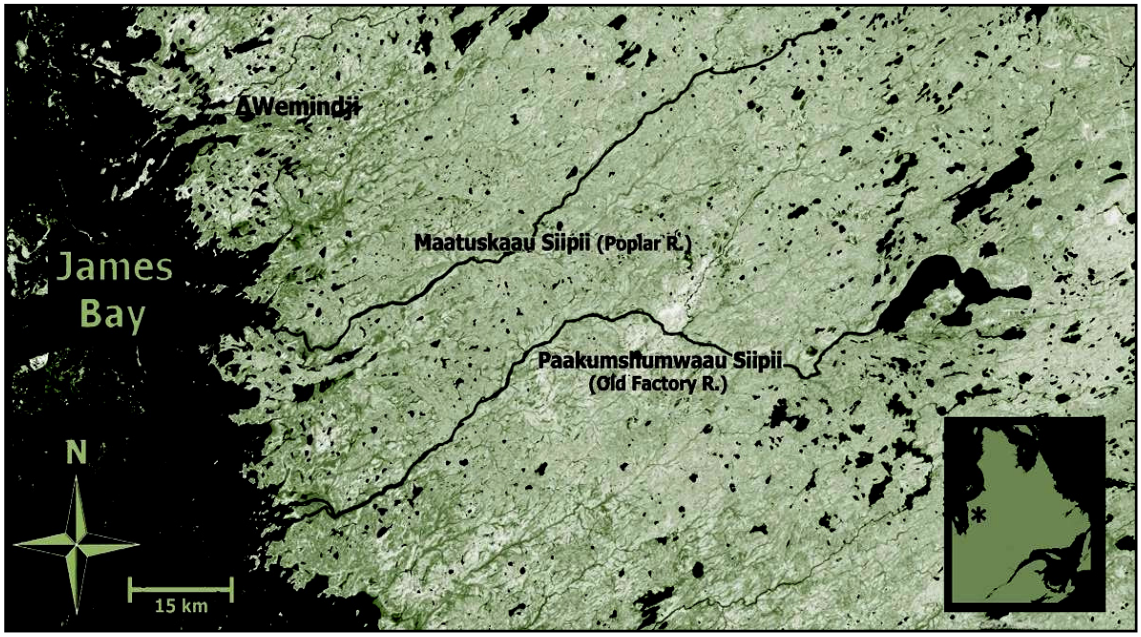

Figure 1.1. Map of Wemindji territory. **Map created by C. Peloquin, Oct. 2006**

offering business start-up opportunities and playing a major role in housing development.

The economic development strategies being considered and/or developed include tourism, mining and small-scale hydroelectric development. The Wemindji Cree who are not occupational hunters work for the most part in construction, education, retail, infrastructure maintenance and administration. Some also work for Québec's public energy corporation Hydro-Québec and for various mining exploration companies.

The Wemindji Cree are also committed to the continuity and renewal of their traditional cultural identity. The slogan of the Cree Nation of Wemindji is 'a community where tradition lives on', and there are a number of projects pertaining to the celebration and transmission of Cree knowledge and values. These include "bush school" programs, a project of cultural center, a snowshoe expedition in the winter, and a number of other initiatives. One of these initiatives for cultural continuity involves a partnership between the Community of Wemindji and a team of southern academic researchers of which I am part. This is an interdisciplinary project, supported by a Community-University Research Alliance (CURA) grant titled "Protected area creation, culture, and development at the Cree community of Wemindji James Bay, Quebec" (Scott 2004). This initiative – the Paakumshumwaau-Wemindji Project[2] – involves exchanges of knowledge through collaborative research, and the exploration of strategies for balancing development, cultural autonomy and continuity, and environmental protection. This includes work towards the creation of a Cree-led protected area designation on a portion of the Wemindji territory.

[2] More information on the Paakumshumwaau-Wemindji Project may be found at the following address: http://wemindjiprotectedarea.org

1.3. Organization of thesis

Chapter two provides an overview of the research context. It situates this study theoretically, expanding upon relevant issues in cultural ecology and social-ecological resilience as they pertain to the James Bay Cree context. Chapter three discusses the approaches and methods used. The first part of the results are presented in chapter four, which expands on themes regarding Cree customary resource-use and land stewardship, with special attention to goose hunting, and how it relates to variability and unpredictability. In chapter five I focus on the factors of change impacting this goose hunt; on how the Cree understand them. This demonstrates how complexity and change amount to turbulence, and on the ways in which the Cree make sense of all this. Chapter six addresses continuity despite turbulence in this social-ecological system, looking at how the Cree respond and adapt to the external factors of change impacting this local resource management system. Concluding remarks on the broader relevance of this discussion are presented in chapter seven.

Chapter II

Theoretical Background

2.1. Cultural ecology and ecological anthropology

Cultural ecology and ecological anthropology are approaches to better understand the relationship between humans and their environment. Western thought has, since the Age of Enlightenment, relied heavily on the assumption of a clear separation between humans and the ecosystems in which they live (Descola and Palsson 1996; Davidson-Hunt and Berkes 2003a), whereas many non-western traditions of thought tend to have relational, or ecological, conceptions of the place and role of humans in ecosystem (Latour 1991; Ingold 2000). In such worldviews, as is the case with Algonquian cosmology, these understandings emphasize the relationships between the individual elements that constitute the world at large, and do not display fundamental distinctions between what is deemed natural and what is not (Hallowell 1960).

The ecological crisis that has become increasingly apparent over the twentieth century revealed the importance of re-thinking the ways in which Western societies relate to, and interact with their environment (Botkins 1990; Hornborg 1996; Castree and Braun 1998). At the same time, critiques of modernism presented 'nature' as a social construct, and the mechanisms underlying this construct were seen as having important implications on human ecology and politics (Latour 1991; Castree and Braun 1998). For example, authors have demonstrated how 'nature' is intimately linked with ‘Western’ imperialism, and thus played a key role in colonial expansion (Descola and Palsson 1996; Escobar 1998). Voices both from within and outside Western paradigms have heavily criticized this 'nature-culture dualism', but conceptually re-situating humans within ecosystems remains

challenging given the extent to which Western thought is grounded in this dualism (Descola and Palsson 1996; Davidson-Hunt and Berkes 2003a). However, there have been some important intellectual developments, such as ecological anthropology and cultural ecology that facilitate a view of 'humans-in-ecosystem' from within this Western cultural tradition (Bateson 1980; Descola and Palsson 1996; Ingold 2000).

'Societies' and 'ecology' are two very broad themes, and the theoretical framing and study of the nexus linking these two themes is challenging. Numerous disciplines and approaches look at these relations from slightly different angles, with different emphases. Cultural ecology and ecological anthropology are two such interrelated and overlapping approaches within the broad scope of human ecology (Cox 1973; Zimmerer 2007). The current academic interest in the ways in which different cultural groups know, and interact with, their environment is in line with a long-standing academic interest, mostly in cultural anthropology and human geography (e.g. Boas 1916; Steward 1955; Lévis-Strauss 1962; Bennett 1969; Toledo 1992; Zimmerer 2007). In their early stage, these enquiries favoured either a deterministic outlook explaining human societies as principally shaped and driven by environmental factors, or a possibilist view emphasizing the role of cultural factors in these adaptations (Davidson-Hunt and Berkes 2003a).

Cultural ecology as it largely emerged from Julian Stewart's work on culture change, sought to go beyond these approaches by looking at the interconnectedness between environmental factors and cultural evolution in shaping human-nature relations, instead of seeing them as unique, mutually exclusive factors (Steward 1955). It thus sought to understand the cultural responses underpinning, and resulting from, human adaptations to changing environmental conditions (Stewart 1955). Cultural ecology then involved

comparative studies of patterns of subsistence as related to environmental processes, and their role in culture change (Bennett 1969; Netting 1977). While groundbreaking, this approach was still criticized as deterministic: despite its recognition of cultural factors in shaping adaptation, it was seen as over-emphasizing the role of environmental factors in shaping culture (Vayda and McCay 1975; Descola and Palsson 1996).

In the 1960s, studies in what then became known as ecological anthropology sought to situate humans as culturally driven actors within ecosystems (Vayda and McCay 1975). Rappaport's (1968) account of the cybernetic functions of cultural patterns such as rituals surrounding crop harvests and sacrificial slaughters in a New Guinean traditional society suggested homoeostatic relations between human cultures and ecological processes. This was one of the early applications of cybernetics and systems thinking in human ecology, which remains relevant to this day (Scoones 1999). This ecological anthropology was, however, soon criticized for relying too heavily on energy transfers in accounting for social-ecological relations, for avoiding explanations of cultural phenomena, for not accounting for the non-equilibrium dynamics of social-ecological processes, and for ignoring both social and ecological cross-scale interactions (Vayda and McCay 1975; Davidson-Hunt and Berkes 2003a).

Subsequent inquiries in human ecology at large have been attempting to address these challenges. Cultural anthropologists seek to explain how cultural phenomena arise (Evans-Pritchard 1951; Geertz 1973), while others in environmental studies, environmental geography, and related fields gradually adopted a resilience approach to replace the emphases on stability and equilibrium in explaining social-ecological relations (Vayda and McCay 1975; Berkes and Folke 1998; Westley et al. 2002). Furthermore, political ecology

developed to address how political economy of resource use also influences human-environment relations (Greenberg and Park 1994; Robbins 2004; Zimmerer 2007).

Additional perspectives on this nature-society nexus include the ones provided by the interrelated and overlapping approaches of traditional knowledge research and of ethnoecology (Toledo 1992; Freeman 1992; Berkes 1999). Traditional ecological knowledge is defined by Berkes as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationships of living beings (including humans) with one another and with their environment" (1999, p.8). Traditional ecological knowledge includes the local knowledge of land and animals, the resource management systems it informs and the social institutions as well as the worldview by which these practices are mediated; it is thus a knowledge-practice-beliefs complex that is constantly adapting in response to changing conditions, rather than a static tradition 'frozen in time' (Berkes 1999). It is understood as organized at multiple nested levels, including site-specific empirical knowledge, the practical management system it informs, the institutional arrangements that facilitate its reproduction, and the worldview in which this entire system is embedded, which provides reinforcement as well as transmission mechanisms (Berkes 1999). There has been increasing work on how traditional ecological knowledge can provide a sound approach to monitor, understand, and adapt to ecological change (McDonald et al. 1997; Parlee et al. 2005), including the manifestation of climatic change and variability (Krupnik and Jolly 2002; Nichols et al. 2004; Berkes et al. 2005).

Ethnoecology focuses on the perception, cognition and appropriation of ecological components at the level of the individual in culture (Toledo 2002). It emphasizes how

different cultural groups perceive and classify ecological components such as species, 'folk taxonomy', and other similar projects seeking to compare and relate different cultural understandings of environment, often with specific attention paid to linguistics (Hunn 1982; Toledo 1992). Davidson-Hunt and Berkes (2003b) addressed the role of perception of spatial and temporal dimensions of biophysical landscape, and how it is linked with social and cultural elements. In this view, knowledge of change is embedded in social memory as the "long-term communal understanding of the dynamics of environmental change, and the transmission of pertinent experience (Davidson-Hunt and Berkes 2003b, after McIntosh 2000). Social memory then, "both frames creativity within, and emerges from a dynamic social-ecological environment" (Davidson-Hunt and Berkes 2003b).

Research in ethnoecology has ties to work in cognitive anthropology that focuses on how individuals in society make decisions toward procurement of livelihoods (Bird-David 1990). This aims at going beyond taxonomy, classification and nomenclature – which only gives an idea of "how things are named but not how they work" (Ingold 2000, p.160). This leads to work on "cultural models", which suggested that the central processes of making a livelihood are culturally constructed (Gudeman 1986, Ingold 2000): "Gaining a livelihood might be modelled as a causal and instrumental act, as a natural and inevitable sequence, as a result of supernatural dispositions or as a combination of all these" (Gudeman 1986, p. 47). This emphasizes the importance of cultural processes not only as a tool but also as motivational force in decision-making (Quinn and Holland 1987).

There has been some debate however as to whether hunter-gatherers rely at all on a 'model' of their environment, as a representation outside of itself *per se* (Ridington 1982; Bird-David 1990; Ingold 2000). For example, according to Ingold:

> For the Ojibway (…) knowledge does not lie in the accumulation of mental content. It is not by representing it in the mind that they get to know the world, but rather by moving around in their environment, whether in dreams or waking life, by watching, listening and feeling, actively seeking out the signs by which it is revealed (Ingold 2000, p.99, after Hallowell 1960).

This takes us closer to the suggestion of the *habitus* perspective by Bourdieu (2000), and of the dwelling perspective proposed by Ingold (2000). In *Théorie de la Pratique*, Bourdieu argues that cultural knowledge is not something that is "imported" from the mind into the context of experience, or the other way around. Instead, this knowledge is generated through practices, social skills that are adopted and that inform an outlook that is specific to a given cultural and environmental context (Bourdieu 2000). It is from this context that a given group derives the different forms of capital (social, cultural, symbolic) through which a given society is organized and re-organized (Bourdieu 2000). The sources and uses of this capital then, are at the core of the interplay between structure and agency in social organization (Bourdieu 2000). This is closely related to Ingold's dwelling perspective, which "treats the immersion of the organism-person in an environment or lifeworld as an inescapable condition of existence (2000, p. 153). A given person then, evolves in an environment in which the perception is shaped through a life-long engagement of skills and practices.

This thesis does not directly address the debates as to whether the Cree act upon a 'model' of their environment or not, or as to what constitute ecological knowledge *per se*. I instead draw from these overlapping approaches (cultural ecology, ethnoecology, traditional ecological knowledge, cognitive anthropology) to address how the Cree express their understanding of environmental change, and how it influences the environmental practices that it informs (Toledo 2002; Berkes 1999; Berkes and Turner 2006). The

definition of cultural ecology used in this thesis then, is an outlook on the relations between culture and social arrangements and the environmental settings of various groups (Cox 1973, p.7). This definition is perhaps the broadest, and encompasses elements of most of the aforementioned views. It also is a practical one, as Robert McNetting suggested; "cultural ecology is a convenient, conventional title rather than an invitation to scholarly debate" (1977, p.vi).

One critical challenge in cultural ecology emerges from the history of 'otherness', through which the thoughts and actions of 'exotic' peoples are extracted from their contexts by Western academics and framed in ways that alternatively support or challenge discourses within 'mainstream' societies (Agrawal 1995). In the context of indigenous people and 'environmentalism', indigenous peoples have been constantly subjected to such caricatures, both to support or to contest arguments based on concepts that are alien to them (Smith 1999; Cruikshank 2005; Sandlos 2007). Various sides or eras of the debate over the 'ecologically noble Indian', has for centuries cast indigenous peoples on either side of an ecological divide that is not theirs (Krech 1999; Dove 2006; Hames 2007; Feit 2007). In this thesis, I do not address this debate as to whether aboriginal peoples are 'conservationists' in the narrow, Western sense, but rather I seek to engage the ecological understanding of an indigenous group, and its role in apprehending complexity and in adapting to change. As I mentioned above, such features are seen by some as essential components of sustainability (Berkes et al. 2003), but the current debates over sustainable development are largely grounded in epistemologies that are non-indigenous, and evaluating indigenous lifeways on the basis of European sustainability criteria may be beside the point (Dove 2006; Hames 2007).

The cultural ecology of the societies indigenous to the eastern Canadian subarctic is perhaps one of most widely studied (e.g. Speck 1935; Cox 1973; Feit 1973; Tanner 1979; Berkes 1999). Early ethnographic accounts describe hunting in terms of relationships of respect and reciprocity between hunters and animals; which led Speck to speak of hunting as a "religious occupation" among sub-arctic hunting societies (Speck 1935), a notion echoed in subsequent accounts (Preston 2002; Tanner 1979; Feit 1995).

These relationships are enacted in a world that is perceived by the Cree as lacking radical distinction between human persons and non-human persons (Speck 1935; Hallowell 1960; Preston 2002; Tanner 1979; Scott 1996). That is, these entities are recognized as different, but are “better seen in complementary relationships than as separate, opposed categories” (Preston 2002, p.167, but also Hallowell 1960). This "community of beings" also includes entities that would be classified as "supernatural" in a strictly western paradigm (Berkes 1999, Scott 2006). In this context, the animals, and their spirits, are sentient, watchful and aware of people’s behaviour (Preston 2002; Tanner 1979; Feit 1988; Scott 1996; Berkes 1999). It is the animals that control the hunt by giving themselves to the hunter as part of a relationship of reciprocity and respect between the hunter and the animals (Feit 1986, 2000; Scott 1989; Berkes 1999). This respect is manifest through a general sense of humility on the part of the hunter. It includes not boasting about hunting skills, but also involves offerings such as pieces of meat placed in the fire, not playing with prey, not wasting food, following specific rules for butchering and carrying meat, and for proper disposal of inedible parts (Speck 1935; Feit 1973, 1995; Preston 2002; Tanner 1979, Berkes 1999). The recognized cycles of hunting success and animal abundance, some of which are on a longer time scale than understood by western science, are traditionally

understood in terms of animals being "mad" and hiding in 'retaliation' or punishment to reprehensible behaviour from the part of the hunter (Tanner 1979; Feit 1995; Berkes 1999; Scott 2006).

In the Cree context of a community of sentient beings, when Cree refer to the concept of “luck” when speaking English, it has a special definition that differs from the mechanistic outlook of European thought (Speck 1935). Luck in hunting then, is not random chance, but it is instead consequential of past actions, knowledge, past good behaviour, which in turn influence animals’ willingness to give themselves (Scott 1983; Berkes 1999). “Luck” is a way of speaking in reference to that relationship between a hunter and the animals. It could change following the life cycle of the hunter, and it may or may not be transmitted from parents (Scott 1983; Berkes 1999). According to Scott, the Cree expression *miiupiihiikuu* is what comes closest to the English concept of “luck”, and it refers to “he is lucky, doing well, being treated well in his hunt (1983, p. 125). Luck then, is charged with meaning, and to ensure good luck, hunters must ensure respectful relationship. Disrespectful behaviour, such as laziness, boastfulness, may result in a decrease of hunting success (Berkes 1999).

Another element characteristic of Cree resource use and allocation pertains to the institutional context of Cree decision-making and ‘authority’. Personal autonomy is a central theme of this institutional context. ‘Rules’ then, are ways-of-doing that are transmitted through a combination of transmission by example and ‘learning by doing’ (Craik 1975; Tanner 1979; Scot 1983). Leaders then, are those that contribute to passing on these ways of doing by being “subtly influential”, as opposed to by restricting others behaviour (Craik 1975, p.459). This is of interest from the commons perspective, as it

raises questions not only on how rules-in-practice are transmitted, but on how they are re-learned in changing contexts (Ostrom 1990; Parlee et al. 2006). Variability and change in social-ecological systems invites individual as well as institutional adaptiveness. For example, Parlee et al. (2006) describe how the sets of 'rules-in-practice' behind Gwich'in berry harvesting, which could be seen as a common arrangement, fluctuates according to berry availability and distribution.

One of the manifestations of this institutional system is in the allocation of resources and territories. Speck first documented this system among Algonquian groups of Northern Quebec; the 'trapline' system. These territories were seen by some as suggestive of active management of resources pre-dating European contact (Speck 1915; Cooper and Penard 1973), whereas others maintained that territoriality was incompatible with the 'foraging patterns' of semi-nomadic hunting groups, and that it could only be explained as an artefact of the fur trade (Leacock 1969). This debate on the territorial basis and social-rules of hunting among indigenous hunting groups expanded significantly into the 1980s, with no clear consensus as to whether this system is aboriginal or not. Tanner's (1973) replication of Specks' earlier mapping exercise of the hunting territories of the Eastern Cree of Mistissini revealed that this territoriality was much more complex than previously assumed. Some suggested that these territories are characterized by relatively fluid boundaries that shift in accord with fluctuations in resource availability and human organization (Tanner 1973; Berkes 1986). Others suggested that the notion of boundary may be better conceived as a series of connected points that are subject to change (Feit 1994), and that animal persons' willingness to offer themselves to the hunters actively mediates this territoriality (Scott 1986). Notwithstanding the conclusions of this

complicated debate, all accounts point out to a social arrangement for resource-use that is dynamic (Tanner 1973; Berkes 1986; 1998; Scott 1986). This is of interest, as the availability of resources in subarctic forests is itself prone to high degrees of fluctuations (Essen et al. 1997; Danell et al. 1998). Furthermore, the organization of hunting territories under the coordination of stewards has been described as arising from distinctive social form and relations that include the influence of culturally defined notions of power, and its role in resource management (Feit 1987, 1995; Scott 1986). For instance, it is important to note that resources are not owned by the hunter but are subject to access rights that have parallels to common property regimes, based on kinship, and that favour an emphasis on access to resources as opposed to rigidly defined spatial rights (Tanner 1979; Berkes 1986; Usher 1987).

Through his studies of Ojibwa-Cree hunting in the 1970s, Winterhalder emphasized the role of the high degree variability of resource availability as one of the main determining factors of resource use patterns (Winterhalder 1983). In this context, Winterhalder sought to explain Cree hunting patterns by using optimal foraging theory, which states that individuals pursue harvesting strategies that constantly maximize energy returns (consuming the most energy while expenditing the less). This approach has been criticized as reducing hunters to mere 'micro-economic agents' that seek to maximise returns on energy expenditure, and that fails to make justice of the important role of other cultural factors in explaining resource-use patterns (Ingold 2000). On the other hand, this work emphasized the challenge of decision-making in the context of "heterogeneous mosaic of habitat types which differ in terms of the kinds and relative abundance of the prey species they support" and that are subject to both temporal and spatial fluctuations

(Ingold 1996, p.36). From the recognition of these challenges, it was suggested that the Cree have developed the skills to "produce rapid solutions to ostensibly rather complex problems posed by specific conjunctions of environmental circumstances" (Ingold 2000, p. 36, after Winterhalder 1983). Winterhalder (1983) then suggested that there are links between these practices and adaptive management, an idea that remains to this day, and that will be further addressed below (Berkes et al. 2000).

Harvey Feit demonstrated that the hunting practices of the Eastern Cree entailed active 'management of the resources' (1973). His extensive ethnographic study of the Cree hunters of Waswanipi made the case that the hunting practices are sufficiently efficient to deplete the resources, but that multi-species switching to diffuse the harvesting pressure across multiple populations allow them to avoid depletion (Feit 1973; 2000). He evaluated the energetic returns of different prey pursuits, demonstrating that hunters pursue species that are less energetically profitable even when other species offering higher returns are available. This strongly suggests that there exist culturally defined restraints on resource harvesting, and that consequently Cree hunters engage in practices that are far more complex than optimal foraging (Ingold 2000).

Monitoring plays a key role in this system. For example, beaver populations are constantly monitored following an estimate of population growth to evaluate the composition of beaver colonies depending on their age as well as on a number of indicators such as tooth marks on trees and the number of placental scars on killed beaver, from which the number of pups can be estimated (Feit 1973, 1987; Tanner 1979; Berkes 1998, Scott 2006). Other indicators of beaver density include 'surveys' of willow and aspen density and health in areas surrounding beaver lodges, which suggest good understanding

of the dynamics of the beaver-vegetation system (Feit 1973, 1987; Tanner 1979; Berkes 1999). All this information combined provides the hunter with a precise survey of the beaver distribution over the territory (Feit 1987, 1995). In an exercise carried out in the 1970s, many Cree hunters could map beaver lodges in territories larger than 300 sq. km., and provide an estimate of their composition (number and age) (Feit 1995, 2000). This monitoring of beaver demographics tends to inform a rotation system, often lasting up to four years, in which some lodges are "rested" in order to allow the population to replenish following some level of harvesting (Feit 1995; Berkes 1998). This system of rotational resting and heavy harvesting maintains beaver harvest rates below carrying capacity, but also high enough to prevent overgrazing (Berkes 1998, Feit 2000). As another example, Cree hunters often exchange their knowledge on the frequency of moose sighting, the demographics as well as the number and size of moose yards (Feit 1973).

The subsistence fishery of the Eastern Cree has been studied by Berkes (1977, 1979). It is dominated by species such as whitefish, Cisco, northern pike, walleye, and lake trout and has been reported as unusual in that it is both productive and predictable, offering a steady and reliable source of staple food in a boreal ecosystem that is usually characterized by low productivity and high unreliability (Berkes 1998). These characteristics of the Cree fishery are attributed to proper use by the Cree, resulting in many years of accumulated production due to the application of practices informed by a longstanding body of traditional ecological knowledge about fish habits (Berkes 1998). It is characterized by a complex combination of fishing ground rotation, multi-species switching and size, sex age and age-class selectivity through the use of nets of a variety of mesh sizes, which is understood as favouring a “thinning” of the population, rather than concentrating

the fishing efforts on larger fishes or older age-classes, which often are the reproductive components of the population (Berkes 1979, 1998). Also, this takes place in a multi-year cycle adjusted differently at different spatial scales (Berkes 1977, 1979, 1998). Part of this involves resting fishing grounds for a few years, followed by some intensive fishing over a short period of time (Berkes 1999). This approach diffuses fishing pressure in over space as well as over time, which is adaptive to age-class selectivity as related to fishing pressure and catch per unit efforts (Berkes 1998).

Scott (1983, 1989, 1996) explored the role of the notion of reciprocity that is fundamental to Cree worldview, and how it informs an ethos of respect with both human and non-human beings alike. Scott's work emphasizes how fundamental metaphors inform the emergence and reproduction of traditional ecological knowledge and environmental management practices. A large potion of his work focuses on how metaphors of respect and reciprocity inform empirical knowledge and practices that are attuned to ecological requirements (Scott 1996). These metaphors and relationships have been described as they occur in the context of the Wemindji goose hunt (Scott 1983, 1996). This thesis directly builds upon Scott's work (1983, 1996) along with other research on this hunt (Craik 1975; Preston 1978; Berkes 1982), by evaluating this harvest from the perspective of natural-resource management. As this harvest is the main topic of this thesis, it is discussed in detail in chapter 4.

In summary, research on Eastern Cree cultural ecology emphasizes the role of the modes of social organization and production with regard to hunting among the Cree, which includes access rights, distribution of hunting territories and networks of communication of knowledge of the animals, all of which are informed by given cosmological and ontological

axioms. Authors also point out to the ways in which the elaborate, trans-generational system of Cree knowledge is flexible, in that it responds to feedbacks and environmental change (Feit 1987, 2007; Tanner 1979; Scott 1996; Berkes 1998, 1999). It is this system of relationships that influences decision-making concerning the number of animals to be captured (Feit 1987; Scott 1996; Berkes 1999). This includes social mechanisms to ensure that harvesting rates do not lead to depletion of the resources. This includes species-switching following observation of population decline (Feit 1987, Berkes 1999), often inferred from decline in the catch per unity of effort (Berkes 1998). Such mechanisms for restraint are necessary, as Cree hunters are efficient enough to deplete population (Feit 1987; 2007).

2.2. Ecology and social-ecological resilience

Non-equilibrium ecology has challenged the conventional view of ecosystems as linear, predictable and stable entities (Pimm 1984; Picket et al. 1994; Levin 1999). One main thrust of this 'new ecology' is the suggestion that ecosystems are complex and dynamic webs of interconnectedness among its components, characterized by overlapping ecological disturbances and responses (Pimm 1984; Pickett et al. 1994; Levin 1999). This view rejects the notion of ‘balance of nature’, to instead emphasize non-stability and cyclical renewal (Botkins 1990; Pimm 1991). This has implications on the place of humans in nature, as the co-evolution of humans and ecosystems becomes more apparent through this non-equilibrium ecological understanding (Gomez-Pompa and Kaus 1992; Norgaard 1994).

These developments call for new approaches to adequately address the complexity of the relationships between humans and their environment (Vayda and McCay 1975; Botkins 1990; Descola and Palsson 1996; Berkes and Folke 1998; Levin 1999). Revisiting these relationships is especially important in the light of mounting environmental problems worldwide and the failure of conventional environmental management to resolve them (Ludwig et al. 1993; Holling and Meffe 1996; Ludwig et al. 2001). Environmental problems qualify as "wicked problems" characterized by variability, surprises, uncertainty and unpredictability, which make them particularly challenging (Ludwig et al. 2001).

Systems-thinking offers a way of thinking that account for the complexity and dynamisms of ecosystems (Bateson 1980; Capra 1996; Levin 1999). It involves focusing on relationships and the system that they amount to; shifting the emphasis “from the part to the whole, from objects to relationships, from content to patterns” (Capra 1996, p.298). One way of looking at this ecological understanding is as 'network patterns', which could be explained as overlapping webs of relationships among elements of an ecological community. These relationships are nonlinear and are interlinked by multiple feedback loops across scales (Levin 1999). This means that an event (disturbance) may have effects that are likely to “spread out in an ever widening pattern (…) and may be amplified by interdependent feedback loops, which may completely obscure the original source of disturbance" (Capra 1996, p.299).

Systems and complexity thinking in ecology includes the concepts of self-organization, cross-scales linkage, resilience, adaptive capacity and panarchy (Scoones 1999; Gunderson and Holling 2002). The self-organizing properties of an arrangement are understood through the notion of complex adaptive systems: complex webs of relationships

from which emerge homeostatic patterns under given conditions (Holland 1995; Levin 1999). Such self-organization implies that "for certain scale ranges, structure and process are not easily separable and interact in an organic way to generate emergent patterns" (Gunderson 2000, p. 430; after Holling 1992). These patterns suggest that ecosystems are not characterized by static equilibria per say, but rather by a tendency toward self-organization that fosters emerging patterns in which system dynamics tend to converge in a stable state, while maintaining a degree of chaotic movements (Peterson 2002). Again according to Capra,

> the flexibility of an ecosystem is a consequence of its multiple feedback loops, which tend to bring the system back into balance whenever there is a deviation from the norm, due to changing environmental conditions (Capra 1996, p.302).

The concept of resilience is applicable to integrated social-ecological systems, and has three defining properties: 1) the amount of change the system can undergo and still retain the same controls on function and structure; 2) the degree to which the system is capable of self-organization and 3) the ability to build and increase the capacity for learning and adaptation (Resilience Alliance 2007). Resilience is related to other key properties of the social-ecological systems that are hypothesized as potentially contributing to its enhancement as well as to its degradation (Walker et al. 2006).

Adaptive capacity refers to the extent to which a system can re-organize itself without significant sacrifice of efficiency or goal, or put differently, the capacity to adapt to and shape change. Adaptive capacity in ecological systems is related to the notions of diversity and heterogeneity (Peterson et al. 1998), and in social systems it is related to institutional flexibility, opportunities for social learning, practices that are adaptive and mechanisms to respond to feedback (Folke et al. 1998, 2002; Berkes et al. 2003). 'Memory'

refers to the mechanisms by which the configuration is 'remembered' by the system following the disruption or collapse. Ecological memory is contained for example in the heterogeneity of patches within and across habitats, and the connectedness across scales (Pickett et al, 1994; Peterson et al. 1998). Social memory is maintained by the institutions or individuals through stories and regulations (Folke et al. 2003). The resources available in the system to face the energetic costs of re-organization could be defined as ‘capital’ (Bennett 1969; Bourdieu 2000; Gunderson and Holling 2002).

Holling (1986, 1992) developed the heuristic framework of the adaptive cycle, which is useful to understand change in human and ecological systems as they undergo 'collapse' and re-organization (Gunderson 2000). This model describes change in systems as four phases linked in cyclical loops. These four phases are growth (exploitation), conservation, collapse (release) and reorganization (Holling 1986). Memory and the availability of capital are crucial in the reorganization phase (back loop), as these elements define the extent to which a given social-ecological system can adapt to and shape change (Berkes et al. 2003). These cycles occur simultaneously at overlapping scales within a given system, and this arrangement has been termed ‘panarchy’ (Gunderson and Holling 2002), which refers to a model of linked, hierarchically arranged adaptive cycles (Gunderson and Holling 2002). This model represents the cross-scale dynamic interactions among different levels and emphasizes the dynamic interplay between change and persistence as it spans across these levels (Gunderson and Holling 2002). A social-ecological system is thought to be highly resilient when the cross-scale linkages allow for rapid feedback and reorganization following the release, or collapse phase of the adaptive cycle (Gunderson and Holling 2002; Berkes et al. 2003; Walker et al. 2004).

In this view, the multiciplicity of scales and levels at which social and ecological systems interact is a particularly challenging aspect of resources management in the context of environmental complexity (Peterson et al. 1998; Cash et al 2006; Reid et al. 2006). Many global or similarly large-levels drivers of change interact and manifest themselves at the local levels where most resource-use decisions are made (Gibson et al. 2000; Reid et al. 2006). It is important to understand how these manifestations impact local systems, how they are understood by resource-users and the responses they elicit among them (Berkes and Folke 2002; Reid et al. 2006). In many cases, this local perspective on social-ecological processes may account for phenomena that are not easily identified or understood by an outlook at higher levels or by universalistic scientific approaches alone (Reid et al. 2006).

Some have argued that the conventional strategies of environmental management often fail, or worsen the problems they were supposed to solve, because they seek to simplify and suppress the disturbances and complexity intrinsic to ecosystems instead of adapting to them (Ludwig et al. 1993; Holling and Meffe 1996). Given the unpredictable nature of ecosystems, strategies and practices of environmental management must be attuned to the spatial and temporal shifts in ecosystem dynamics (Holling 1978, Walters 1986; Ludwig 2001; Walker et al. 2004), as well as to linkages across scales (Peterson et al. 1998; Cash et al. 2006). The approaches of resilience thinking and adaptive management have been proposed to allow thinking in a way that is more attuned to such dynamic settings. Adaptive management in natural resources and environmental management favours living with variability and change as opposed to attempting to suppress it (Holling 1978; Walters 1986). In addition it is grounded in the recognition that managers must make

decisions, and act within ecosystems whose responses remain unpredictable, non-linear, and ever-changing (Botkins 1990). Resource managers must then expect surprises and crises, and be ready to revise their practices in the face of them (Holling 1986). In such an approach practices are seen as 'experiments' tentatively applied in order to deal with unpredictability (Holling 1978; Walters 1986).

Folke et al. (2003) summarized a number of ways in which different societies manage their resources in ways that are more or less attuned to the complex and turbulent nature of their environment. They stress the importance of monitoring, of treating management strategies as experiments, and of aiming at resilience rather than stability. As I mentioned earlier, some authors have suggested that there are links between traditional ecological knowledge and adaptive management for resilience (Berkes 1998; Berkes et al. 2000; Elmqvist et al. 2004). This involves living and managing for disturbances (Berkes 1998); 'spreading the risks' (Berkes et al. 2003), adaptive learning (Davidson-Hunt and Berkes 2003b); and monitoring of indicators of change (Parlee 2006).

The question of how social-ecological systems navigate through complexity and turbulence, and manage to build resilience, requires understanding the roles of social arrangements, institutions, knowledge and practices in resource use as it pertains to adaptiveness; as "self-organization is enhanced by coevolved ecosystem components and the presence of social networks that facilitate innovative problem solving" (Carpenter et al. 2001, p.765). The concept of resilience in social-ecological systems has mostly been useful as a theoretical framework rather than as a readily observable characteristic of systems (Carpenter et al. 2001; Walker et al. 2004). This may partly be because the factors contributing to resilience are highly contextual, and disturbance experiments are not

possible in social-ecological systems in the same way as they could be in ecological studies (Gunderson 2000; Holling 2001; Walters et al, 2004). This thesis is not directly concerned with measuring resilience per say, but rather with understanding how change arises out of the complex interplay across scales, and resilience thinking provides useful sets of heuristics for such a purpose. It allows accounting for the dynamic interconnectedness between social systems and ecological systems, and to understand the mechanisms that allow sustainable trajectories in a complex and changing world. Of particular relevance in the analysis are the concepts of adaptive capacity, cross-scale linkages, as well as social and ecological memory to understand how re-organization occurs.

Another interesting implication of this thinking is that the recognition of inherent complexity invites the multiplicity of perspectives in ecological understandings – there is more than one 'valid' point of view as situations constantly differ in time and in space. Zimmerer (2000) discusses the political ecology implications of this intersection of dynamic and non-equilibrium view of ecosystems and the role of cultural and social resource-use and perception of landscapes. His analysis is developed through the notion of a dynamic web of fluxes, which he calls a nature-society hybrid, within which are negotiated land and resource access and use by various political actors. The non-equilibrium view of landscape, it is argued, may allow re-thinking the spatial context of a given 'nature-society hybrid' by recognizing the inter-dependence of both biophysical and social-cultural processes (Norgaard 1994; Scoones 1999; Zimmerer 2000). This thesis is largely driven by this idea.

2.3. Social-ecological resilience, traditional ecological knowledge and James Bay Cree cultural ecology

Looking at social-ecological systems through the lens of resilience allows one to explore human-in-ecosystem dynamics in a way that accounts for the complexity and non-linearity of social-ecological processes, with a focus on resilience and adaptation as opposed to stability and equilibrium (Gunderson and Holling 2002; Berkes et al. 2003). Given the tremendous complexity of these interlinked social-ecological processes, the reductionist models prevalent in conventional management science are often insufficient for a sound understanding of social-ecological interactions. Understanding this highly complex web of interactions requires multiple 'vantage points' (Ludwig 2001; Olsson et al. 2004). Especially so as these interactions occur at multiple nested levels, with emerging properties that differ at each scale (Cash et al. 2006). Understanding how change manifests itself at the different levels and scales calls for a plurality of views, models and explanations (Reid et al. 2006). There is also an impetus to better understand and learn from local environmental practices, partly following the suggestion that traditional societies often develop sets of tools and practices useful in managing for resilience by maximizing flexibility and adaptiveness (Alcorn and Toledo 1998; Berkes et al. 2000; Berkes et al. 2003).

In this context, resilience thinking offers ‘Western’ ecologists a good way of thinking about and a set of concepts to describe the interplay between change and persistence in human-environment relations. That being said, it important to point out that social-ecological resilience thinking remains bound to basic assumptions on the nature of that are central to Western thought (Botkins 1990; Braun and Castree 1998). These

assumptions and metaphors are not universally shared among various cultural groups (Cruikshank 2005). Accordingly, it is important to keep in mind that ecological understandings, especially in cross-cultural contexts, may not be adequately explained by the discourse of resilience.

The aim of this thesis is not to claim that what the Cree do *is* adaptive management for resilience. Rather, for the most part, I point out to similarities between Cree practices and recommendations arising from work adaptive management and resilience (e.g. Berkes et al. 2000). This treatment contributes to a shared understanding between two perspectives, but it is not to say that the former *explains* the latter. Different cultural groups have different ways of knowing and of relating to the world, these are internally coherent, and it is not my goal to reduce one to another (Smith 1999). At the same time, there also are also dissimilarities between how the Cree view their relationships to their environment and what emerges from resilience thinking, and these should be kept in mind.

Chapter III

Methods

3.1. Collaborative research

This thesis stems out of a collaborative research that is embedded in a larger project, the Paakumshumwaau-Wemindji Project, based at McGill University. This project takes on a participatory research orientation in which both Cree and non-Cree researchers look into the implementation of research processes focusing on the environment and the role of humans in it. This strategy seeks, among other things, to avoid the framing of Cree participants as passive objects of a Western research project, but instead as key actors in the design of a project that they value as self-serving and crucial to cultural continuity (Park et al. 1993; Scott 2004). Participatory research seeks to contribute to enforcing the autonomy of peoples, enabling by strengthening groups that are marginalized, in ways that should boost the awareness of their own capabilities (Gilchrist 1997) To this effect, it involves a political analysis component, important to the understanding of the dynamics of authority and of power that are active in the political landscape (Gilchrist 1997). The Paakumshumwaau-Wemindji project falls in the transformative participatory research category in that it seeks to create a dialogue leading to understanding across different traditions of knowledge, thus transforming the roles within the relationship between the two groups of actors (Park et al. 1993). A participatory research orientation requires that the participants in the research are involved right from the inception of the project, rather than only at the data collection stage, when the objectives and approaches have been chosen and imposed by the principal investigator (Gilchrist 1997).

While this thesis research is embedded in this larger participatory project, a truly participatory research design for this thesis did not appear desirable given the nature and the limited depth and extent of the Master's program, and the context of the Paakumshumwmaau-Wemindji project. For instance, the thesis objectives where largely established by the researcher while at the University of Manitoba in Winnipeg, and although they were influenced by information and suggestions from community members and other members of the Paakumshumwaau-Wemindji project, it would be a stretch to say that these are established through processes that were genuinely participatory. Time and other resource constraints from both the community and the University side of the partnership required the researcher to be more self-reliant than what would normally be expected in a participatory research. Additionally, community members do not have the endless pools of free time and energy that would be required to be involved in 'each and every step' of each individual research project that takes place under the umbrella of the larger community-university partnership in Wemindji. This is especially so in the case of thesis research at the Master's level.

Despite not being participatory per say, this research is collaborative. I was accountable to both the community where the research is conducted and to the institution that support the research: I adhered to the partnership guidelines concerning ownership of knowledge, reciprocity, validity and protocol, while ensuring that the research was relevant to the participants' needs and concerns and that it was carried out in a culturally sensitive manner (Durst 2004; Davidson-Hunt and O'Flaherty 2007). Also, the research evolved and the objectives were constantly re-evaluated following on-going dialogues with the various community partners.

3.2. Qualitative research

The research is qualitative, which is most suitable for enquiries on cultural perceptions of social-ecological processes. Also, qualitative design is better attuned to the participatory orientation of the larger Paakumshumwaau-Wemindji project, to the preferences and views of the researcher and to the reliance on ethnographic and grounded theory research approaches. Qualitative research allows avoiding overly naturalistic interpretations and allows results to accommodate some measure of cultural relativism (Creswell 2003).

A quantitative research design is desirable when one seeks to evaluate hypotheses through measurement of phenomena (Creswell 2003), which is not the case with this thesis. This research navigates between the absolutes of 'naturalism' and 'relativism', as it seeks to understand culturally informed explanations of a reality that is assumed to exist. To this aim, it favours an approach of research as a 'dialogue', which seeks "truth merely as consensus" (Demeritt and Dyer 2002, p.238). This pragmatic approach is viewed as a way of maintaining commitment to methodological rigour in qualitative research while at the same time allowing for some cultural relativism.

3.3. Ethnography and grounded theory

Ethnography has been explained as a "Way of Looking" through which patterns and processes taking place within a cultural context are experienced, enquired upon and examined (Wolcott 1999). This methodology falls within cultural anthropology (Steward 1955), especially the tradition of ethno-science of the late 20th century (Marcus and Fischer 1986; Preston 2002). This approach emphasizes cognitive patterns within cultures

as opposed to across cultures (Geertz 1973; Preston 2002). Ethnographic fieldwork aims at the translation from one culture to another, "with depth of understanding, of the meaning of a relatively few basic concepts and notions" (Evans-Pritchard 1951, pp.79-80). Ethnographic research emphasizes the context of the observations, thereby maintaining an approach that is holistic, and that is more likely to take into account the complexity of human behaviour, avoiding overly deterministic explanations (Wolcott 1999). Ethnographic methods are categorized under three main themes, or goals: experiencing, enquiring and examining (Wolcott 1999). Experiencing is probably the broader and less tangible theme; it refers to what is perceived by the researcher in the cultural context where the study takes place. The main task of ethnography is to translate such experience. Enquiring refers to the task of asking for guidance, or explanations on, how these observations, or other phenomena, could be interpreted. Examining involves thorough evaluation of the interpretation of the subject, often through content analysis and documentary research (Wolcott 1999). This research involves first and foremost 'enquiring', as done through interviews that are the key sources for the analysis, but the interviews greatly benefited from insights gained from 'experiencing' through participant observation.

My approach also borrows from grounded theory, which is a qualitative approach seeking to verify and refine conceptual ideas by formulating systematic generalization of theories, induced from empirical observations (Glaser 1992). Grounded theory combines inductive and deductive thinking to look into the theoretical construct used for the conceptualization of observed processes and patterns (Glaser 1992). It allows the researcher to develop new understandings of phenomena as they emerge, while at the same time borrowing from existing theoretical constructs to the extent that they validly apply.

Theory is then used as a tool to make sense of empirical observations and participants' accounts, and to verify and refine a number of conceptual ideas by evaluating them in the light of empirical observation, but the research is not necessarily committed to the 'testing' of theory as an end goal (Glaser 1992).

This thesis is informed by elements of the theoretical context discussed in chapter 2. These are used largely as heuristic tools, and as ways of conceptualizing the studied phenomena, but I remain careful not to let the research be determined by these models and tools. These theoretical constructs largely inform where I come from as a researcher, and how I am likely to interpret some of my observations as they pertain to my research objectives. For instance, social-ecological system thinking and cultural ecology provide ways of thinking about how human societies relate to non-human ecosystem components that are compelling, but they are unlikely to provide complete and valid explanations for culturally defined phenomena (Hornborg 1996; Nadasdy 2003). Consequently this research does not seek to encompass local knowledge in a "totalizing framework" and it seeks to avoid precipitating, oversimplifying and reducing the complex of Cree knowledge and values to mere theoretical construct of Western thought (Descola and Palsson 1996; Nadasdy 2003; Cruikshank 2005). It instead aims at a dialogue in which perspectives and knowledge are exchanged, hopefully to the benefit of all parties involved.

3.4. Research protocol

A protocol for the recording of all sources of data was defined before the beginning of the collection process. I kept a field notebook in which I documented my observations in as much detail as possible. The same applies for interviews, in which I noted not only the

content of the interview, but also the context and non-verbal responses as the conversation unfolded. The issues pertaining to data recording are discussed in further details within the discussions for each data collection approach.

Confidentiality has been maintained in general, but given the low level of sensitivity presumed of the research topic, it did not appear to be an issue of crucial importance. A protocol of confidentiality in the transcription of the notes and the consolidation and communication of results has been designed and implemented. No consent form has been used, but verbal consent was sought. In this respect, as Smith (1999) points out, “consent arises out of a dynamic relationship of trust and respect, as opposed to a static decision" (p.136), and for cultural groups such as the Cree for whom the importance of oral forms precedes over written forms, verbal consent appears more appropriate. That being said, it is crucial that participants be aware of the research goals and of my role as a researcher. To this effect a one-page cover letter explaining the project, my role in it, my research objectives and contact information, has been produced in order to supplement verbal introductions.

I asked participants for the permission to quote them, and whether full name, initials or covered initials should be use when doing so. This was asked first during the interview, and then again during verification and follow-up. The selected quotes were shown to the participants and then often further discussed.

The interdisciplinary research nature of the Paakumshumwaau-Wemindji project also influenced the research design and data collection. In this context, insights, suggestions and non-sensitive information are exchanged among researchers, and this

coordination makes the research more efficient while at the same time avoiding the undue imposition of repeating the same questions to participants

Participants were 'selected' on multiple bases (Davis and Wagner 2003). The inputs of customary stewards – *uuchimaau*, or tallymen – of the hunting territories involved in the Paakumshumwaau-Wemindji project were first sought. Tallymen are usually the most knowledgeable of what takes place on their territory, and they have the authority to speak on these issues. Their participation was thus highly valuable and provided the bulk of the information for this thesis. In addition, they, along with other community members with whom I interacted, did suggest other individuals who are knowledgeable on certain issues and likely interested in participating in the research. I followed up on these suggestions whenever possible, which broadened the pool of participants. Certain elders in the community were approached following some of these recommendations, and their teachings greatly ameliorated my understanding. The other key participants were the Wemindji representatives of the Cree Trappers Association (CTA). This association plays a key role in the coordination of initiatives for 'life in the bush' and traditional pursuits, and representatives are keenly aware of past and recent events and trends regarding hunting. I spent much time in the CTA office, and I am thankful to the representatives for their time and highly valuable inputs. By spending time in the CTA office, I also met some younger hunters who provided me with their own perspective on the contemporary social and cultural factors influencing hunting, and some of the challenges in balancing economic development, livelihood in the ‘modern’ world, and traditional pursuits.

This thesis is not a controlled study requiring sampling for measurement purpose, but rather an ethnographic attempt at generating an understanding of how social-ecological

phenomena are collectively perceived and the response they elicit (Bernard 1994; Wolcott 1999). For this reason, and given the wide scope of enquiries, it was more important that participants be recruited on the basis of availability, timing, and willingness to teach than according to some sampling methods.

Participants of a wide range of ages are represented. The youngest participant was 17 years old and the oldest 93 years old. The bulk of the respondents were between 35 and 70 years old. On many topics, response variability seems to result more from the variability of individual's outlook than from age difference, although a more systematic evaluation would be required to attest to that. An estimate of the respondent's age is mentioned where it is felt that it could have an incidence on the response.

3.5. Data collection

The data collection component of this study has been carried out during two sojourns in the territory of the Cree Nation of Wemindji: first from June to August 2006, and during a follow-up trip in September-October 2006, for a total of over twelve weeks. As I had previously been to Wemindji three times since 2003 through my participation in the Wemindji-McGill project as an undergraduate student, I already had some sense of how to carry my research project in the community, which helped me complete the fieldwork in this time period. I spent another two-month in Wemindji during the summer of 2007, when I spent more time out on the territory doing various field works for the Paakumshumwaau-Wemindji Project. During that time, I also verified quotations and my interpretation, and the analysis of my thesis. The final revisions of this thesis were made while in Wemindji in August 2007.

Data collection strategies are informed by the previously discussed approaches and methodologies. They include participant observation, open-ended and semi-structured interviews (Bernard 1994). Over the approximately three months of field work, a hundred-and-one interviews of various degrees of formality were carried out with thirty-nine participants, and I took part in over a dozen field trips of lengths varying from one to seven days. These are discussed in further detail. Also, when appropriate, some of the interviews have been carried out in teams of two researchers. This turned out to be greatly helpful when there was some overlap in the respective objectives of the researchers, as the questions sometimes combine and lead the conversation in directions that reveal unexpected topics or insights.

3.5.1. Participant observation

Participant observation as a method embodies much the aforementioned process of "experiencing" in ethnography (Wolcott 1999). Schensul et al. (1999) define participant observation as "learning through exposure and involvement in the day-to-day or routine activities of participants in the research setting" (p.91). In this research it involved first and foremost accompanying Wemindji Crees in their fishing and hunting activities, and taking part in some of the daily activities in town. This allowed me to gain some first-hand knowledge of issues and relevant topics that characterize life in James Bay, which hopefully increased the relevance and quality of my interviews. As many hunters emphasized, 'life in the bush' is centered on practical skills that cannot really be learned through mere conservations, but rather through 'learning by doing'; in fact many interviews brought up this disclaimer and even led in some cases to invitation for extended stays in

hunting camps in future months and years. Many of the themes gained whole new 'layers of meaning' when I experienced them myself, regardless of the knowledge previously acquired through reading and conversations. For example, the uncertainty inherent in traveling over long distances in a motorized canoe along the James Bay coast during stormy weather, or the 'monitoring' of the state of hunting territories by tallymen are some of the themes of which I gained an improved appreciation through direct exposure. Consequently, the depth of this thesis is most probably largely limited by the amount of time spent actually spent in the bush, relative to the time spent talking about it. At the same time, this thesis can only partially represent the breadth and the quality of the rich teachings that were so kindly offered by elders and hunters. I am infinitely grateful for each trip, for each invitation to each bush camp I was fortunate enough to visit, and for the tremendous learning that each visit provided.

3.5.2. Interviews

Both in camps and in the community, I sought comments and explanations from Cree research participants on more specific aspects and phenomena surrounding life in the bush in general, and the goose-hunt in particular. These exchanges took the form of open-ended and semi-structured interviews with Cree elders, community leaders and hunters, on aspects of ecological knowledge, subsistence activities, tenure, and resource management practices. These started as broadly exploratory, relatively casual and unstructured conversations in which I sought to clearly explain what I most interested in learning, i.e. the objectives of my research, and at the same time to find ways to exchange on the topics covered by the research questions (Bernard 1994). This first step informed a more

structured (semi-structured) round of interviews, in which my questions were more refined and informed (Bernard 1994).

The interviews were carried out in person (face-to-face), with participants in the research, and much effort was spent in ensuring that the interview took place in a physical context that is comfortable for the participant, and that allows relatively little disruption. The interviews varied in lengths from twenty minute to two hours, with large majority around one hour. Participants were presented with a contact sheet that summarized the research and the consent agreement. Consent was verbally agreed upon following a brief explanation of the goals and protocol of the interviews. Participants were financially compensated for their contribution. Topographic maps and acetates were used as a complementary tool for the interviews, providing a visual context to situate the spatial elements of the conversation.

Most of the interviews were in English. In the cases where translation was required, as when interviewing elders that are monolingual Cree, I sought to have a joint interview with their spouse or children when they would be available and able to translate. This was the most practical solution, and it often was the most appropriate for the participants as well. In the instances when such a pairing was impossible, the elders were proactive in finding or recommending translators that would be competent and appropriate.

Twelve of the more formal interviews were recorded, but most of them were written as notes both during and after the interviews. Given the purpose of these interviews as 'dialogue' to seek explanations that are agreed upon, the interviews were more valuable as 'organic' exchanges in which patterns and phenomena are explained, and in which the researcher asks for the validity of his or her interpretation. Recording would not have been

of great help in this context. On the other hand, the interviews that were recorded did allow to revisit and to pick up issues that were missed the first time around, and the transcripts of these recordings also provide most of the direct quotes used in the text.

3.6. Data Organization and analysis

Research questions were addressed following ethnographic and grounded theory approaches (Bernard 1994; Wolcott 1999; Glaser 1992), through a triangulation of field and interview notes, and from the results of similar studies in northern Canada. The various strands of data documentation (field and interview notes, maps) were transcribed and/or typed, and compiled. All the data were read multiple times, in order to gain a general sense of the information, and to reflect on its overall meaning, while keeping an eye out for patterns that that may emerge regarding the topics or angles chosen by participants. Following this first step, the identified topics were listed and coded as 'components', and components that are similar were clustered in categories. In this step of the analysis, different items were compiled in a computer spreadsheet, classified according to their categories. The mentions and explanations of relationships among the elements and category were also listed in a separate table, along with the supporting references. The flowchart and diagram software *OmniGraffe* was then used to synthesize this web of components and the relationship among them, representing it graphically as a diagram. Each component was then represented as a 'box' in the diagram, and the links among them was represented as an arrow linking the boxes. This large diagram was then broken down in 'themes', within which components of different categories interact.

The organization of the thesis results is largely influenced by the sub-themes that emerged from this analysis and synthesis of the data. Each of these themes was then further enquired upon during follow-up interviews, and through additional literature research.

As this thesis looks into the inner workings of the ecological understanding of an indigenous group, and its role in adaptation to change, I sought to remain faithful to the perspective of my Cree teachers, and to avoid simplifying or distorting their insights to make them fit some Euro-Canadian discourse (Smith 1999; Nadasdy 2003; Sandlos 2007). That being said, my perspective remains the one of an outsider to Cree culture, and it remains bound to Western thought. This is reflected in the analysis and organization of the material. Below I discuss some of the ways in which I sought to maintain validity despite these shortcomings.

3.7. Validity and verification

The validity of the research is partly bolstered by the collaborative approach discussed earlier, in that this approach increases the likelihood of research questions that are relevant and meaningful to the participants. Additionally, the research process unfolded as a dialogue in which my own on-going interpretation of the data was communicated to the participant in an attempt to seek validation or refutation (Demeritt and Dyer 2002). This approach allowed iterative adjustment and improvement of the research as it evolves, following participant inputs. The thesis remains an outsider's perspective, but it is based in the assumption that there are commonalities and compatibilities between various strands of knowledge, and that shared understandings may be reached through collaborative, place-

based research in which perspectives are exchanged in trust and respect (Davidson-Hunt and O'Flaherty 2007).

Concerning the grounded theory component of my methodologies, validity is assessed by an evaluation of the fit between the concept used and the observations, of the relevance to the participants, and of the workability and modifiability of the theory (Glaser 1992). It appears that these criteria are met, as it demonstrated throughout the iterative back-and-forth between theoretical constructs and empirical data, and of the constant re-evaluation of the ways in which they converge, and in which they are appropriate to the given cultural context.

Chapter IV

The Wemindji Cree goose hunt: Living with variability and unpredictability

Plate 3. Canada geese (*Niskw*)

Plate 4. Preparation of hunting camp

Plate 5. Hunter on his way to hunt geese on a coastal island **All Photos C. Peloquin**

In this chapter, I describe the Wemindji Cree goose hunt, discussing how ecological variability and unpredictability, such as weather, goose population dynamics and migration patterns, are mediated by local management strategies in which goose hunting areas may shift in space and time. These strategies usually involve rotation of hunting sites, minimizing of disturbance, and minor physical modifications (bush clearing etc.) to the landscape. This fine-tuning of local arrangements to local environmental conditions has implications from the standpoints of resilience theory and cultural ecology. I discuss these implications, building upon previous work by Scott (1983; 1996) and Berkes (1982; 1998) and Elmqvist et al. (2004). This presents how the goose hunt 'normally happens'. It also presents the 'normality', from which the departure is the topic of the next chapter.

4.1. The Wemindji Cree goose hunt

4.1.1. The setting and preparation

The spring goose hunt is one of the most important subsistence activities for the coastal Cree, and it involves a greater level of social coordination (Scott 1986; Belinsky 2000). Throughout the months and weeks preceding the arrival of the geese, from February through early April, hunters plan spring goose camp. Hunters are invited, or they invite others, to participate in a given camp. These invitations are part of the commitment to sharing food and access to animals and territories, which is of central importance to Cree society. Invitations are usually based on kinship and friendship, and most of the alliances are made while in the village, but occupational hunters who are

elsewhere on their trapline communicate with others through direct visits, or through the VHF 'bush' radio network that covers the most parts of the Cree territory.

While planning and preparing for goose camp, hunters are on the lookout for news and signs that the geese are on their way. As spring approaches, news concerning the geese becomes an increasing part of the everyday conversations in town, and of news and weather reports on the local radio station. Hunters who are out on the land, as well as those from neighbouring Cree communities further south, such as Eastmain and Waskaganish, report the arrival of the geese through bush radios and other means of communication (W. Mayappo, 2 Aug. 2006). The shifts in temperature at the onset of springtime also are noted and discussed, as these strongly influence goose migration patterns.

Once the conditions are right, it is time to travel to camp. Occupational hunters, and others who are able to do so, make their trip sometime in April, traveling by snowmobile (*Skidoo*) to which a sled is attached, following the trail along the coastline, over distances varying from 2-3 kilometres to 40-50 kilometres. More than one trip is often made over the first days to take families and supplies, but hunters try to limit their use of snowmobile and other motorized vehicles once the geese start to congregate in the area. Some members of the community who have employment in town usually go a few weeks later, waiting for the three-week long 'goose break' that is part of the Cree calendar. These hunters often make at least one trip to the camp prior to the actual hunt in order to deliver their supplies and make other preparations, usually during a weekend when the weather is favourable, and return at the onset of goose break. The Cree usually arrive to their camp when the Bay is still frozen over, the hunt takes place more or less

throughout ice break-up, and hunters return to the community using motorized freighter canoes once the Bay is ice free and the last geese have left the area.

The principal unit of organization for this harvest is the goose-hunting territory (Scott 1986). These are not exactly the same as the more formally defined beaver trapping territories discussed in chapter two. Whereas the goose-hunting territories are distributed according to the same kinship patterns as, and they overlap with, the traplines, the two differ in multiple ways. ‘Traplines’ cover land areas. Many of them are elongated polygons, 20-30 kilometres wide, and spanning from the coast to over 150 kilometres inland, often following a given watershed. Goose hunting territories are often an outward extension of these traplines beyond the coastline, covering the points, bays and islands adjacent to a given trapline. But goose territories are more fluid, changing over years and seasons. In some cases, two adjacent territories may overlap and share one or a few sites in this overlapping area, subject to inter-territorial communication and coordination. These goose territories are also smaller, and fewer than traplines, since the inland territories that are 'landlocked' lack access to coastal goose habitat. In Wemindji, only 7 out of the 20 traplines have access to the coast. Hunters whose family's territory are inland then get to participate in the coordinated coastal goose hunt through invitations from members of coastal families, which highlights the social importance of these alliances and invitations. The "goose-boss" (*paaschichaau uuchimaau*, or shooting boss) is often the same person as the "beaver-boss" (*amisk uuchimaau*) (Scott 1983, p. 54), but not necessarily so. For example, when one senior hunter from a family is held to be a more experienced goose hunter than the tallyman is, this hunter is likely to become the goose-boss (LU, 3 Jul. 2006, R. Atsynia, 7 Aug. 2006) although others insist that the

tallyman and the goose-boss are always the same person (JM, 10 Jul. 2006). The goose-boss may also be an elder who is no longer an active hunter (J. Blackned, 6 Aug. 2006).

Goose camps are usually composed of a few dwellings including at least a cabin and a *Miichwaap* (tipi), and they involve the participation of 6 to 12 hunters, who are often accompanied by members of their respective families. A given camp could then easily involve 20-30 people from 6 to 7 families (AV, 3 Aug. 2006; J. Blackned, 6 Aug. 2006). Each goose-hunting territory contains multiple sites suitable for the hunt. These are mainly found in goose feeding areas in coastal salt marshes, freshwater ponds near the coastline, and heath habitats on non-forested points or coastal islands (Scott 1983; Reed et al. 1996).

Some of these sites have historically been engineered through small-scale modifications of the landscape in order to enhance their effectiveness. These modifications include cutting down some trees near a hunting site to create a *Tuhiikaan*, or what the Cree describe as a "fly-way" in English (Scott 1983). These openings have the purpose of "driving" geese in a given direction as they land. Other modifications include the creation of new ponds and building small dikes to retain the water in some of the ponds, often to offset the effects of the "growth of land" associated with isostatic uplift (Scott 1983). Each site is surrounded by a series of hunting blinds – usually 5 to 7 of them – that are displayed either in a semi-circle or in a line. These blinds are cone-shaped structures, 4 to 5 feet high, built using a combination of stones, branches, snow, and canvas (AV, 3 Aug. 2006; J. Blackned, 6 Aug. 2006). Each of these blinds is meant for one hunter to sit in, where they usually kneel waiting for the time to shoot.

The fall hunt takes place when geese travel south from September to October. It is relatively less important than the spring hunt, both in numbers of geese harvested and in the extent to which hunters coordinate. It often overlaps with the preparations for the other fall and winter harvests that take place further inland, such as moose hunting and beaver trapping. The 'inland' families thus usually travel to their territories without participating in the coastal goose hunt (JM, 10 Jul. 2006, J. Blackned, 6 Aug. 2006; AV, 3 Aug. 2006). Furthermore, the fall goose hunt tends to be less reliable than the spring one, as geese are less prone to stop over during the fall, especially so when few berries are available (Scott 1983). These differences notwithstanding, the spring and fall goose harvests follow very similar practices.

Once hunters have arrived to their camp they wait for the geese while chopping firewood and building hunting blinds. During this period, some small-game trapping, such as hare-snaring, and ice-fishing are also practiced. Most, but not necessarily all of these activities will be suspended once the goose hunt actually starts. In preparation as well as throughout the period of the hunt itself, the Cree are especially careful to avoid generating irregularities on the land that could alert the geese (Berkes 1982; Scott 1983). Geese are known as highly intelligent and observant beings that are able to detect, and be suspicious of, even subtle 'hints' of hunters' presence (Scott 1983, 1996). For example, any material of bright colour such as clothing, especially red and orange, must be hidden, no garbage must be left around, and the blinds must be well camouflaged. This is part of a broad commitment to keeping camps clean, which is related to manifesting respect to the animals, and to their spirits (Tanner 1979).

Open fires also require special care: “When we make the fire, when we see geese coming, we have to put out the fire right away, not to scare the geese” (R. Atsynia, 7 Aug. 2006). Other sources of light must be kept in check. Some point out that the curtains of cabins must be closed at night so that the geese do not see the indoor lighting. Similarly, it is preferable to turn off the headlight of snowmobiles when traveling:

> In the spring, when we go goose hunting, we went hunting; the geese were at the end of the bay. A skidoo came with its light off, it didn't scare the geese. Another came with its lights on, the geese took off. So light is very important (R. Atsynia, 7 Aug. 2006).

At the same time, the sensitivity of geese to human disturbance also does involve sensitivity to noise, which hunters take into account and try to minimize. This will be addressed later when discussing the impact of snowmobiles and helicopters on the hunt. This is also manifest in hunters’ preference for smaller calibre shotguns. There is a tendency among experienced Cree hunters to prefer the lighter, less noisy .16 gauge shotguns, especially the 1 1/8in. long, lead shells, as opposed to the 3in. long ones (F. Stewart, 20 Jun. 2006; J. Blackned, 21 Jul. 2007). This is related to a general preference to lighter guns, as these are less damaging to the prey, spoiling less of the meat, and also less noisy. In general, the Cree do not approve of hunters who use overly powerful guns and rifles, as these demonstrate an attempt to compensate poor hunting skills with stronger tools, in addition to being messy and wasteful (J. Blackned, 3 Aug. 2006).

The ways in which Cree mediate their disturbance to the geese are important topics that will be further discussed in the next two sections.

4.1.2. Niskw: the Canada goose in Eastern James Bay

The planning and organization is in preparation of the arrival of *Niskw*, the Canada goose, especially the *Branta canadensis interior* subspecies. These migratory birds stop for staging, feeding and roosting as they travel along the James Bay coast, to and from their northern breeding grounds in tundra habitats that range from the Ungava region of Québec to Nunavut (Reed et al. 1996).

In the spring, geese usually start arriving early in April, in small numbers at first, making use of the open areas as the ice and snow are melting. Their numbers increase throughout the weeks, leading to a peak migration where geese congregate in large numbers (Scott 1983). The length of their stay in the area varies according to weather, ice, food availability and human disturbances. Their stay is longer during long springs, when ice breaks-up and snowmelt are both slow. In contrast they leave sooner when spring is early and fast, or short. The last geese to stop in the area usually leave around late May to early June, although some geese do not leave the Bay at all, but instead congregate on offshore islands where they undergo wing moult and breed. The Cree stop hunting these 'resident' geese at some point during June when they become "too skinny" and are left alone to reproduce (F. Stewart, 20 Jun. 2006; J. Blackned, 21 Jul. 2007; LU 3 Jul. 2006). These geese usually leave with their goslings around August when both the parents and the young are ready to fly (LU, 3 Jul. 2006). Others migrate later in June, when all ice and snow are gone, but they tend to fly too high and do not stop in the area (LU, 3 Jul. 2006). The ones that did fly to northern breeding grounds return south starting at the end of August all the way into early October. Again, they stop to feed and rest, but their stay is less reliable than during the spring (S. Mistacheesick, 27 Jun. 2006)

A wide range of coastal habitats is available for goose feeding and staging in the area. These include salt marshes along the coast where scaly sedges (*Carex paleacea*) and sea lime-grass (*Elymus mollis*) are dominant; protected, shallow bays with low salinity where sub-tidal beds of eelgrass (*Zostera marina*) are found, and non-forested, low relief islands and points covered by a heath of lichens and ericaceous shrubs such as Black crowberries (*Empetrum nigrum*), blueberries *(Vaccinum boreale)* and cranberries *(Vaccinum oxycoccus)* (Dignard et al. 1991; Reed et al. 1996). Other habitats of importance include freshwater marshes, open lakes, rivers, ponds, and areas of mud, sand tidal flats and saltwater surrounding the points and islands (Reed et al. 1996). The extent to which geese use these respective habitats fluctuates highly according to local geography, season, current weather patterns, and other similar factors. Geese tend to roost in open water habitats and fly to specific sites to feed. In the spring, salt marshes tend to be favoured over the other habitats as they provide a more diverse selection of food sources and become ice-free earlier, which allow for a longer fattening period before the geese leave to their breeding grounds (Dignard et al. 1991; Reed et al. 1996). In a study of stomach contents of geese on the Northeast coast of James Bay, Reed et al. (1996) found that 80% of the 30 plant species eaten by geese in the spring were salt marsh plants of which they eat the seeds, leaves stems, rhizomes, bulbs, and in some cases the entire plant (Reed et al. 1996, p.25). In the fall, geese make use of more diverse food sources and habitats as these are then no longer limited by snow and ice, and berries provide an additional food source. During this season, the proportion of species that are aquatic plants found in stomachs drops to 50%, and their relative proportions change as well. The difference is due to the geese feeding on various berry species that are found on the

islands and points. The local presence of geese in the fall is highly contingent upon the availability of these berries: when the berry crops are poor, the geese are reported not to stop on their way south, and to fly very high. Scott (1983) reported astonishment among the Cree about the ability of geese to know beforehand, or to predict, whether or not berries are present, as they then fly straight up without stopping.

4.1.3. The hunt

As geese are migratory birds that are not bound to a given area, it is important that hunters minimize their impacts to reduce the risk that geese find the territory too risky, and decide to go elsewhere, which would effectively terminate the hunt in that area (Berkes 1982; Scott 1983). The goose hunt is thus enacted through a set of practices aiming at balancing the requirements of both hunters and geese, both of which are subject to change in time and place, according to multiple factors (Scott 1983).

Early in the morning, the shooting boss steps out of the camp to evaluate the hunting potential of the day. The key factor at the onset is weather, especially wind. Wind influences goose foraging patterns – geese fly more and they fly lower on windy days than they do on calm days, and a strong wind also covers the sound of the shotguns: "We go to places when it's not that windy, know where to go by the weather, and where the wind comes from" (R. Atsynia, 7 Aug. 2007).

If the wind is not strong enough, no hunting should take place until it picks up, which could take from a couple of hours to a few days. When the wind is sufficiently strong to allow hunting, its direction largely defines the hunting location so as to avoid incoming geese hearing the shots from a distance, and to increase the likelihood that

geese will be likely to visit a given site. The best conditions are when the wind switches direction, making the geese fly back and forth between sites:

> When the wind is southwest, south, we go around in a bay that is good for that... on the North side, then when wind is North, we go for a place that is good for that. This is the best way, it keeps them around (LU, 10 Jul. 2006).

Other key factors influencing the hunt include tide levels, temperature, and previous hunting pressures. In addition, the shooting boss often observe goose congregations from a distance, often using binoculars, taking into account their numbers and behaviour (R. Atsynia, 7 Aug. 2007).

This monitoring and decision-making informs use and selection of hunting sites. One of the main goals of this practice is to diffuse hunting pressure, shifting hunting efforts in time and space through a judicious use of site rotation that provides the best fit to given weather and goose foraging patterns (Scott 1983; Berkes 1998). While a given site is being used, others are 'rested' to prevent the geese from associating a specific area with higher hunting pressure, which would in turn make them avoid it:

> There are places, even if there is a lot of geese and there is no wind, we don't go. It is the tallyman who decides where we hunt and don't hunt. There may be two or three places on the trapline where we could go, but he says only one, at least one or two in one day, you just go to one, that's it. You have to listen to the tallyman. Maybe next day we'll go to that other one (A. Gilpin, 12 Jul. 2006).

Throughout the duration of the hunt, these sites are rotated almost daily to ensure that the pressure is diffused across the multiple sites within a territory, and that it is time-sensitive as well. Sites are ‘rested’ during calm days, but there are also days when the goose-boss suggests that no hunting should take place at a given or any site even if the conditions seem favourable, for the sole purpose of giving the geese ‘a rest’. In addition to this near-daily rotation, there are days when the entire territory is rested. At the minimum, there is

no hunting on Sundays, as the Cree do not participate in harvesting activities on this day, mostly for religious reasons.[3]

This results in a system of 'no-take' zones that fluctuate according to ecological dynamics, and that is comparable to a fallow system in agriculture,[4] although on a much shorter time-scale, as this takes place over days instead of months or years (Scott 1983, p.54). Hunters usually avoid approaching and entering large congregations, as this would scare the geese, and chase them away in large numbers. Since geese are known to remember and to communicate these events, the consequences of such neglect could last a long time (Scott 1983, pp. 42-48). Only under optimal conditions, and once a congregation is steadily established in an area can hunters attempt a 'drive' in such a congregation. These congregations and feeding areas are especially sensitive; hunters should not enter them except when practicing a goose-drive: "Feeding areas is where we must be most careful, for noise and fire at night" (R. Atsynia, 7 Aug. 2006).

In addition to only shooting when the wind is strong enough and in an appropriate direction, hunters must avoid superfluous shooting, again to avoid scaring the geese (R. Atsynia, 7 Aug. 2006). It is also important to stop shooting before dusk so that the geese don't see the spark at the end of the shotgun. This is again related to the geese's ability to see bright colours at a distance. This probably originates from the days of black-powder guns when these sparks were much more pronounced, but it remains relevant to this day (Berkes 1982; Scott 1983).

[3] In the context of hunting as a religious occupation, however, it is difficult to clearly distinguish between 'religious' and 'ecological' themes (Speck 1935, Tanner 1979). For the Cree, this distinction may very well not exist.

[4] The agriculture reference is apt: when Cree explain their relationship to the land to southerners, they often use the metaphor of 'garden' to convey the stewardship and management required for successful harvest (See Feit 1988).

There are two main approaches to the goose hunt, and their respective uses are determined by period in the season, environmental conditions and goose abundance. In the first technique used, mostly at the beginning of the season, geese are hunted by waiting for them to fly over as they travel from one site to another. Hunters choose a suitable site that is ice-free, or when no open areas are available in acceptable locations, they dig a depression in the snow that suggests a pond. They then place decoys in the pond or depression, and position themselves in the blinds surrounding the site. This is a delicate strategy. Again, geese are very observant, and they then could be alerted by improper use of decoys: if these are not placed correctly according to the wind, or if one falls on its side, the geese will fly higher and will not land over a long distance until they are assured of their safety. The decoys that are used nowadays are the commercially available plastic kind, which replaced the homemade wooden ones of the past. Hunters carry a limited numbers of decoys. During a successful hunt, these could be supplemented with some of the killed geese placed in a natural pose on the snow. These are seen as more realistic and effective than artificial decoys, which, as Scott (1983) suggested, entails a positive feedback regarding hunting efficiency.

The other main technique involves approaching a smaller congregation of landed geese as they are feeding, and chase them away by slowly walking toward them:

> When they hang around in one area, if it's a north wind or something, we chase them out, and then they fly back, that's when we shoot them. We don't slaughter them. We just walk in, don't shoot, just chase them away, they come back after, later on. They won't come back if we shoot them right away (A. Gilpin, 12 July 2006).

This technique usually brings higher returns, but is also less reliable and can only be practiced under specific conditions, when winds are strong and in the right direction:

> People don't hunt on calm days. And on windy days they go where there is lots of geese. They don't shoot right away, they go there, make the geese fly out, and later in the day they come back. But if you shoot on a calm day when the geese fly away the geese won't come back, or maybe just a few of them (JM, 7 Jul. 2006).

Also this practice is limited to periods that are sufficiently late in the season, so that geese are present in large numbers and congregations well established (Scott 1983). During the fall, hunters could carry out such a drive at a site during the incoming tide; the geese would then leave to feed on berries on nearby islands. During this time, the hunters prepare their blinds around the selected site and wait. As the tide recedes, some of the geese are expected to return gradually, usually in small groups of 4 to 6 geese at a time, and hunters will shoot them as they arrive (A. Gilpin, 12 Jul. 2006). It is also possible to hunt geese on these points and islands, especially later in the spring or in the fall. These sites are less sensitive to disturbance. These islands and points are the last to become free of snow and ice, so by the time these are available for goose hunting, there is a greater diversity of alternative sites for the geese to choose from. Geese that are chased from an island may then go to a coastal marsh for a while, and return later, instead of leaving the area altogether. Furthermore, as these sites are relatively remote the sound of shotguns does not disturb the larger congregations in coastal bays. For both these reasons, the hunt on the islands is less rigidly coordinated. It is not subject to the same system of rotation, and it is accessible to hunters that do not get to participate in the more established goose-hunt in the bays and on the mainland. As some hunters explained, ‘anyone can go on the islands’ (LU, 5 Jul. 2006; JM, 16 Jul. 2006). For instance, hunters who have jobs and who cannot take the goose-break may do some limited hunting in late afternoon on weekdays or during weekends (Scott 1996). Again, even if these sites are less sensitive, most, if not all the same ‘rules’ to minimize disturbance apply to this hunt, and improper

actions are reprehensible. There are consequences to neglecting these rules. For instance, many elders and hunters mentioned one specific event in the mid-1950s when a careless hunter did shoot geese at night, at a site called Long Point in English, firing multiple shots that scared the geese (S. Hughboy, 23 Jun. 2006; S. Mistacheesick, 27 Jun. 2006). Geese have since then been known to avoid this area. This event was also previously reported to Scott (1983, p. 47). This neglect is also partly blamed by some Cree for the migratory shift of the snow goose that was then present in high numbers in the area, but that have started to fly elsewhere during the 1950s and 1960s (Scott 1983). Here is another example of such neglect involving visiting especially sensitive congregation sites:

> There is this one site, my grandfather used to go there late in the fall, just to check on the geese, and would not allow others to come with him. He would go by himself, and climb up a tree to see them without disturbing them. This is how sensitive it was. The geese do not congregate there anymore. Once he got there and there were people. He asked where they parked they canoe, and it was where the geese congregate, so that was the end of that hunt (R. Atsynia, 4 Aug. 2006).[5]

The hunt usually lasts from 3 to 6 weeks, geese are few at first, and their numbers increase up to a peak to then start diminishing when the geese leave as the season progresses. As mentioned before, in spring, geese cease to be available at some point in May. The ones that had stopped in the area leave around that time or they become too skinny and are left alone to breed. Some geese are still migrating at that time, but these late comers usually do not stop in the area and they fly too high, although hunters sometimes get to kill a few of these even in June when they are seen flying low over the Bay.

[5] This story was also earlier reported to Scott (1983).

In any case, the period from late May and early June is a turning point in the Cree harvesting calendar. At this point, hunters either return to the community or leave to their fishing camps further out on some coastal islands, where they start fishing and also hunt other waterfowl (loons, ducks, Brant geese) that can be found around these islands (Scott 1983; Bussières 2005). At that time, "the fish start to be ready, fat enough", (F. Stewart, 12 Jun. 2006) and the goose camps that are on, or close to the mainland become "too hot, and there is too many mosquitoes" (I. Mistacheesick, 27 Jun. 2006).

4.2. Living with variability and unpredictability

When one hunter mentioned a specifically poor hunt in two consecutive years, where hunters returned with very few geese after three to four weeks of waiting, I asked him why they keep on waiting for so long despite the absence of geese. He replied:

> Maybe the year before was not too good, if no geese one year maybe you expect more the following year, so you don't know, but it could be the same again. People used to live like that: we go there and we expect to have a good season but we don't know (J. Blackned, 6 Aug. 2006).

Such unpredictability has been described by many hunters as central to the goose-hunt. Here is another example:

> "In the springtime we sit in ponds, and they come in. We just sit around and wait. They go flying all over, if we're lucky they're gonna come our way" (A. Gilpin, 12 Jul. 2006).

Hunters do the best they can, according to their knowledge, to ensure a successful harvest, but beyond these measures they depend on 'luck'. As we saw in chapter 2, the concept of luck in Algonquian worldview – especially as it refers to hunting – is much more than random coincidence (Tanner 1979; Scott 1989; Feit 1995). Events and successes in a hunt are determined by multiple elements, and influenced by multiple

factors, including agency from the part of the preyed animal-persons. Hunting is a relationship of reciprocity between the hunter and the animal. Hunting 'luck' in this context refers in some ways to the successful fulfillment of this relationship. It is often shaped by proper behaviour from the part of the hunter, it may or may not be passed on from parents, and it can change for mysterious, unknown reasons. For instance, one Wemindji hunter reported that he never had much luck with bears (AV, 6 Aug. 2006). His father had it, but did not pass it on to him. This hunter has, however, more 'luck' with beaver than his father had. This 'luck' can be maintained or improved through manifestation of respect, or offerings to the animals. These include hanging the skulls of bears and other bones of important in trees so that dogs and other animals don't have access to them (Tanner 1979; Peloquin unpub. field notes). For the geese, some hunters hang bundles of the inedible trachea on a branch, using wires, for similar effect (Scott 1983; Peloquin unpub. field notes). But proper behaviour does not guarantee hunting success. Animals offer themselves as gifts, and they themselves decide to whom and when (Scott 1989; Feit 1995).

It is interesting to look at this 'community of beings', in which relationships between hunters and animal-persons change for various reasons, from an ecological perspective. Variability and unpredictability are then key defining aspects of life in the bush, driven by personhood. Subarctic environments are 'marginal' environments especially characterized by high seasonality as well as infrequent, large disturbances (Dale et al. 1998; Batterbury and Forsyth 1999). It has been suggested that peoples indigenous to these and other marginal areas have through time developed set of skills and knowledge that are attuned to the ever-fluctuating and seemingly chaotic nature of

these environments (Winterhalder 1983; Smith and Winterhalder 1992; Batterbury and Forsyth 1999). In the context of Cree ecology, this variability leads to a high degree of contingency. One treatment of the subject that is particularly helpful here comes from the writings of anthropologist Richard Preston (2002). As part of a broader, in-depth ethnographic study of Cree narratives, he interpreted the meanings of some stories as suggesting "that every Cree individual is socially and ecologically very much on his own in a world over which he enjoys very little and very temporal control" (Preston 2002, p.152). He then goes to further discuss this notion of contingency:

> The assertion that the Cree world is an essentially contingent one seems to almost automatically call forth the question 'contingent upon what?' The fact that the question can only be answered in generalities such as 'quirks of weather, animal migration, etc.' is in itself revealing. Precise answers are not easily given by the analyst or by the Cree, for the contingencies of the Cree world are not predictably patterned and directly apprehended in all their complexity (Preston 2002, p. 152).

According to Preston then, this reality is not explained in terms of mechanical laws but rather in terms of relationships. The Cree world is one in which both human and non-human beings, including the geese, are sentient beings that have agency and interact as part of intricate webs of relationship that change all the time. In this context the notion of 'natural resource management' has limited meaningfulness. The Cree do not seek to 'manage' the 'resources': these act on their own will, with which one should avoid interfering. The ethos of non-interference and respect of individuality are central to Cree ways of doing, and they inform the relations among people as much as the ones between humans and non-human beings (Preston 2002).

This takes us back to a central theme of Cree cultural ecology; the management is on the Cree side of their relationships with animals, and mostly enacted through self-

restraint and efforts to be respectful (Feit 1973; Preston 2002; Tanner 1979). Respect in the Cree cultural context entails humility, not boasting about self, using just as much as is needed, and ensuring the reciprocity in relationships through gifts and other exchanges (Tanner 1979; Feit 2004). This conclusion is similar to the one of Scott (1983):

> Hunters can not always be sure why an animal has gone away or why it returns, but one important factor they can control is their own manner of hunting, and respect shown to the animal in general terms (p. 196).

This applies directly to the goose hunt: the harvesting practices of the Cree are not aimed at the 'management' of the population per say. Given their high degree of mobility, goose population are influenced by factors that are beyond the influence of Cree hunting, and beyond what happens in the James Bay/Hudson Bay bioregion (Berkes 1982; Scott 1983; Reed et al. 1996). Consequently, the Cree are not so much concerned with the absolute meta-population numbers of geese, but with their availability at the local level. It is this availability that the Cree principles and practices of land stewardship aim to maximize.

Most of the harvesting practices are highly flexible and situation-specific, depending on the behaviour of the geese, on the wind, and on many other factors. The Cree do not necessarily seek to maximize short-term returns but instead favour active restraint on harvest to ensure its long-term viability (Feit 2007). The restraint is informed by and enacted through specific elements of knowledge, practices and institutional arrangements (Berkes 1999). For instance, the dynamic goose territories amount to a system of access to, and harvesting of resources that is flexible and focused on the resources themselves (Scott 1986; Elmqvist et al. 2004). This differs from more static arrangements in which access and use is allocated by spatial boundaries that are defined *a*

priori and rigidly: the application of the rules concerning the goose hunt are determined by where the geese are, their population numbers and what they are doing. All of this is always changing in time.

Being inconspicuous and 'treading lightly' are two additional key themes of Cree land stewardship in the context of high variability and unpredictability. Hunters must be cautious, and remain attentive to the impacts of what they do:

> There used to be a place where my grandfather used to go for many decades. He used to portage to go hunt. The geese would stay around for a long time, and he would hunt them when they fly out. The geese would see him only when he was shooting (R. Atsynia, 4 Aug. 2006).

Failure to act upon these principles often brings about dire consequences, as in the two cases earlier where geese have been avoiding a spot following improper behaviour from the part of Cree hunters, these events being even associated by some as contributing to the major shifts in geese flyways and the scarcity of Snow geese associated with them. These large-scale shifts are central to Cree cultural ecology. Large fluctuations are part of the natural course of life, but some shifts that are undesirable may be exacerbated through recklessness and other disrespectful behaviour from the part of the Cree. Occurrences of such large scale shifts then often inform normative knowledge embedded in lessons and stories. This relation between natural fluctuations such as cyclicality of animal abundance, and human behaviour is here suggested by Raymond Atsynia, an elder and tallyman from Wemindji:

> Before my time, there used to be more caribou, marten, bald eagles, even inland. They are slowly coming back. This is one of the reasons to be extra careful. For example, with the geese, once you disturb them, it takes generations to recuperate; this is what happened to those other animals who are now coming back (R. Atsynia, 4 Aug. 2006).

This explicit recognition of intrinsic ecological unpredictability informs a set of knowledge and practices that has parallels with western notions such as 'precautionary principle', where risk is minimized in the face of uncertainty (Mitchell 2002). This need for cautiousness is emphasized in discussion about sensitive areas and processes such as spawning areas, dens, goose ponds, use of fire and proximity to water sources. In fact, cautiousness is a central theme of Cree ethos and way of life. The recognition of unpredictability and uncertainty increases the readiness of the Cree to surprise. The hunt is expected to fluctuate highly, and Cree practices aim at maximizing flexibility in response to these fluctuations.

This points to similarities to the Western prescriptions for 'adaptive management' where practices are seen as ‘experiments’ that must constantly be re-adjusted to changing conditions (Walters 1986; Berkes et al. 2000). One key element of adaptive management is the ability to monitor and evaluate change as a prerequisite to respond to and shape it (Folke et al. 2003).

While there seems to be similarities between Cree ecological understanding and resilience thinking, it is important to note that there also are dissimilarities. For example, Wemindji hunters do not seem to think of their relationship to the land in terms of ‘adaptive management’, and the relationships that they entertain with animals are not ‘experiments’. On the other hand, it is not likely that the majority of ‘Western’ ecologists using a resilience approach in understanding social-ecological processes are ready to accept the notion of animal-person acting within relations of reciprocity in a community of sentient beings. While these dissonances may not be resolvable, challenging the likelihood of a truly common understanding *per se*, this does not exclude the possibility

of shared understandings where various groups get a better sense of how others perceive their reality, and act in ways that are respectful of these differences. As a Wemindji tallyman puts it, "We have to understand each other, what we are doing, how we are thinking. The Cree, the Inuit, the Whitemen, if we want this place to work" (OV, 3 Aug. 2006).

Cree hunters and elders make explicit mention of the importance of monitoring and the connectedness to the land that it implies. The tallymen are key actors at this level, as they are in a position to better read the signals and to propose the right thing to do. Again, Raymond Atsynia explains this clearly:

> There used to be quotas for beaver. Even when I had reached my quotas, I still used to roam the land just to monitor, check beaver lodges. That was my responsibility as *uuchimaau* to monitor, to be aware of the land all the time (R. Atsynia, 4 Aug. 2006).

This notion of "being aware of the land all the time" highlights the importance of monitoring at the root of appropriate decisions. This allows constant re-adjusting of the practices to ensure an appropriate response to changing conditions (Parlee 2006).

Cree ecological understanding is one in which actions may have unpredictable consequences, and where large parts of the system may quickly 'tip' over in a different configuration. These shifts may include an animal species becoming rare or absent, sometimes replaced by another (Berkes 1999). This happens periodically at the scale of each site/territory, but also at larger scales, sometimes over the entire Cree territory, and for decades. This happened for example when snow geese stopped flying in large numbers over the eastern coast of James Bay, to be replaced by Canada geese (Scott 1983). Another example is the long period of absence of caribou in the region, starting in the early 20th century followed by its relatively fast return in the 1980s (Berkes 1999),

and the decline of beaver abundance following over-trapping in James Bay in the 1930s (Feit 1988). In such a context, it is preferable to favour an approach that is humble, and flexible (Speck 1935; Tanner 1979; Feit 1995)

Again, looking at the goose hunt from the perspective of social-ecological resilience, the system of site rotation could be understood as generating series of 'pulse' disturbances fostering spatial-temporal diversity across the different 'patches' or hunting sites (Berkes 1998). This diffuses hunting pressure in time and in space, avoiding that it becomes too concentrated and overwhelm the overall system. This diffusion then contributes to the viability of each respective site within the territory – geese will avoid for a long time sites where human pressure was too great, as it happened at the "Long Point" hunting site in the 1950s, and numerous other sites that are now 'spoiled'.

Keeping with the resilience approach, we could also refer to the idea of 'panarchy', as processes nested at multiple and interlinked levels, with feedbacks among processes. In this context, the regime of pulse disturbances at the level of the patch reduces the risk that multiple *patches* at the local levels *collapse* simultaneously in a manner that would lead to a *revolt* at higher levels.[6] The controlled and limited hunting pressure is distributed to sporadically occur at given sites under suitable conditions. This could be seen as fostering patch diversity at the smallest scale, reducing the risks of a widespread 'contagion' of a state that could tip the whole system over (Walker et al. 2006). Put differently, it is by ensuring that different hunting sites are subjected to different levels of pressure in time, so that geese will alternatively be given a chance to congregate and rest, be chased, or be hunted, ensuring that they keep landing, but also

[6] The concept of *Revolt* is used here in the resilience sense (Gunderson and Holling 2002). It refers to the situation where a combination of fast and small events overwhelm slow and large ones through feedback loops from lower to higher levels (Resilience Alliance 2007).

that they could also be harvested. From this perspective, site rotation has two main roles. First, it has the direct management role of diffusing the impacts of human disturbances in time and space by distributing them as pulses, preventing that human pressure becomes too concentrated and in turn influence the geese to avoid the area altogether. Secondly, it is plausible that this system of hunting rotation contributes to keeping goose habitats in a desirable steady state through its regulatory influence on goose grazing pressures at the level of a given site (Berkes 1998; Elmqvist et al. 2004). Recently research on the central flyway of the snow goose has suggested that migratory waterfowls are sufficiently efficient grazers to deplete coastal vegetation in their northern ranges, thus pushing habitats into an alternative state of exposed sediments (Abraham et al. 2005). This situation is most likely specific to the snow geese habitats along the Central flyway, and no similar phenomena has been documented regarding the habitat of the Canada goose along the Atlantic flyway, but such occurrence remain plausible.

The extent to which the rotational system of Cree goose hunting diffuses the pressure of both Cree hunting and goose grazing to the point of maintaining it in an 'alternative stable state is unclear, but the Cree notion that relationally, too little hunting is often just as incorrect as too much hunting, seems to share some similarities with this hypothesis (Feit 1973; Berkes 1999). That being said, for the Cree the idea underpinning this view is that hunting is a relationship of reciprocity between the hunter and the prey, in which the animal offers itself as a gift to the hunter (Feit 1988; 2000). In this context, too little hunting is not desirable, as it represents non-acceptance the gift. Similarly, over-hunting amounts to greed and wastefulness. Both these behaviours are manifest of a lack

of respect, and thus reprehensible. Animals may refuse to make themselves available following such occurrences (Feit 1995, 2004).

Continuing in the direction of looking at both Cree ecology and resilience thinking, the social memory that allows the continuity of this system is maintained through sets of skills, institutions, and stories carrying a strong normative component (Davidson-Hunt and Berkes 2003b). Cree institutions efficiently foster this memory by relying heavily on the wisdom and knowledge of the elders and of the *uuchimaau* (Feit 1988). At the same time, authority among the Cree is exerted through non-direct suggestions and by example – coercive practices are not really part of Cree institutions, and a leader will have authority to the extent that he or she is correct (Craik 1975; Preston 2002; Tanner 1979). This could also be linked to complexity, where there is not necessarily one absolute solution, and multiple approaches may be just as valid, if not complementary. Additionally, the ability of individuals to ultimately act upon his or her judgement whenever it differs with the more authoritative recommendations may often contribute to the flexibility of the arrangement. The absence of 'rules' in the sense of rigid codes may very well be what makes Cree lifeways adaptive to shifts and change in their social-ecological system. From a resilience perspective, there may be links between a) Cree individual autonomy in coping and adapting to change, and b) the 'diversity' of responses to ecological disturbances that is seen as crucial for ecosystem renewal (Walker et al. 2006).

The Cree goose-hunt fits this description of a resource use characterized by multiple nested spatial and temporal levels. This harvest is a series of encounters between the Cree and the geese, taking place at the local level over relatively short periods of

time, but both these elements are influenced by factors that take place at much larger scales. Temporally, both hunters and geese make decisions influencing what is to happen over a few hours to days and weeks, with consequences that may be over decades in some instances (Scott 1996). The specific knowledge and memory of Cree hunters go back decades, anecdotal points up to a century, and practices, rules and stories have evolved over millennia. Geese are seen by the Cree as having a long collective memory as well, perhaps in the order of decades according to some elders (S. Hughboy, 23 Jun. 2006; R. Atsynia, 4 Aug. 2006). Spatially, the signs and indicators taken into account for decision-making are read both at the level of the site and at the level of the goose hunting territory, where hunting efforts are coordinated through a constant evaluation of the overall distribution and history of hunting pressure as well as other disturbances. The hunt itself takes place at the level of the hunting site. The goose-boss and hunters of each territory communicate and coordinate with each others throughout the Wemindji territory, and in turn, Wemindji hunting practices are similar to, and coordinated with the ones of the other coastal Cree communities. Given that the practices are highly similar, and more or less coordinated along the James Bay coast, this nested management system may well span over 100,000 sq. kilometres (Feit 1988).

The encounters between the Cree and the geese are largely determined by processes occurring beyond the local level of the hunting site. The Cree harvesting system, then, aims at being attentive, and responsive to variability and change while at the same time seeking to minimize its impacts (Berkes 1998). Both the Cree and the geese are influenced by factors taking place at much higher scales, i.e. that are external to the Cree management system. The geese, being migratory birds, operate on spatial scales

that transcend Cree management by a wide margin. Their behaviour is directly influenced by factors occurring at the level of the continent, and they are at least indirectly affected by global processes as well (e.g. Scott 1983; Abraham et al. 2005). The Cree also do deal with external factors influencing their social and ecological setting in general, and their harvesting practices in particular. Some of these factors are related to rapid environmental change, which combine with socio-cultural changes as well. In the next chapter I explore the ways in which the goose hunt as a local resource management system appears to be (to some extent) overwhelmed by some of these processes taking place outside of its sphere of influence. What this study suggests is that the exogenous variables are responsible for patterns in goose behaviour and availability that do not meet hunters' expectations. This conjures two possibilities; 1) environmental processes fluctuate beyond what was usually experienced, and/or 2) Cree hunters may be less prone to deal with ecological unpredictability in their harvesting activity, due to various social-cultural factors. I further explore these two possibilities in the next chapter.

Plate 6. Hunting camp on Old Factory Lake **Photo C. Peloquin**

Plate 7. Hunters visiting a goose pond in summer **All photos C. Peloquin**

Plate 8. *Uuchimaau* Fred Stewart showing an old goose blind structure

Chapter V

Variability, change and continuity in an Indigenous social-ecological system

During my conversations with Cree hunters, I was aiming to interpret the ways in which hunters perceive, understand, and talk about environmental variability, unpredictability and complexity. I chose to focus on the Cree goose hunt for this exercise, as it appeared to provide a suitable context for such discussions. The goose-hunt, as it is the case with other Cree harvests, is characterized by a high degree of dynamism. Elements change constantly, and it is against this ever-changing background that the Cree must read and make decisions on the optimal use of resources (Winterhalder 1983; Ingold 2000). I suggested that the hunt takes place within complex and dynamic webs of relations between human and non-human elements. The normally expected variability and change characterizing this harvest could be seen as 'surprises' that could be mediated by an individual or smaller group, as part of the normal course of events. Conversations with hunters regarding the role of variability and unpredictability in the goose hunt highlighted that while there is some measure of predictability, that ecological processes follow some patterns that are known by hunters, there always remains a great deal of uncertainty as to how events will unfold on the land. Identifying the elements of 'endogenous variability' characterizing this hunt as separate from exogenous factors is not a straightforward endeavour. The Cree with whom I spoke clearly explained that 'things change all the time', and that change in itself is no cause for alarm. For instance, cyclicality is a recurring theme in the Cree understanding of life in the bush. Animals 'leave' and 'come back', and fires, re-growth, renewal are all key themes of Cree

ecological understanding. However, the topic of the goose hunt almost invariably brought up mentions of change that appear to be of a higher magnitude than the normally expected fluctuations. These changes are reported to have been going for almost three decades now, and things are perceived as only getting worse. This echoed what I had previously heard and read on the topic (Scott 1983; MacDonald et al. 1997) but I initially thought that these changes were beyond the scope of enquiry of this thesis. Furthermore, I was reluctant to shift my attention to these points, because they were suggesting to a 'linear' decline in the quality of a subsistence hunt, and not to the more 'cyclical' types of variations I was looking for. After some time however, the conversations were overwhelmingly pointing to the fact that the 'signals' I was looking for were 'lost in the noise': 'variability' and 'change' were intermeshed, and that whichever way I was to look at it, I could not separate the former from the latter. It then became clear that an up-to-date and accurate picture of the goose-hunt required a closer inspection of these changes. At the same time, this provided a relevant and useful context to inquire about two themes. First, how do the Wemindji Cree perceive and understand large scale change within their social-ecological systems? Second, how does customary land stewardship navigate turbulence caused by changes occurring at multiple and overlapping temporal and spatial scales? This chapter presents the results of these enquiries. I address ways in which the customary goose hunt discussed in the previous chapter is impacted by external factors of change. This involves a discussion of these drivers and how they are perceived in Wemindji. This leads to a discussion, in the next chapter, of what adaptation strategies these changes invite.

Whereas there is no clear consensus on what the key factors underlying these changes are, there are many suggestions as to what they may or may not be. The collective understanding of this 'web of factors' suggests that resource users rely on a sound understanding and recognition of complexity, for which they constantly look into a wide range of signs and criteria indicators. They notice unusual events and exceptions, but they do not seek to precisely measure the trends of observed change. Their understanding does not require absolute proof of causal links. Instead these observations are understood within a relational context, in which correlations and synergies among factors are attributed varying degrees of plausibility. Causality itself remains uncertain. I expand on the implications of such a way of knowing at the end of this chapter.

5.1. Decline in goose availability

Here are some of the accounts on the state of the goose-hunt in recent years:

> It's been getting worse every year, bad goose hunt last two years, I did not catch any goose this spring (2006). Many others also did not catch any. It used to be 100 in a season (F. Stewart, 15 Jun. 2006).
>
> Before, I would get 130 geese or so in a spring, now usually ten, this year, six (S. Georgekish, 25 Sep. 2006).
>
> Hardly any geese anymore. In 1984, got 50 geese a day, now you get ten and return home because you know you won't get any more (J. Blackned, 6 Aug. 2006).
>
> This year I killed three only. We were there about 3 weeks I guess. There was hardly any, we would see them flying that's it. They wouldn't stop (A. Gilpin, 12 Jul. 2006).
>
> This year and last year, (…) the hunting wasn't too good, spring hunting. That's why, I bought three boxes of shell, and I still have them all. There's hardly any geese… some men didn't even kill a goose in the spring (S. Mistacheesick, 27 Jun. 2006).

> There have been a lot less geese in the past 10 years (E. Georgekish, 15 Jun. 2006).

These accounts are typical. Almost all of the interviewed hunters mentioned that the hunt is getting worse and worse. This is part of a long standing trend, as Scott (1983) reported the same concerns as early as 1977-1979. However, while the current changes are qualitatively similar to the ones reported here, they are of a much higher magnitude. Cree participants in the "Voices from the Bay" project mentioned that the current trend of goose decline in Eastern James Bay started in 1988 (MacDonald et al. 1997). In the summer of 2003, when I first visited Wemindji for undergraduate research work, hunters reported that the goose-hunt has been especially poor in the last few years (Benessaiah et al. 2003). When I returned for this research in 2006, hunter's accounts revealed that things had not improved, in fact the two previous springs had been the worst hunts remembered. These changes were also reported by almost all of the Wemindji hunters who participate in a Cree Trappers Association workshop on data collection on migratory birds in the James Bay territory, held in Wemindji in 2005 and involving Canadian Wildlife Service (CTA 2005; Tétreault 2006).

This is surprising when one considers that Canada goose populations are currently at an all time high (Hass 2002; Harvey and Rodrigue 2006). Over North America, most of the Canada goose subspecies have been increasing in numbers since the 1940s, when many of them were endangered due to over-harvesting and habitat loss (Hass 2002). This population increase largely results from conservation measures (Migratory Birds Convention) combined with agricultural subsidies (USFWS 1997; Abraham et al. 2005). Their numbers are now so high that people speak of probable overpopulation in some parts of the continent (Hass 2002). Of the three main populations of Canada goose in the

province of Québec, it is mainly the Atlantic population that flies along the Eastern coast of James Bay (Rodrigue 2005). While population estimates at the level of flyway are difficult and imprecise, it is clear that the numbers for this population have increased tremendously over the last ten years, going from the low point of around 30,000 breeding pairs in 1995, when they were at their lowest, to over 160,000 in 2005 (Harvey and Rodrigue 2006). This five-fold increase coincides with the time period when the Wemindji goose-hunt has been going from bad to worse.[7] It is thus clear that the hunt is not limited by meta-population numbers, but rather by goose availability as determined by factors other than demographics. This includes changes in goose behavior, which in turn is partly related to biophysical and social-cultural drivers of change.

These changes in goose behaviour and availability are perceived and apprehended by the Wemindji Cree within a view of their social-ecological system that could be described as a complex web of fluxes that are dynamically interacting. The first and foremost elements of change in the goose hunt concern goose behaviour and migratory patterns. There are key determinants of their availability to hunters, and consequently, of the viability of the harvest. As we saw in the preceding chapter, most of the practices regulating the goose hunt are based on certain assumptions on where geese are expected to land, and what they may or may not do once they arrive. It appears that increasingly, these assumptions are not met. Figure 5.1, on the next page shows, a representation of this complex web of interacting factors, as understood by Wemindji hunters.

[7]During interviews, I occasionally highlighted the discrepancy between the upward goose meta-population trend reported by CWS biologists and the local decline in goose availability reported by hunters. Cree participants did not appear particularly surprised by the differences between these reports. Many of them are aware that larger numbers of geese are found over areas larger than the James Bay coast, but this information does not seem to be of particular direct relevance to them regarding the goose hunt *per se*.

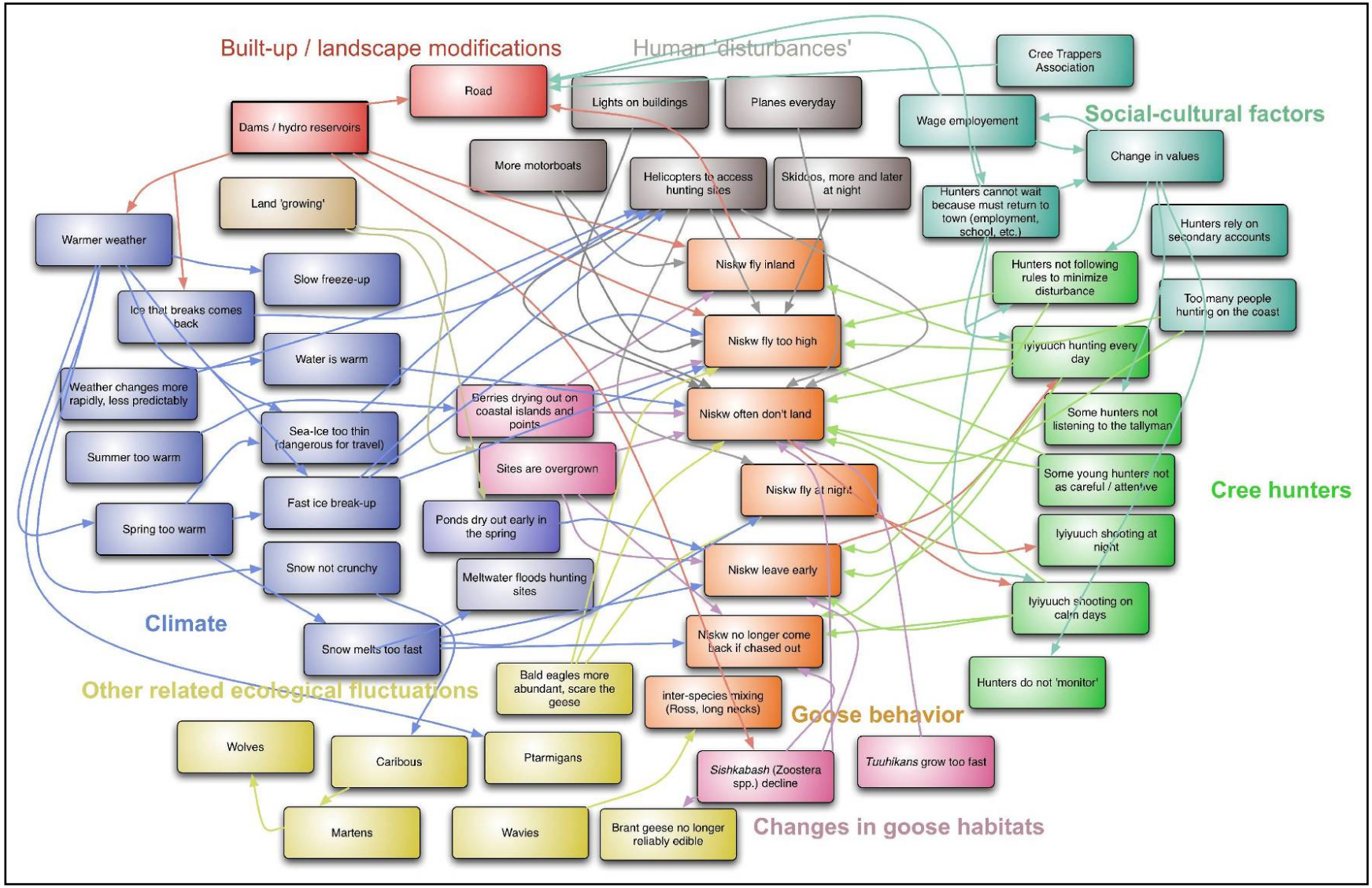

Figure 5.1. The complex web of intersecting factors of change impacting the Wemindji Cree goose hunt

5.2. Change in goose behaviour

One of the main categories of change is the results of geese's flying inland instead of along the coast. This is part of a trend that some identify as having started around the 1960s, but that has since gone from being an exceptional occurrence to almost being the dominant pattern:

> In 1953, on the inland portion of my trapline, I seldom saw geese over there. I first saw geese inland in the fall of 1959, it was unusual. By 1969, I realized that it was usual that there were geese inland in the springtime (R. Atsynia, 4 Aug. 2006).

This has important implications. First, geese are not reliably found on the coast, where hunters wait for them according to the practices discussed earlier. Geese also land in more scattered patterns over the territory, instead of congregating in large numbers, as they would usually do in large bays and coasts. In addition to not concentrating in large numbers at specific sites, the geese are less prone to return when they are chased. This causes problems to the 'drive' hunting technique as this method relies on the return of the geese after they are chased.

A related trend is that geese tend to fly too high and are less likely to land. In the spring such occurrences are normally associated with fast ice-break up and snowmelt:

> This year and last year, we had an early spring, early open water; the ice went really fast, so there is less geese. Because the snow is really going fast, and there is hardly any water in the swampy areas, the geese don't land and don't stick around. This spring and last spring, I noticed its early spring, and there's hardly any geese (S. Mistacheesick, 27 Jun. 2006).

> Sometimes, it all depends on the snow, the weather. If the snow melts fast they don't stop, if the snow hangs around they're gonna stop. It was fast spring in the last 2 years, and they didn't stay (A. Gilpin, 12 Jul. 2006).

In the fall, this is normally expected to happen when the preceding summer was too warm and dry and caused a failure of the berry crop on coastal islands and points (F. Stewart,

20 Jun. 2006; A. Gilpin, 12 Jul. 2006; S. Mistacheesick, 27 Jun. 2006). Such accounts were reported by Scott (1983, p.50), in which Cree hunters explicitly described the links between hot and dry weather earlier in the summer, the failure of berries crop on these islands and points, and poor goose harvests. One such account specifically suggested that the geese would even decide to switch to the west side of James Bay, relying on the marshy areas on the Ontario side during these years (Scott 1983, p.50).

As we will see later, these weather patterns are more frequent, and are increasingly perceived as local manifestations of global climate change (LU, 20 Jun. 2006; JM, 7 Jul. 2006; E. Hughboy, 26 Jun. 2006). Some suggest that this may partly explain why geese are more prone to fly too high, and to not land in the area. But this explanation seems only partly valid, since geese sometimes even decide not to land when conditions do appear suitable.

Another important reported behavioural change among geese is that they have started flying at night instead of during the day, which makes their hunting impossible: "They fly at 2, 3, 4 AM, we see them but we don't shoot" (J. Blackned, 6 Aug. 2006). This was seen as exceptional in the late 1970s when it was reported to Scott (1983, p.200), but according to the Cree interviewed in the course of this study, nocturnal flights have become increasingly common over the last five to ten years, and are especially frequent during the period “between quarter and full moon, (when) they use moonlight for navigation” (AV, 8 Aug. 2006).

No specific cause is singled out as sole responsible for all these changes in goose behaviour. Rather, they are linked with a myriad of other types of social-ecological change. These changes are understood within a broader web of fluctuations, in which

events may or may not be correlated. During our conversations about change on the land, Cree interlocutors often referred to specific events and observations, which are then juxtaposed, sometimes ambiguously. These associations between events first appear to serve a role as mere temporal reference points, but they also are mentioned in a way that more or less ambiguously suggest the possibility of links between them; links that may or may not be causal. This is in agreement with Preston's suggestion that "precise answers are not easily given by (…) the Cree, for the contingencies of the Cree world are not predictably patterned and directly apprehended in all their complexity" (Preston 2002, p. 152). This suggest that the Cree do not seek to diminish complexity or uncertainty, but that they instead act upon a relational model of their environment in which events and patterns are understood in probabilistic terms, an approach that allows the treatment of a very high numbers of variable, especially at the collective level.

5.3. "Lots of change, not just with geese, in the bush everything changes"

This quote from Cree hunter James Sashaweskum (15 Jun. 2006) is representative of many others that I heard, probably when my questions were becoming too pointed, or my focus seemed too narrow. As I mentioned above it appears that the Cree understanding of changes involving the geese can only be understood within a larger 'constellation' of factors and events that are more or less 'normal'. During conversations with Cree hunters, they were quick to correct me whenever I seemed to over-emphasize the catastrophic nature of these changes, and they explicitly situated them in the broader context of 'things changing all the time' (A. Gilpin, 12 Jul. 2006; J. Blackned, 6 Aug. 2006).

For instance, after reporting that the goose hunt has been declining over the last years, many hunters are often quick to point out that 'it's not so bad'. Elders Rev. Samuel Hughboy (23 Jun. 2006) and Sinclair Mistacheesick (27 Jun. 2006) noted that the on-going trends of "not many geese" did happen before, most recently around 50 years ago. Freddie Atsynia, also and elder, goes even further back in time:

> A long time ago, like my mother used to say a long time ago, before I was born, her walking out ceremony, she only had 8 geese to celebrate with, that spring, that was long time go, I'm 64 years old, and that was before I was born (F. Atsynia, 16 Jul. 2006).

These accounts suggest that periods of goose rarity and abundance are part of the normal course of events, and part of the larger web of changes in which "fire, things burn, grow back, moose and beaver leave, then they come back" (F. Atsynia, 16 Jul. 1006).

Animals then frequently fluctuate in numbers and change their behaviour. Other birds such as ptarmigan have also been observed to fly more inland, which is new (S. Hughboy, 23 Jun. 2006). Moose are more abundant in the area than they were within memory. One tallyman first heard of a moose in the inland portion of the Wemindji territory in the 1950s, and they can now be found over most of the territory, all the way to the coast (AV, 8 Aug. 2006). Some Wemindji Cree suggest that this moose abundance in the James Bay area may be the result of disrespectful behaviour from the part of people in the southern portion of the province (LU, 10 Jul. 2006). Some even make the parallel with the geese, suggesting that, in the same way that moose have 'left' their southern range due to improper management by non-Natives, perhaps geese are less prone to make use of coastal James Bay habitats due to some measure of improper treatment from the Cree (S. Georgekish, 18 Jul. 2006; AV 8 Aug. 2006). This suggestion is linked with some comments on social-cultural factors that will be discussed later. Another example of this

changing nature of the environment is the view that Caribou are also making a comeback. One hunter saw a caribou for the first time on the Wemindji territory in 1976, and over the 30 years since they have become abundant to the point of almost being a 'nuisance' (OV, 3 Aug. 2006). This increase in caribou abundance is also linked with an increase in numbers of martens and wolves, as these three species "travel together" according to some research participants: "Ever since we had caribou, we had martens too, they move with caribou old people say. And wolves too" (JM, 10 Jul. 2006). Increases in the populations of martens and wolves have predatory effects on smaller prey species such as snowshoe hare and ptarmigans, making them difficult to harvest for the Wemindji Cree (LU, 3 Jul. 2006). Of more direct relevance to the goose-hunt, some participants suggest that wolves predate on goose nests (LU, 6 Aug. 2006). Bald eagles are also becoming more common in the area, reportedly scaring the geese away (LU, 3 Jul. 2006). Some advance that geese started flying at night since these eagles made a come-back in the area, as "the geese are afraid of everything that flies" (LU, 3 Jul. 2006). Another important change in animal species involves the Brant geese. This sea bird is usually harvested by the Cree later in the summer, at the same time as other ducks and loons, when Canada geese have left the Bay (Berkes 1982). Over the last ten years, Brant geese have been making people sick, causing minor food poisoning and stomach illnesses (LU, 3 Jul. 2006; J. Blackned, 26 Jul. 2006).

> Just a few years ago, people have been complaining about those brants. When you eat them, you get a stomach ache. We don't shoot those brants anymore. People shoot them but they don't eat them very much. And my brother in law, David Visitor, he used to work for the band office, he send out a few birds for testing, they didn't get any results on that. Four or five years ago. No one told us why there is a problem eating those. It seems it's the things they eat in the bay,

> those eelgrass, they don't grow anymore. It's probably what they eat instead that makes them sick (JM 10 Jul. 2006)

According to Jimmy Blackned, in the past hunters would know which brants to avoid. When their flesh was yellowish, they were known to be inedible and to cause this sickness, but nowadays this indicator is no longer valid, as brants make people sick even when their flesh is of the 'right' colour (J. Blackned, 26 Jul. 2006). The Cree associate this illness with the decline in eelgrass *Zostera marina* or *sishkabash* in Cree, on which brants primarily feed. It is thought that whatever it is that the brant eats to compensate for the missing eelgrass is behind this phenomenon (F. Atsynia, 16 Jul. 2006). This decline of eelgrass is a great source of concern, and no culprit has been clearly identified, although, again, many factors are suggested (CTA 2005). This is relevant to our main theme, as Canada geese also feed on eelgrass, and the dramatic change in their patterns coincides with the decline of this food source (I. Mistacheesick, 27 Jun. 2006). When I asked a Wemindji trapper if he thought that eelgrass had any effect on geese, he replied: "Probably, ya. Maybe it's the reason there is so much geese inland. Geese eat berries in the fall, not the same as brants, they don't eat" (JM, 10 Jul. 2006).

These changes in other species numbers and behaviour are implicated both as causes as well as symptoms of the changes concerning the geese. They are seen by the Cree as inter-linked, but it is not clear which leads to which. There are two other categories of drivers that appear to the Cree as ultimate, underlying factors: biophysical processes (climate, vegetation); and, built-up/anthropogenic disturbances, often linked with economic development pressures. These are seen as having the most direct and important impacts on the goose hunt, and will be reviewed in greater detail.

Climate

Climate and weather in Wemindji have been observed to change drastically and at accelerating rates over the past decades. The weather has been reportedly warmer in the Wemindji area since the late 1970s, (J. Blackned, 27 Jul. 2006) some even say "too hot" (F. Stewart 24 Jun. 2006; E. Hughboy, 26 Jun. 2006; LU, 10 Jul. 2006). This is consistent with reports from elsewhere in the subarctic and arctic (MacDonald et al. 1997; Berkes and Jolly 2001; Krupnik and Jolly 2002; Nichols et al. 2004; ACIA 2005). As elsewhere in the north, the trends of changing temperature are manifest through multiple signs on the land (Krupnik and Jolly 2002). In Wemindji, for example, with warmer temperature, "snow is not crunchy… It doesn't scare the caribou when we walk toward them" (D. Mayappo, 16 Jul. 2006). This warmer temperature also makes the ice on the bay thinner:

> The weather has been changing a lot since the late 1970s. It's not as cold in the wintertime, and after freeze-up you have to wait a long time before you can travel on the ice. And people say the ice is not as thick as it used to be, even out in the Bay. In late February I put out my fish nets, five kilometres from here, I was surprised that the ice was very thin, it was about this thin (~10 inch), it used to be about 3-4 feet thick. It makes it easier for digging a hole in the ice (JM, 10 Jul. 2006).

This decrease in the thickness of sea-ice makes it more dangerous to travel on the frozen Bay in the fall and in the spring[8]. This trend has incidence on harvesting activities:

> Freeze-up takes longer, we must wait a long time before going on ice (in the fall), and then in the spring ice goes out really fast, too fast (LU, 3 Jul. 2006).

> In the past, say 25-30 years, it would not be unusual to travel by snowmobile as late as 15th of May, whereas nowadays the ice is often too thin for such travel as early as mid-April (J. Blackned, 6 Aug. 2006).

[8] On this matter, Wemindji Cree often cite as reference the resident Inuk in the community, who is seen as the local expert on sea-ice.

> In the fall, we used to travel on the ice in November. Nowadays, it's often only safe after the New Year (S. Georgekish, 25 Sep. 2006).
>
> In 1966, the Bay was frozen on 31st of October, at least by the barge (S. Georgekish, 25 Sep. 2006).
>
> My father used to come back on May 20th, by snowmobile. Now the rivers break up at the end of April, third week of May on the coast. (S. Georgekish, 25 Sep. 2006).

This brings us to one of the key issues pertaining to climate. Spring is seen as too early and too fast. This has the consequence that the snow-melt and ice break-up both occur too early and too fast as well. Last spring in Blackstone Bay, one of the important coastal goose hunting territories, "when the geese arrived there was no snow, only ice." (S. Georgekish, 1 Aug. 2006). A hunter from the neighbouring territory to the north reports a similar trend: "Over the last 30 years hunting at Moar Bay, I noticed that there is no more snow nowadays" (AV, 8 Aug. 2006).There are many other reported indicators of these changes. For example, one hunter now sees seagulls in March, which is exceptionally early, and in late spring and early summer, some hunters report that the waters of the Bay are 'too warm' (LU, 4 Jul. 2006). Year-round, but especially in the spring and summer:

> It's the same inland, it's warmer there too. In the summer too, sometimes it's very hot for a few days, and then it can change very rapidly. It changes faster than it used to (JM, 10 Jul. 2006).

Next page shows a diagram representing some of the key factors of change that are climate related, and how they interact.

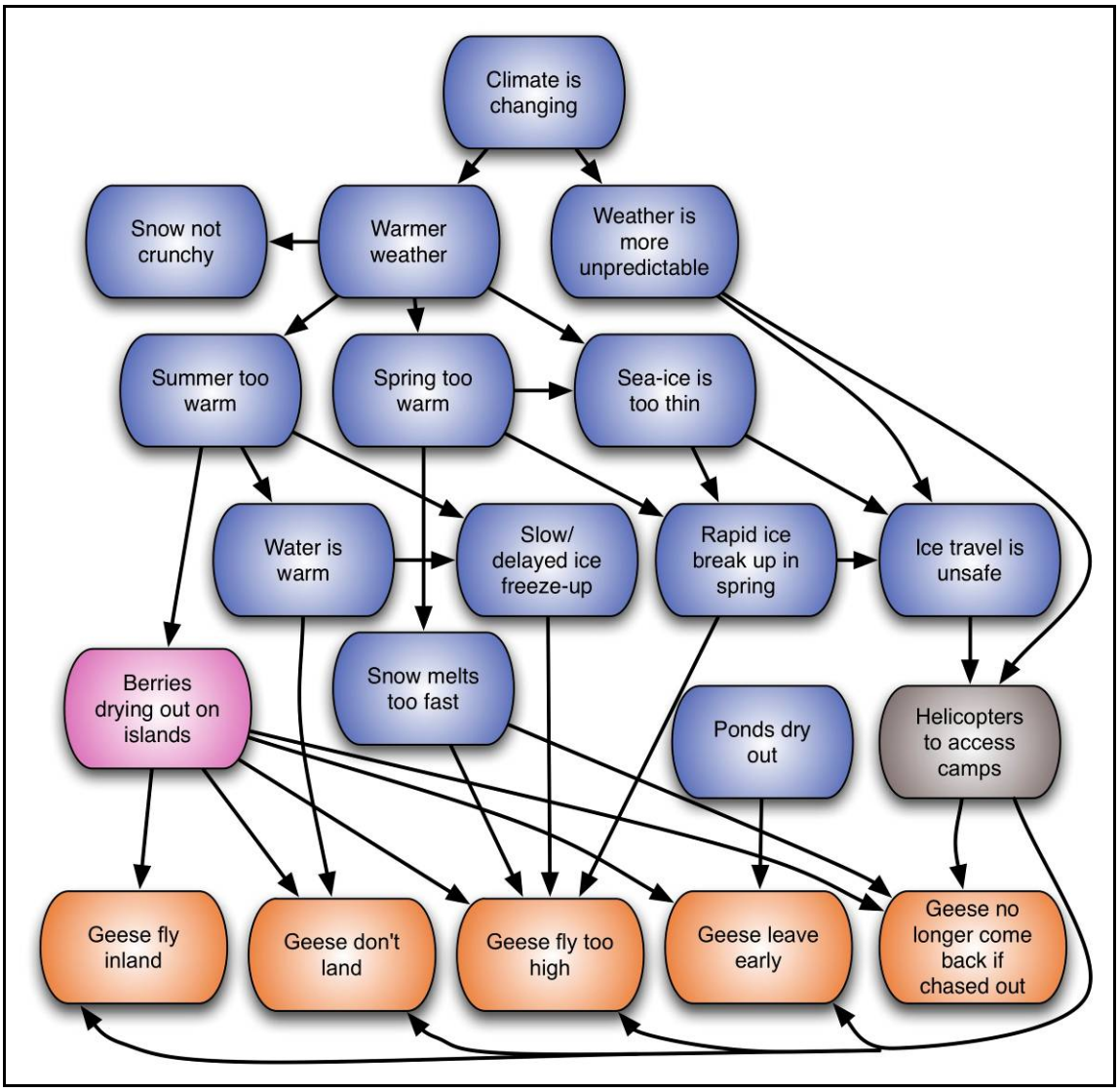

Figure 5.2. Climate-related factors of change impacting the Wemindji goose hunt

These climate-related factors diminish the reliability of the ecological indicators on which the Cree normally base their decisions, and make subsistence activities on the land more hazardous. Moreover, these factors directly impact goose availability. Early and fast springs and ice break up, as well as warm weather, are all seen as key factors influencing geese: "It's too warm, it's not good for the geese, they fly right through, it's probably why the geese change their patterns" (AV, 8 Aug. 2006). At the same time this

observed climatic trend has influence on other related biophysical processes and elements, which in turn impact the goose-hunt as well, amounting to a series of *indirect* climate-induced factors of change. One of these factors involves the crop of black crowberries, what the Cree call 'gooseberries' when they are speaking English, and *aschiimin* (earth or moss-berries) in Cree (K. Scott, 10 Oct. 2006). Geese feed on these berries on their way south in the fall. People have reported that with the recent summers being too warm, these berries 'dry out' under the sun before ripening. By the time the geese start coming back in August-September, these berries are then all dried out and hard, which is seen as contributing to the geese not stopping, and not being available for harvest. People have been saying there are fewer 'gooseberries' in the past five years. Whereas such crop failure was known to occur sporadically in the past (Scott 1983), it seems to be much more frequent in the recent years: "Last few years, not very many berries, so geese don't stop in the fall" (F. Stewart, 13 Jun. 2006). "The berries don't grow as much because it's too hot in the summer" (I. Mistacheesick, 27 Jun. 2006), "Blackberries used to attract geese on islands, not much of them anymore" (JM, 10 Jul. 2006). It is reported that while berries on the points and islands are less reliable in the Wemindji territory, over the last 20 years they have become more abundant in Whapmagoostui, the northernmost Cree community some 250 kilometres to the north of Wemindji (I. Mistacheesick, 27 Jun. 2006).

Not only berries and eelgrass are scarce, as it is reported that much of the marshy vegetation on which the geese rely is being replaced by woody shrubs and other more terrestrial forms of vegetation: "What the geese eat is buried" (J. Blackned, 26 Jul. 2006) "places we can't hunt anymore, lots of willows, trees" (E. Hughboy, 23 Jun. 2006). Two

main reasons are associated with this. With land uplift, many of the marshes and ponds are 'drying out', gradually becoming part of the terrestrial mainland:

> The land is growing fast. I used to paddle down the river. Where it was about 4 feet deep, there is an island now. The vegetation is growing very fast. It's changing fast. Where we used to paddle, in the river, its four feet high now (E. Hughboy, 23 Jun. 2006).

Some suggest that "lack of maintenance" from the Cree combines with the effects of land uplift (AV, 8 Aug. 2006). It is unclear what this maintenance has or would be, but many think that some form of ploughing of these grounds may contribute to the renewal of goose food species in certain sites. On the other hand, many report that vegetation 'grows too fast', and that hunters can't keep up with maintenance requirements. For instance, many Cree say that they don't bother to maintain some *tuuhikaan* – the goose 'flyway' corridors – anymore as they grow back too fast, and goose pathways are becoming too unreliable to justify such energy investments (J. Blackned, 26 Jul. 2006; AV 8 Aug. 2006). All these factors cause some hunting spots to be "no good anymore" (E. Hughboy, 23 Jun. 2006; J. Blackned, 26 Jul. 2006) and for some reasons, new sites are not created quickly enough to replace the dysfunctional ones. The thinness and rarity of snow and ice combine with land uplift and overgrowth of woody plants, and both result in a reduction of the range of suitable sites. This reduces the extent to which hunters can rotate and 'rest' hunting sites, contributing to an increase in concentration of hunting pressure, which in turns 'scares' the geese.

In addition to being an important part of the explanation of the changes occurring in the goose hunt, these accounts of the ways in which the changing climate manifests itself locally are valuable contributions to climate change and adaptation research in northern environments. These are partial but robust accounts of how resource-users

themselves interpret and are affected by the processes and patterns resulting from global climate change, as they impact resource accessibility and harvesting practices at the local levels. The scientific studies that measure and model climate change and its impacts provide a picture of this change as a global phenomenon, and offer precious insights on the ways it is manifested at continental and sub-continental scales (ACIA 2005; Adger et al. 2006). However, it is difficult, to derive from these universal models, an understanding of what these phenomena truly mean for the individual as he or she engages in harvesting practices (Berkes and Jolly 2001; Cruikshank 2005; Adger et al. 2006; Reid et al. 2006). In this context, local and traditional knowledge is not limited to information on observed patterns and events, but also involve a rigorous evaluation of what these patterns and events mean to the observer (Berkes 1999; Cruikshank 2005). This knowledge of the ways in which global processes impact local livelihoods is a key theme of adaptation strategies (Krupnik and Jolly 2002; Adger et al. 2006). Furthermore, there are striking parallels between the various indigenous accounts of climate change impacts in northern societies (Berkes and Jolly 2001; Krupnik and Jolly 2002; Nichols et al 2004; ACIA 2005). These parallels attest to the robustness of these local understandings and of their role in better understanding manifestations of global processes (Berkes 1999; Reid et al. 20006). Lastly, these different accounts combine, and point out to key issues in vulnerability and adaptation to change in the north (Berkes and Jolly 2001; Nichols et al. 2004).

5.4. "Ever since the dams"

In addition to these 'natural' factors of change in the biophysical context of the goose-hunt, climate and uplift, there is a series of large scale disturbances – anthropogenic this time – associated with the massive hydro-electrical developments in the area, that are central to the Cree perception of a changing world (Richardson 1976; Feit 2004). The significance of this change is so great that, even if these hydro-electric developments are not directly implicated as causal factors, it is always possible that they contribute – albeit indirectly to any observed social-ecological change.[9] Most of the changes associated with the goose-hunt are seen situated temporally – if not causally – in relation to the dams and reservoirs brought about by these developments:

> I think since Hydro-Quebec made the reservoirs, the geese changed their patterns. If you look at the maps all the way to Eastmain River, there is a lot of water, just like James Bay. That's why I think that's one thing that they follow. And along the Bay, there used to be grass. How do you call that? We call it in the Cree *sishkabash* (eelgrass). Over 10 years now, there used to be lot of *sishkabash*, so I noticed when I set the nets in the water there is just a little bit of that now...They say it came from La Grande, I think it changed the water. I don't know (F. Atsynia, 16 Jul. 2006).

> Ever since they built the dam, geese are flying more inland. A person from Labrador, Schefferville, he didn't sees geese back then. But ever since they built the dams they can see geese, ptarmigans, they didn't have before. They used to fly along the coast, and now they fly inland (S. Hughboy, 23 Jun. 2006).

> In the early days, geese would fly inland. They always went along the coast. Since they built the dams, the geese go more inland, there's water up there (S. Hughboy, 23 Jun. 2006).

> Because of the dams, you notice out in the bay, it's almost like the same, you have probably seen LG 2, LG3, LG4 (dams), they have so much water, its almost like out in the Bay. So the geese go more inland, because they like water (S. Mistacheesick, 27 Jun. 2006).

[9] At the same time, the hydro-electric developments are of such an important social-cultural significance that they could possibly play a metaphorical role in communications on ethics and values, beyond the scope of this thesis.

As one tallyman puts it, “for lots of change with the geese, people blame Hydro-Québec a lot.” (LU, 20 Jun. 2006) For example, the reservoirs are seen as contributing to the pattern of geese flying inland. Some suggest that the upcoming Eastmain-Rupert diversion (EM1) will exacerbate the situation. A portion of the current climate change pattern is also related to these changes: “The weather is warmer, ever since the reservoirs” (F. Atsynia, 16 Jul. 2006). “Ever since the dams, since the late 1970s, it has been warmer” (JM, 10 July 2006).

Again, this emphasis on the impacts of hydroelectric development is pervasive, and appears to be of broader significance than as a limited and direct cause-to-effect relationship. “The dams”, and all that came with them, are perhaps the most fast, catastrophic and overwhelming changes that the Cree had to face, at least in living memory. The entire social-ecological system of Eastern James Bay has been undergoing transformations at much faster rates since the late 1970s when the hydroelectric projects got started. Some entire territories were flooded, rivers diverted, the hydrology of a very large basin was modified, including spatial as well as temporal shifts in the freshwater discharge into James Bay, with possible implications on the salinity and temperature of different areas in the Bay (Macdonald et al. 1997). For example, changes in salinity and water temperature may contribute to the observed change in sea-ice processes, and may also be involved in the decline of sea-grass, especially by favouring the emergence of parasitic wasting disease (Rodrigue 2005). In addition to the dams themselves, these projects brought roads, and these in turn brought in more ‘whitemen’ who further exacerbated previously on-going social-ecological changes (Scott 2001; Feit 2004). That being said, my interlocutors were quick to offer caveats on this topic as well, and

corrected me whenever my interpretation of their account seemed over-simplistic or over-generalizing:

> Since the dams, it changed, but it's not that bad, it didn't harm the environment that much. The caribous are here, they were not here before, they came after the Hydro project, now you have to scare them away out of the cabin, its like dogs (OV, 3 Aug. 2006).

This hunter further expanded on this, making the case that knowledge and connectedness with the land and animals allow the Cree to appropriately respond and adapt to external change. We will see some of the ways in which such response and adaptation unfolds in the next chapter.

5.5. Social-cultural change

The last main category of change pertains to the Cree as key actors in the goose hunt. Cree society is changing too. There are social-cultural drivers related to recent economic developments and cultural change among the Cree that influence values, knowledge, and patterns of resource use. Additionally, changes in goose behaviour also cause hunters to revise their techniques. This could be understood as a bi-directional feedback loop influencing both how the Cree and the Geese act and interact.

These changes have become somewhat dramatic during the period that followed the hydro-electric developments, with increases in government transfers, wage economy, and also financial support to the Cree bush economy in the form of the Income Security Program (Scott 2001; Feit 2004). Wemindji Cree spend more time in the community than out in the land, both in numbers and in duration of their stay. There has been a substantial increase in Cree population over the last decades and it is improbable that the bush economy could support these growing numbers by itself. At the same time, there are

some employment opportunities in town as well as elsewhere in the James Bay territory, which keep some would-be hunters away from the bush: "Jobs are in town; people don't hunt as much" (LU, 10 Jul. 2006). Cree youth attend school in the community, and many elders also stay in the community where they receive medical support. This is seen by some as resulting from, and causing, some measure of change in Cree values and lifestyle. For example, the level of participation in the Income Security Program for Trappers and Hunters in Wemindji has started to drop at the end of the 1990s (see Appendix)[10]. On that point however, some suggest that this is a readjustment following the steep rise in participation after the signing of the James Bay and Northern Quebec Agreement in the late 1970s (LaRusic 1979; Scott and Feit 1992).

Many elders and occupational hunters note that some of the younger generations are not as well connected with the land as in the past: "Before they would know when caribou are coming, could predict a storm. Now with technology, people are disconnected from the land" (SB, 2 Aug. 2006). The following comment point in the same direction:

> Nowadays people don't observe like in the past, for them a rabbit is a rabbit. Back then in the old days, people observed a lot, they would find things, observe change (S. Georgekish, 19 Jul. 2006).

Many younger hunters rely on secondary accounts when making decisions on when and where to hunt. According to some elders, this is due to a lack of connectedness with their environment, which prevents these hunters from 'read the land' themselves. This connection is largely spiritual, and according to some, "nowadays people only believe in bingos, even the old ladies" (S. Georgekish, 19 Jul. 2006). Some customary rules are not respected as much as in the past: "People don't monitor anymore, they visit

[10] Participation numbers in the Income Security Program in Wemindji, however, have slightly risen in 2005-2006. It is too early, however, to know whether this is part of an upcoming trend, or mere annual fluctuation.

feeding grounds in the fall, and they take off whenever they want" (R. Atsynia, 4 Aug. 2006). This is related to reported cases of hunters not listening to the tallyman. It is important to point out that there is no consensus on this trend, nor should it be exaggerated. The same respondents are quick to add that the youth are respectful and attentive when they get the opportunity to learn the traditional ways, when they get to go out on the land and see, observe, and adopt the proper ways of doing and of interacting with the land (A. Gilpin, 12 Jul. 2006; J. Blackned, 6 Aug. 2006). In a similar way, not everyone agrees with the suggestion that the Cree are changing their approach to resource harvesting, and maintain that biophysical factors are to blame (J. Blackned, 6 Aug. 2006).

> The way we hunt hasn't changed, only the geese change. We do the same thing we used to do. And the land changes… Vegetation, no goose food. Lots of grass where we hunt. Willows, and trees (E. Hughboy, pers. comm., 23 June 2006).

Yet, without over-generalizing, there are trends of social change that can be linked with changes in the goose-hunt. These are related to the synergistic effect of three main themes: 1) generally less flexible schedule for many hunters, 2) change in the relationship between the Cree and the land, the animals, and 3) reduction in goose availability. As one hunter explains: "I work, so I get three weeks for goose break, with jobs in town, I can't wait around" (J. Blackned, 6 Aug. 2006). Many hunters are in the same situation: their temporal flexibility is to some extent reduced by the constraints of their work schedule. Once at the goose-hunting site, most hunters wait around for the right conditions, staying in the camp, or not shooting when it is not the right thing to do. But it is reported that some of them become impatient: "Not enough days because work, people just shoot, don't wait" (J. Blackned, 6 Aug. 2006).

Some go out hunting every day – except Sundays – meaning that they do not purposefully 'rest' the sites, and that they may shoot on calm days (A. Gilpin, 12 Jul. 2006). There are instances where "Young hunters run at incoming geese instead of waiting in the blinds" (R. Atsynia, 5 Aug. 2006). Also, some younger hunters have been shooting geese later into the evening, not so much out of a wilful neglect of customary rules but rather because in some instances it is the only time when geese are available (WW, 2 Aug. 2006). The hunters who reported occasionally doing so put it in the context of multiple days of waiting around when geese only fly after the afternoon; at some point hunters get frustrated, and in some instances stick around later, eventually trying a few shots into early evening. As we saw in chapter 4, according to the Cree, there are important consequences to do so as shots at night are among the scariest things for the geese. This amounts to a positive feedback loop in which goose scarcity encourages some hunter behaviour that in the turn further encourage geese to avoid the area even more so.

Greater reliance on, and availability of wage employment, medical treatments, and store-bought food 'the Whiteman's food" as the Cree call it, have reduced the risks, uncertainty, and hardships that often characterized life in the bush (Tanner 1979). Elders highlight that things were often difficult 'in the old days' when hunger and starvation were always possible outcomes of 'bad luck' in harvesting, animal scarcity, bad winter, etc. (S. Hughboy, 23 Jun. 2006; R. Atsynia, 4 Aug. 2006; W. Asquabaneskum, 23 Sep. 2006). Fluctuations in animal availability were probably just as great then as they are today, but hunters were more vulnerable to them back then. This combination of uncertainty and vulnerability, and their influence on contingency in the Cree world, probably played a key role in informing an ethos of respect and flexibility. Historically,

Cree hunters sought to be adaptive to ecological fluctuations in order to avoid suffering the consequences of inappropriate action. The recent greater integration in global market economy has in some ways reduced this vulnerability as the Cree no longer face the great risks of starvation, epidemics and other 'quirks' of life in the bush. While this new reality is largely welcomed by the Cree, they also associate it with some erosion of their connectedness to their environment. This has impacts on their ability to quickly respond to surprises out on the land, to adjust their behaviour to ensure it is attuned to changing ecological requirements.

This connectedness, as relationships of respect and reciprocity between the Cree and animals, contribute to ensuring animal availability. Alternatively, inappropriate behaviour from the hunters also has consequences which may very well lead to a diminution in animal availability. In the context of the goose-hunt, some hunters have mentioned that too much, or inadequately distributed hunting pressure on the coast may be a cause (SG, 1 Aug. 2006; OV, 2 Aug. 2006; AV 8 Aug. 2006). This was a concern in the past, as reported by Scott (1983, 1996) and Scott and Feit (1992), especially as the income security program attracted more hunters out on the land. On this point, Scott and Feit (1992) concluded that, as we saw in the preceding chapter, the Wemindji system of access to resources appears to diffuse this pressure in space and time. That being said, there may be limits to the amount of hunters that a given territory can accommodate, especially when less experienced hunters are involved in greater proportion.

This effect of hunting pressure may also be exacerbated by the reliance on motorized transportation by many hunters. Motorboats, helicopters and snowmobiles are often mentioned as probable cause or aggravating agent on this changing pattern of the

geese. I mentioned earlier how the headlights on snowmobile could scare the geese away, and there have been many similar mentions of motorized vehicles impacting goose behaviour:

> When the helicopters started coming, they started scaring the geese during the day, so they fly at night. I don't remember exactly when, but maybe it was in 1994 when the geese started flying at night (R. Atsynia, 4 Aug. 2006).

> But when I was young they didn't do what they do now. Now they hunt every day. It's worse now too, they have motor, skidoos (A. Gilpin, 12 Aug. 2006).

> Yes… and also they got scarce, they got less. Because, they didn't have skidoos, because here we have so many skidoos, all you can hear, you can hear skidoos all day. Even at spring camp. Even during the evening. And here we noticed people coming back in the evening around 10h00, 10h30. By skidoo (S. Mistacheesick, 27 July 2007).

The reliance on helicopters especially, is a key component of the synergetic interactions and feedback loops between the social-cultural and biophysical drivers that contribute both to the reduction in Cree flexibility and reduction in goose availability:

> People are flown back because they have to come back right away. They can't wait because they are workers, or students, so they need the airlift. The spring airlift, using helicopters down the coast, all the communities do that so it must scare them. It is since they've been using that in 1985, there is less geese, there use to be more, now they are scared (S. Georgekish, 1 Aug. 2006).

This link between social-cultural and bio-physical factors, and its implications on goose harvesting activities will be further addressed in the next chapter. Figure 5.3 provides a simplified representation of the relationships among the different social-cultural factors impacting the goose-hunt.

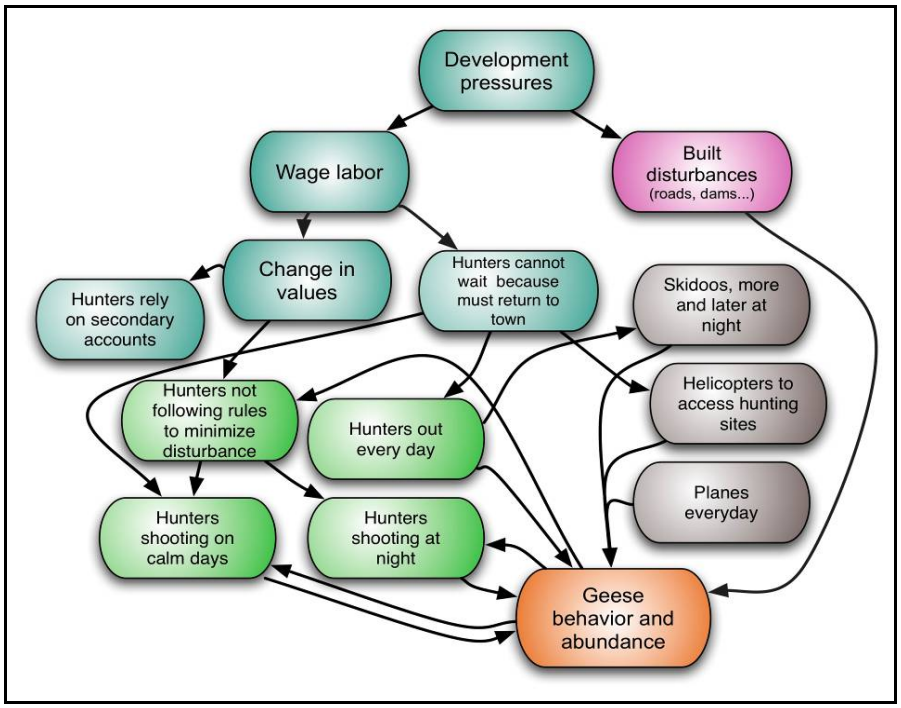

Figure 5.3. Some social-cultural changes impacting the Wemindji goose-hunt

5.6. Change, turbulence and resilience in the Wemindji social-ecological system

In this chapter I presented my interpretation of how the Wemindji Cree perceive, understand and relate the complex interactions among social and ecological processes as they impact the subsistence goose hunt. Figure 5.4 is a representation of how the different categories of change intersect, which is a simplified version of figure 5.1.

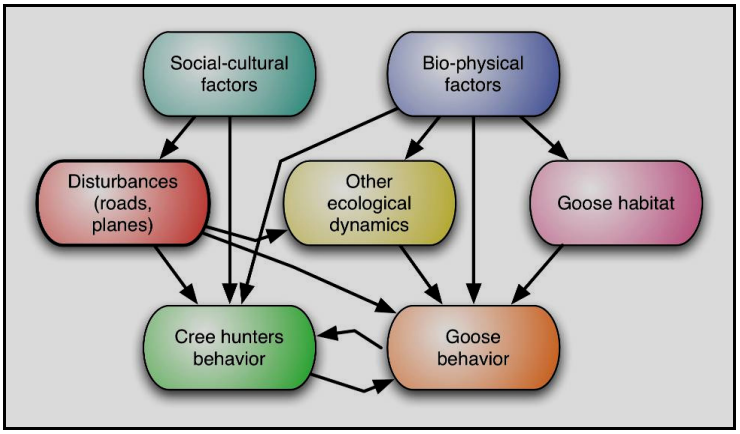

Figure 5.4. Simplified categories of change impacting the Wemindji goose hunt

In chapter 4 we saw how this harvest involves a set of strategies that enhance the attentiveness and flexibility of hunters to ecological fluctuations. These strategies also minimize and diffuse the impact of hunters on the migratory flocks of geese, reducing the risks that they eventually avoid the territory. This amounts to a management system that is based on self-restraint on the part of the Cree. Hunters seek to do what appears to be 'the right thing', but there always remains a great deal of uncertainty as geese are influenced by many factors that are beyond the scope of the Cree management practices (Scott 1983). Both the Cree and geese interact at one given spatial and temporal scale, where it is largely influenced by local and immediate conditions and processes, but this interaction is also determined by drivers that take place outside of this context. The Cree strategies of harvesting have a 'scale of influence' that is not endless, but that combines with external processes. These processes interact in such complex ways that separating the underlying from the proximate factors is difficult. Causality in these linkages can be suggested by Cree observers, but it is not really 'proven' *per se.* The Cree are constantly watching for signs and signals that help interpret the observed change, and numerous potential causes are summoned to suggest explanations, but there always remain a great deal of uncertainty. Certain accounts directly highlight the place of unknown factors in shaping ecological events and processes. Here is one example concerning the geese:

> While we were living in Old Factory in the 1950s there was a Roman Catholic priest living there. He said 'in the future there will not be very much geese along the coast'. And that is how it is now. I don't know how he knew that (JM, 10 Jul. 2006).

A similar point was made by another participant when she suggested that the only way to really understand what is happening to the goose-hunt would be to "ask the geese" (I. Mistacheesick, 27 Jul. 2006).

As it was mentioned before, this research suggests that the Cree understanding of 'life on the land' is complex and dynamic. It is built by combining direct observations of specific trends indicators, which are supplemented with anecdotal evidences as well as second-hand accounts. It also suggests that Cree hunters are not keen on simplification or generalizations, that many explanations are context-specific (Berkes 1999). Complexity and uncertainty are not ignored; but they are dealt with in a practical manner. The Cree communicate, exchange their observations, and whenever possible they attempt to correct their behaviour according to their interpretations of these changes. This amounts to a flexible monitoring of change that relies on opportunistic observations of unusual events, occurrences and other exceptions. The Cree "ways of knowing", in this context, appear to be largely – but not exclusively – qualitative and probabilistic. Hunters do not apprehend change through precise measurement of specifically pre-determined variables. Given the complexity of life in the bush, such a precise approach would be too narrow and likely to miss key elements. Given the large amount of variables involved, treating them through a precise, quantitative evaluation would be impracticable, as the astonishing amount of information required to account for the high degree of complexity would be simply unmanageable.

The Cree ecological understanding, then appear as largely similar to what proponents of system thinking ecology have been suggesting in order to tackle social-ecological complexity. This involves a holistic focus on the dynamic relationships among elements rather than on the elements themselves (Capra 1996; Levin 1999). This view of ecosystems as a dynamic web of relationships among elements informs specific management practices that aim at flexibility and responsiveness to ecological dynamics

instead of ‘command-and-control’ for stability (Holling and Meffe 1996). Also, the lack of consensus and high degree of variability in participant’s perspectives may be seen as contributing to what amounts to a broader, collective assemblage of complementary perspectives, which result in a flexible and dynamic understanding that may be more suitable to soundly grasp ecological complexity and dynamism.

Change, surprises and turbulences have varying magnitudes. Cree hunting practices are attuned to some degree of surprise, such as day-to-day variability and some weekly, seasonal and annual fluctuations. This flexibility notwithstanding, the social practices underpinning the Cree goose hunt appear overwhelmed by the pressures of external processes. Again, returning to resilience thinking, this takes us back to Holling and Gunderson: "the answer might simply be that the resilience is never infinite and is eventually swamped by some external, large scale change and the system is replaced by something else" (2002, p. 31), in this context, “the challenge (…) is to conserve the ability to adapt to change, and to be able to respond in a flexible way to uncertainty and surprise” (Holling and Gunderson 2002, p. 32). The next chapter will present some of the ways in which the Cree respond to these larger turbulences.

Plate 9. Canada Geese resting on a pond close to the road **Photo: C. Peloquin**

Chapter VI

Responses and adaptation to external drivers of change: Customary land stewardship in a complex and changing world

The previous chapters made the case that the traditional goose harvesting activities of the Wemindji Cree are grounded in an ethos of being careful and attentive to ecological events and processes. This involves 'treading lightly' in a world of contingency where actions can have unforeseen consequences**.** Wemindji hunters live in a world that they know they cannot fully understand, nor control. In this context, 'doing the right thing' entails respect, humility, as well as attentiveness and flexibility.

However, this is not to say that Wemindji Cree merely are passive observers of what external elements bring onto them. Continuity in social-ecological system involves a balancing act between adapting to, and shaping change. Wemindji hunters are responding to the external drivers of change impacting the goose-hunt by modifying the local arrangement underlying this harvest to the new conditions imposed by external pressures. While it is early to draw final conclusions on how they are dealing with this change, the responses that are underway and those that are planned and suggested provide some interesting insights on how a social-arrangement for resource-use can navigate turbulence. Furthermore, in the same way that the different interpretations of these changes vary widely from one individual to another, there is some diversity of responses suggested and implemented. In this chapter, I describe how the goose-hunt continues in the context of the turbulence outlined in the previous chapter, and discuss some of these responses in the light of resilience thinking.

6.1. Surprise and adaptation

It seems that the diminishing availability of geese does not in itself constitute a sufficient change to invite a re-visiting of the historical practices. As we saw in the previous chapters, poor harvests are part of the normally expected course of events. Assuming that the correct practices are followed, hunters must rely on some elements of 'luck' and patience for success. While goose availability is undergoing a decline that is becoming a source of concern, its range still appears to many as within the variability that the traditional harvesting system can accommodate. It is important to note however that some hunters are now starting to believe that this decline may be beyond that normally expected variability, although there is no consensus on this yet.

But there are other biophysical drivers impacting the goose-hunt; some of which affect the geese directly and/or the hunter's ability to successfully follow the traditional practices. Furthermore, these combine with social-cultural changes that impact resource use patterns, and may in turn have consequences on goose availability itself. It is this complex synergy of drivers that is inviting adaptive response from the part of the Cree.

6.2. Tradition and continuity: the coastal hunt in Blackstone Bay in spring 2006

To better understand how external processes are impacting the traditional goose-hunt, it is helpful to see how they manifest themselves at the scale of one goose-hunting territory during one season. A number of conversations with hunters involved mapping exercises in which the day-to-day uses and rotations of hunting sites within a territory were mapped while explaining the reasons and factors determining the choices.

Here is the resulting map for the 2006 spring goose hunt in the territory of Blackstone Bay, some 20 kilometres south of Wemindji. While a few other territories were mapped in similar exercises, I focus on Blackstone Bay because the spring goose-hunt in this territory was previously mapped in 1979 by Dr. Colin Scott (Scott 1983, p.66), which allows comparative treatment. The interview in which this exercise took place was carried out with Mr. Jimmy Blackned who has been participating in the spring goose hunt in Blackstone Bay both in 1979 and in 2006. This allowed further comments on the differences that took place over the 27 years separating these two seasons. Figure 6.1. shows the map resulting from this exercise.

The left-hand portion of the map displays the territory and the different sites used over a 4 week period in 1979. The triangle indicates the location of the camp, and the circles represent the used hunting sites. An extensive rotation and switching of sites was used in that year, and there were many days when no hunting took place, in order to 'rest' the territory. The right hand portion of the map shows the same hunt as it took place during goose-break in May 2006, for over about three weeks. It shows that only 4 sites were used during that season, down from the 13 used in 1979, and that these 4 sites are much more clustered at the center of the territory. At first glance, this map seems to suggest that hunters are not as committed to using different sites as they were in the past; some form of breakdown in the customary system. Further explanations by Mr. Blackned however revealed how biophysical changes in the territory limited the number of suitable sites; highlighting the previously noted comment that many sites are no longer good due to these changes.

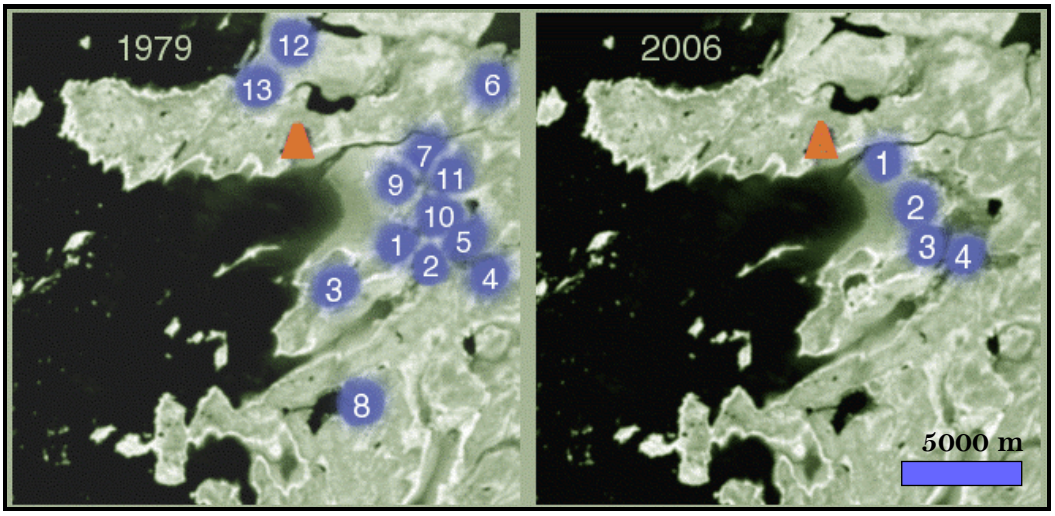

Figure 6.1. Map of the hunting sites used for the spring goose hunt in Blackstone Bay, Wemindji territory, in 1979 (Scott 1983) and 2006 (Peloquin, unpub. field notes)

Land uplift in the area has 'dried out' many hunting sites, and consequently portions of the Bay are now parts of the mainland, especially on the west side of Blackstone Bay. This is also associated with vegetative succession on these sites, in which harder woody plant species replace the more marshy species that constitute 'goose food'. It is in these sites where "what the geese eat is buried" (J. Blackned, 6 Aug. 2006). The second major factor influencing hunters' ability to move from one site to another is the thickness and reliability of ice on the bay. As we saw in the preceding chapters, it is reported that the ice has often been too thin in many places over the last years. This prevents access to many of the sites further out in the Bay, as well as those at the south end of the Bay. Properly accessing these sites that are at a further distance from the camp would necessitate going around the closer ones – as sites are 'rested' hunters must avoid them, which often involves going further out on the ice, which is not possible when the ice is too thin.

Hunters' ability to practice the same techniques as in the past is constrained by changes in various biophysical factors. This is over and above the reality that geese are not even available in the area in the first place, as they fly elsewhere, too high, or simply do not land at all. As we saw earlier, it is possible that this coincidence between poor goose harvests in the recent years and other bio-physical and socio-cultural events is not entirely fortuitous. For example, a more concentrated use of certain hunting-sites may result in human disturbance scaring the geese away from these sites. This notion that there is too much hunting pressure along the coast, or that is not properly diffused, is becoming a source of concern from some hunters, to which we will return later. For now, the main point is that hunters are constrained in their use of sites by biophysical factors over which they have little to no control. These practices of site selection and rotation on coastal territories still appear flexible enough – in this case at least – to adequately meet these biophysical changes alone, at least in their current magnitude. It is in this context that Ernie Hughboy's mention that "the way we hunt hasn't changed, only the geese have changed" becomes more significant (as it turns out, Mr. Hughboy is one of the hunters whose family territory is Blackstone Bay). Yet, for many hunters, these factors combine with others, and that combination does invite adaptive responses.

6.3. Jobs, unsafe ice conditions and helicopters

One of the social changes in the way hunters participate in the goose hunt involves the use of helicopters to access the coastal goose-hunting sites when ice conditions are unsafe for surface travel (boat or snowmobile). This 'air-lift', available to members of the Cree Trappers Association, has been practiced since the mid-1980s. It

was then mostly used at the end of the goose-hunt during ice break-up when conditions prevent both snowmobile and boat travel. Due to various commitments, hunters and youth must often return in town by a given date at the end of the three week-long goose break. This reduces the temporal flexibility of the hunters in waiting for the right conditions to travel, and the airlift allows the mediation of this new condition.

However, as previously discussed, a number of hunters link helicopter flights with the changing flying patterns of the geese, to which is added daily flights of airplanes along the coast (although planes fly at a higher altitude and with possibly lesser impacts). This has been especially important in recent years, when the airlift was necessary even at the beginning of the hunt, due to especially warm and fast springs that made ice unsafe for travel. The use of helicopters before the beginning of the goose hunt is even more problematic than after, as geese are most sensitive during this period. Reliance on helicopter then provides feedbacks that may worsen the situation by further scaring the geese away. Additionally, it is a very costly operation, and with limited results, since geese are no longer reliably found in large numbers along the coast in the first place.

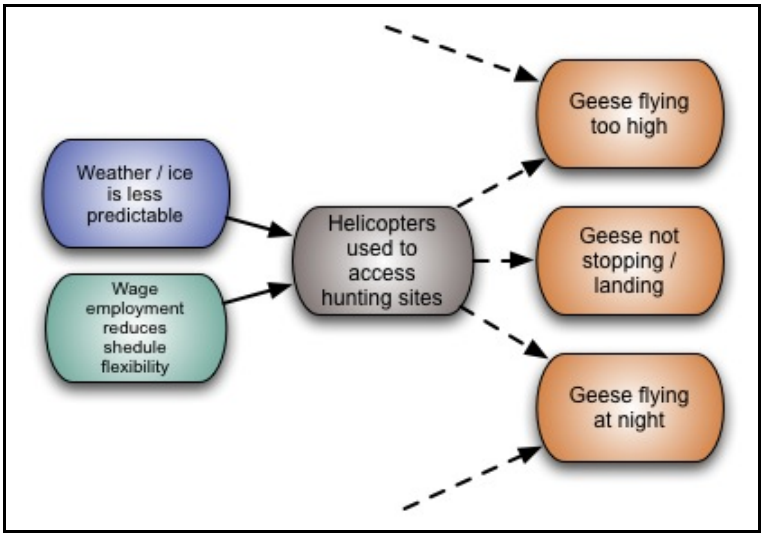

Figure 6.2. Helicopter travel to mediate changing conditions, and their consequences on goose behaviour

6.4. Roads, vehicles and 'inlanders' practices

The main genuine transformation that the goose-hunt is undergoing is a shift away from the coast to the inland hunting territories. This is made possible by the all-weather, gravel 'access road' that covers the distance separating Wemindji from the paved 'James Bay Highway', which crosses the James Bay territory on a north-south axis 100 kilometres to the east of Wemindji. This access road replaced the winter road in the mid-1990s.

As some point out, the roads have brought with them their share of problems. Scott and Webber (2001) discussed the impacts of an increased influx of non-native sport hunters in the area following the opening of the James Bay highway to the public in the 1990s. Many of these sport hunters ignore the customary rules of respect to the animals that are central to Cree cultural ecology, and many Cree feel that their territories are passably less safe due to the presence of sport hunters in the area. The gravel access road, on the other hand, covers for the most part an area where the Cree have the benefits of exclusive harvesting rights, and where the pressure of non-native hunters has not been reported.

Despite these and other disadvantages brought in by the roads, they do offer some advantages as well. Since their creation, many Cree winter trapping camps have been established along these two roads. Such locations are attractive because accessing roadside camps is much less costly than the ones require aerial transport. In the same way as it subsidizes the air-lift, the Cree Trappers Association provides vehicle transportation to these sites to members who do not have their own vehicle, and help with the gas expenses of those who do. These subsidies are made possible through the income security

program for occupational hunters and trappers, along with other funds meant to help hunters maintain traditional pursuits.

It is not surprising that roadside locations are favoured for fall and winter camps, as these are usually further inland, where they could otherwise only be accessed by snowmobile, bush plane and helicopter. In this context, road travel is cheaper and less vulnerable to weather fluctuations. Hunters can then travel to, and back from, their camp at a lower cost, and when they are required, which allow them to accommodate more strictly scheduled commitments in town. The Cree can visit their camps and the community more frequently, at lesser costs and with less uncertainty in travel.

The spring and summer goose harvests are still largely coastal, where travel involves snowmobiles in the spring, and motorized canoes in the summer. What is interesting however is that recently some hunters are increasingly favouring road-based travel for the goose hunt, both in the spring and in the fall. This allows them to accommodate the new conditions resulting from a number of intersecting drivers of change.

Part of the reasons behind the decline in goose availability is the trend that geese are increasingly flying inland instead of along the coast where they are normally expected. Road travel allows mobility over inland portions of the Wemindji territory, even in the spring and early fall when absence of snow cover render snowmobile travel impossible. This allows hunters to reach these inland areas where geese could be expected. Some hunters have mentioned that geese are more scattered as they fly inland, and it is thus more difficult to effectively predict where they could be found. Being able to drive from one area to the next is thus preferable.

At the same time, reliance on roads to access camps used for goose-hunting is less vulnerable to changing weather patterns and ice conditions than are the boat and/or air travels necessary to access the coastal hunting territories. When driving to inland camps, one does not have to rush to leave before ice break up, or to wait for the ice to have cleared up before returning to the community at the end of the hunt. This is safer, it allows community members who have employment in town or who are enrolled in school to return in due time. It is also less costly and complicated than flying by helicopter, which is the other option available to hunters for them to overcome these factors.

Also, cars are less noisy than are helicopters and airplanes, and no one mentioned automobiles having any scaring effect on migratory geese as they travel in the area. This is thus seen as contributing to reduce the impacts of human disturbances along the coast – diminishing disturbance associated with the airlift, which is seen by many as contributing to goose scarcity. Similarly, it allows further diffusing of hunting pressure across a broader area, as it multiplies the available sites. If this is the case, as some suggest, that there are too many people hunting on the coast, then it makes good sense to have some hunters going further inland rather than all along the coast. This goes along the suggestions of an experienced Wemindji Hunter: "Helicopters are expensive and noisy, let's hunt geese along the road, leave the coast a chance to rest" (OV, 3 Aug. 2006). This comment brings in the notion of 'resting' coastal territories as some sort of fallow cycle, which could be seen as an extension of the site rotation customarily practiced at the level of one individual goose-hunting territory. Using inland hunting sites, accessible through the road, may thus allow the coast to become attractive to the geese again.

In the fall, some hunters are now starting to combine the preparations for the moose hunt with some inland goose-hunting. For these hunters, goose availability on the coast cannot be expected reliably enough to justify a trip for that sole purpose. Instead, hunters spread the risks of investing energy and time in the goose hunt by combining them with their investment in the moose hunt and beaver trapping season, both of which are based at their inland bush camp. Here is a representation of the role of road travel in the context of adaptation to changing conditions in the goose hunt:

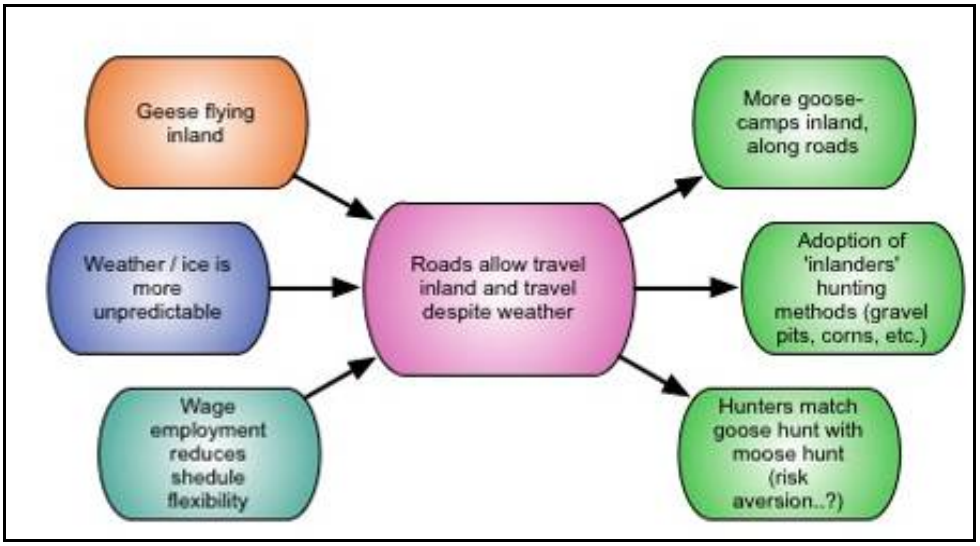

Figure 6.3. Road as capital facilitating adaptation to changes in the goose hunt

As I first heard that more people were traveling inland to hunt geese, I was under the impression that these cases were exceptional. I began to doubt my assumptions as my Cree interlocutors insisted on the importance of the trend: “Most people hunt inland now, along the road, some by the access road, some by the James Bay Highway” (E. Hughboy, 23 Jun. 2006). This doubt was confirmed when I was shown a map of the goose hunting camps for spring 2006. The map is actually a computerized database developed and used by the Wemindji Trappers Association for emergency purposes, and I am thankful for the

Wemindji Fur Officer Ross Miniquaken for showing and explaining it to me. It revealed that there are many more camps along the roads than on the coast: in fact, out of the 31 spring camps active in 2006, only 8 were on the coast and 19 on the side of roads (10 on the Wemindji Access road, 7 on the James Bay Highway, and 2 on the trans-taiga south of LG3, the remaining 4 were 'scattered' elsewhere along the territory). This confirms that the goose hunt is undergoing some profound reorganization. I asked hunters who participate in the 'inland' version of the goose hunt to describe how they proceed and to compare it with the more traditional, coastal version.

6.5. Inland goose-hunting

As one would expect, the inland goose hunt does involve a set of modified practices, but appears to be regulated by the same principles and goals:

> FA: About 10 years ago. We changed the area where we hunt. Started going by the highway.
> CP: So you don't hunt geese on the coast anymore?
> FA: No. When the geese start flying up north, so we moved up too, on the road. I don't know, I think it's been six years since we go over there (by the road). We go over there, to hunt, place decoys, 17 kilometres from the road. They go to this way, to the reservoirs.
> CP: Do you hunt the same way inland as you used to go on the coast?
> FA: In the fall we never tried there yet. In the spring we set our decoys in gravel pits. Some geese land, some just go down and they take off. We shoot them when they land, just like we hunt on the coast (F. Atsynia, 16 Jul. 2006).

It must be specified that the gravel pits by the road are covered with snow. Hunters dig a pond-shaped depression in the snow, where the decoys are placed. This is the inland equivalent of sitting around the pond, waiting for geese to land. There also is an inland equivalent to the 'goose-drive' technique practiced on the coast, this time using store-

bought corn that is purchased in large sacks in the larger town of Amos, south of James Bay (OV, 3 Aug. 2006).

> We take corn, and we put it in the marshland, so we feed them there. Once you put the corn, you have to wait for 2-3 days to gather, the geese start eating, so after three days you go there, you chase them out. Then they come back and you can hunt them (F. Atsynia, 16 Jul. 2006).

These techniques are used by Mistissini Cree, to the southeast of Wemindji (W. Gunner, 27 Oct. 2006). Here is how a younger hunter described this road-site hunt:

> We make a clearing not too far from the road; when they land in large numbers, we chase them, they come back about 2 hours, we shoot them as they land in small numbers (WM, 2 Aug. 2006).

This is truly similar to what is practiced on the coast. There also is some rotation of sites in many of these locations, although these are more difficult to evaluate at this point. This also brings up questions on the eventual reorganization of goose hunting territories, which are also too early to evaluate.

This adaptive response results from coping and adapting strategies adopted over the years, in which hunters constantly revise their practices, adjusting them to changing conditions. The different ways in which Wemindji hunters mediate and respond to changing conditions seems consistent with earlier discussions on adaptation (Bennett 1969; McCay 1978). Resource user act by reducing risks in the context of uncertainty, trying out and eventually adopting new approaches as these prove successful. Over time, the various coping mechanisms, add up and amount to adaptive strategies, transformations at the higher levels of organization. These eventually lead to true reorganization that take place at levels beyond the conscious decisions made day-to-day by individuals (McCay 1978). It remains unclear, however, at which stage of the reorganization process is the Wemindji goose harvest, and whether the on-going

modifications arising from immediate response to relatively new problems constitute a truly novel arrangement that will be retained in the future.

6.6. Adaptive cycles, panarchy, memory and resilience in a social-ecological system

Returning again to resilience thinking in ecology, resilience entails a) the capacity to absorb shocks, and b) the ability to re-organize when this capacity is overwhelmed. The ways in which goose hunters 'navigate' change and complexity involve interactions with drivers occurring at levels beyond this local harvesting system. This invites some measure of reconfiguration of the harvesting practices. This response draws from an opportunistic combination of customary ‘rules’ that maximize flexibility and spatiotemporal diversity, along with the uses of other available sources of capital such as roads and Cree Trappers Association subsidies.

The interplay between continuity and change that these dynamics involve can be understood by using the heuristic of adaptive cycles explained in chapter 2. In this context, it is possible that the goose hunt is subjected to the influence of large-scale, external drivers, and the pressures from these drivers call for a re-organization of the system. Such re-organization is termed "revolt" in resilience theory (Walker et al. 2006). This re-organization, driven by Cree agency, involves the re-configuration of different sources of capital. In a way, social capital seems to be undermined in the loss of some of the traditional knowledge, or erosion of some traditional practices pertaining to Cree land stewardship. But it could simply be that that these practices are not pursued because they are not suitable to the new conditions.

Geese operate at a much higher level than the goose pond, and therefore their overall condition is not particularly affected by what happens at this local level. The

overall population of Canada goose is at its highest now for a long time, back from the low numbers pre-dating waterfowl conservation laws in North America (Harvey and Rodrigue 2006). But it is possible that a form of revolt is taking place if too many of the usual goose hunting habitats along the coasts are becoming unattractive due to changes that occur at the level of the pond (Reed et al. 1996; Abrahams et al. 2005; Walker et al. 2006). It is a possibility that these disturbances – lack of goose food, warmer temperatures, overwhelming hunting pressure, other noise disturbances such as snowmobiles and helicopters – all these and more, add up, possibly up to the point of influencing the geese in a reconfiguration of their migratory patterns. This is especially plausible if alternative opportunities are available to the geese at little extra 'costs'. According to Wemindji Cree, these opportunities may result from changes in the weather patterns, or they may include the availability of relatively undisturbed, large bodies of water inland in the form of hydroelectric reservoirs, and easy migratory beacons in the form of electric power lines and communication towers.

Wemindji hunters still believe in the appropriateness of their harvesting practices, and they largely see the apparent shortcomings of these practices as merely resulting from manifestations of 'normally' expected variability. The customary system is seen as flexible enough to absorb these stresses and adapt, and the principles are broad enough to remain adaptive to truly changing conditions.

At the same time, these hunters are expanding the spatial scope of their goose harvesting efforts, as the coastal setting is turning out to be insufficient, or inadequate. This also, could be seen as a 'revolt' following the synchronization of multiple collapses at the levels of individual coastal territories. This re-organization draws from other forms

of capital allowing hunters to maintain their harvest in the face of turbulence. The all-weather access-road connecting Wemindji to the James Bay Highway since the mid-90s has been of prime importance in the mediation of both climate-induced and social-cultural drivers of change contributing to the need for reorganization. The same applies to the Cree Trappers Association, and the initiatives it supports such as the airlift service taking families to their hunting camps by helicopters during ice break-up when neither boat nor snowmobile travel would be safe. This highlights the importance of flexibility, of diversity of opportunities to ensure social-ecological continuity and adaptation to changing conditions.

Chapter VII

Conclusions

The foregoing thesis has presented the traditional subsistence goose hunt of the Wemindji Cree as a social arrangement for resource-use that has implications from the standpoint of social-ecological resilience. This harvest is attentive to environmental fluctuations, grounded in a social arrangement for resource use that is attuned to the complexity and dynamisms of social-ecological systems. It takes place within a worldview of relationships among sentient beings that is characterized by what Preston refers to as a high degree of contingency (Preston 2002). In this context, Wemindji hunters do not seek to control or to simplify the complexity of social-ecological processes, but instead are willing to live with them. This involves ways of knowing and ways of doing that are embedded in a broad ethos of respect (Tanner 1979; Scott 1989; Feit 2000).

From an ecological perspective, this involves being careful to minimize human impacts in the ecosystem by treading lightly and being attentive to the results of given actions, as well as being aware of the interactions between a myriad of other events and patterns, some of which are mysterious to the observer. Cree hunters aim to be “aware of the land all the time” and to constantly adjust their harvesting efforts to ever-changing conditions. They also seek to minimize anthropogenic disturbance to migratory waterfowl, informed by a set of practices and social coordination for this purpose. These include rotation and resting of hunting grounds in order to minimize stress on migrating populations and to prevent the geese from "getting wise" (Scott 1983; 1996; Berkes 1982). Normally, a new spot is chosen every day of the hunt (Scott 1983, 1996). Again,

this hunt is coordinated by a hunting boss, who supervises the effort of a group of up to a dozen hunters (Scott 1986, 1996). Hunting camps are away from the staging grounds, and noise is kept to a minimum (Scott 1996). In order to minimize disturbance to the geese, hunters avoid shooting on calm days and at dusk, as both the noise and light generated by shotguns are known to scare the geese (Scott 1996; Berkes 1999). All this is explained as related to the geese being smart, observant and communicative; failure to observe these precautions would result in the geese avoiding an area that they perceive as noisy (Scott 1996). Also, hunters usually do not enter the areas where the geese are feeding or staging, and avoid shooting in the main flock, instead attempting to intercept smaller groups as they fly between either of these areas (Berkes 1982, 1999). The areas that are sensitive for the Cree hunters vary in space and time, depending on where the geese land and feed (Scott 1986; Madsen 1995; Elmqvist et al. 2004).

While this local system is attuned to small-scale variability and unpredictability, it is also being impacted by external pressures. I presented accounts of how this change and complexity are apprehended by Wemindji hunters, and their role in the ecological understandings on which hunters rely for their decisions. This suggests that the Cree do account for the complexity and irreducible uncertainty characteristic of ecosystems, they observe and monitor change, and suggest possible links between different factors. Figure 7.1 presents another representation of how these factors interact. We saw how the Wemindji goose hunt is best represented as sets of relations linking hunters and geese. Figure 5.1. shows that hunters recognize a very large numbers of variables and the richness and complexity of the goose hunt.

Thee hunter-goose relations are influenced by both these two categories of actors, and are consequently prone to be subject to high degrees of fluctuations. At the same time, the ways in which both the geese and the Cree act within these relationships are influenced by various factors that are more or less external to this arrangement. Both the geese and the Cree have been changing their practices during the goose hunt over the last decades. As we saw in chapter 5, there are numerous possible and likely factors explaining these changes. Many of these factors are suggested by hunter's accounts, but few, if any of these, are seen as having a direct or causal link that is proven. Instead, the roles of these factors are suggested, following observations of patterns in which different trends appear as related. Occurrences and observations are noted and remembered, whereas correlations and causalities tend to be only suggested. The ecological understanding resulting from this approach appears to be highly flexible, and accounts for a high degree of complexity.

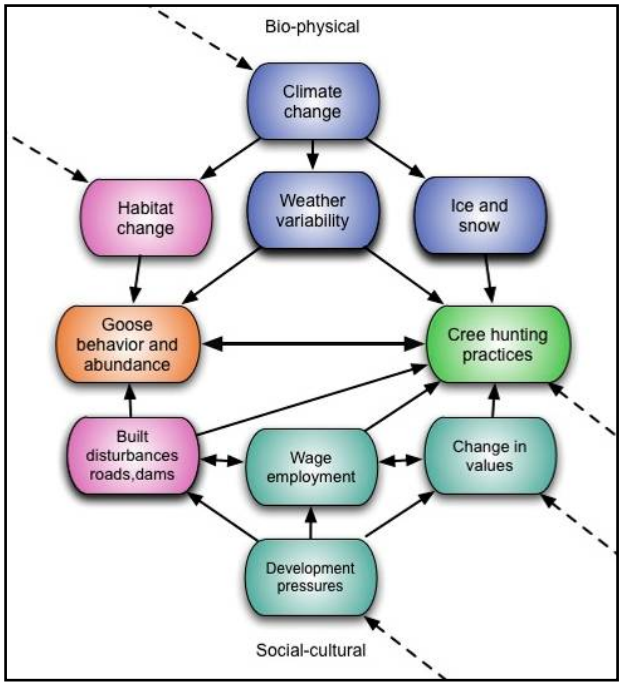

Figure 7.1. Key processes impacting the Wemindji goose hunt

I focused on some of these factors as they were explicitly identified by Wemindji hunters during interviews. Many of these factors are related to weather and climate, where numerous trends and events are seen by hunters as providing at least partial explanations of changes in goose behaviour. At the same time, some of these trends, such

as a diminution in sea-ice reliability, impact hunters' ability to pursue their 'normal' hunting practices. This is an important part of what is happening to the goose-hunt, but it also provides insights on the ways in which global climate change manifests itself at the local level, especially on the ways in which it impacts livelihoods in northern environments (Krupnik and Jolly 2002). This also provides a picture of the ways in which global processes such as climate change are locally interpreted and apprehended (Nichols et al. 2004), their significance in specific cultural contexts, and the implications for adaptation (Berkes and Jolly 2001; Cruikshank 2005; Adger 2006).

Biophysical drivers such as climate change are not the only factors mentioned. There are numerous human driven processes as well, changing the context in ways that have implications both to the Cree and the geese. Following participants' insights, I focused on the role that large anthropogenic disturbances such as hydroelectric developments have had in modifying the landscape. This is partly related to changes in the social-cultural context in which Wemindji hunters evolve, which include some measure of change in livelihood and values.

These different drivers are overwhelming the local processes, and in turn inviting adaptation. People still practice rotations in the coastal ponds to the extent that it is possible, as it was demonstrated by the mapping of site use in Blackstone Bay during the spring goose hunts of 1979 and of 2006. But the combination of multiple drivers makes this traditional, coastal approach to hunting less practical. Wemindji hunters then, respond in different ways to the synergetic impacts of both bio-physical and social-cultural factors of change. Some responses involve using aerial travel to access coastal goose-hunting sites, mediating unpredictable ice conditions and less flexible schedules.

As this is costly and is seen as further contributing to the decline in goose availability, this is increasingly replaced by another adaptation strategy, which involves using roads to hunt geese inland. This is not meaning that a road is in and of itself a beneficial addition to the James Bay landscape, but it suggests that the value of an asset is contextual. It turns out that in this specific context the presence of the road provides capital useful to mitigate impacts brought in by other external drivers of change. The interplay between change and continuity – resilience in social-ecological systems – involves opportunistic use of whichever capital is available for re-organization when initial conditions are not longer suitable due to changes in the overall system,

Resilience thinking provides one way of looking at social-ecological complexity and at how to live with it. As a Wemindji Cree Trappers representative put it, the Cree have "their own version on this issue". This version is embedded in the collective knowledge encoded in stories, myths and it is reproduced through what Ingold called "the dwelling perspective"; the skills and practices by which the human-in-ecosystem situation is enacted (Ingold 2000). We saw that, while grounded in a different worldview, and produced in different ways of knowing and ways of doing, the scientific reasoning that led to systems-thinking has striking parallels with many elements of indigenous perspectives and life-ways. Some authors have suggested that there are links between traditional knowledge and environmental management practices and adaptive management for resilience (Winterhalder 1983; Berkes 1998; Berkes et al. 2000).

The overview of the customary goose hunt of the Wemindji Cree provided in the preceding chapters suggests that these similarities apply in this harvest as well, both in its historical, coastal form, and as it is undergoing transformation. The goose hunt is

regulated by a harvesting system aiming at reducing uncertainty through monitoring and risk diffusion, but it also is embedded in a broader cultural ecology context in which the presence of some irreducible uncertainty is acknowledged, and where surprise is part of the normal course of events. In this context, change is observed and understood in all its complexity, and resource-users do not seek to reduce uncertainty by ignoring it, but rather learn to understand change through a probabilistic, relational mental model, and to be able to appropriately respond and adapt to turbulence. Part of this commitment to flexibility is related to the Cree's emphasis on maintaining diversity and heterogeneity. Wemindji hunters often stress the importance of 'keeping options open'**.**

The extent to which the Cree can navigate this change relies on the fit and flexibility of the combination of their local management practices, the institutional arrangements that serve as buffers between this local arrangement and external drivers of change, and to some degree, on these external drivers themselves.

The respectfulness and flexibility of this harvest maintained through monitoring, communication, and it is interpreted in the context of the social memory held within elders' knowledge, stories, and other social codes. At the same time, hunters must constantly re-learn this memory with new generation, and re-adjust this collective knowledge to changing conditions. Lastly, this system is grounded in a broader ethos of respect, reciprocity and humbleness. This highlights the social goal of equity and trust as the basis of environmental management. Respect and reciprocity are at the core of the relationships among the Cree themselves as well as with the animals. These social goals may be at the core of the Cree's ability to use and manage resources in a manner that is attuned to the complex and dynamic nature of the ecosystem in which they live.

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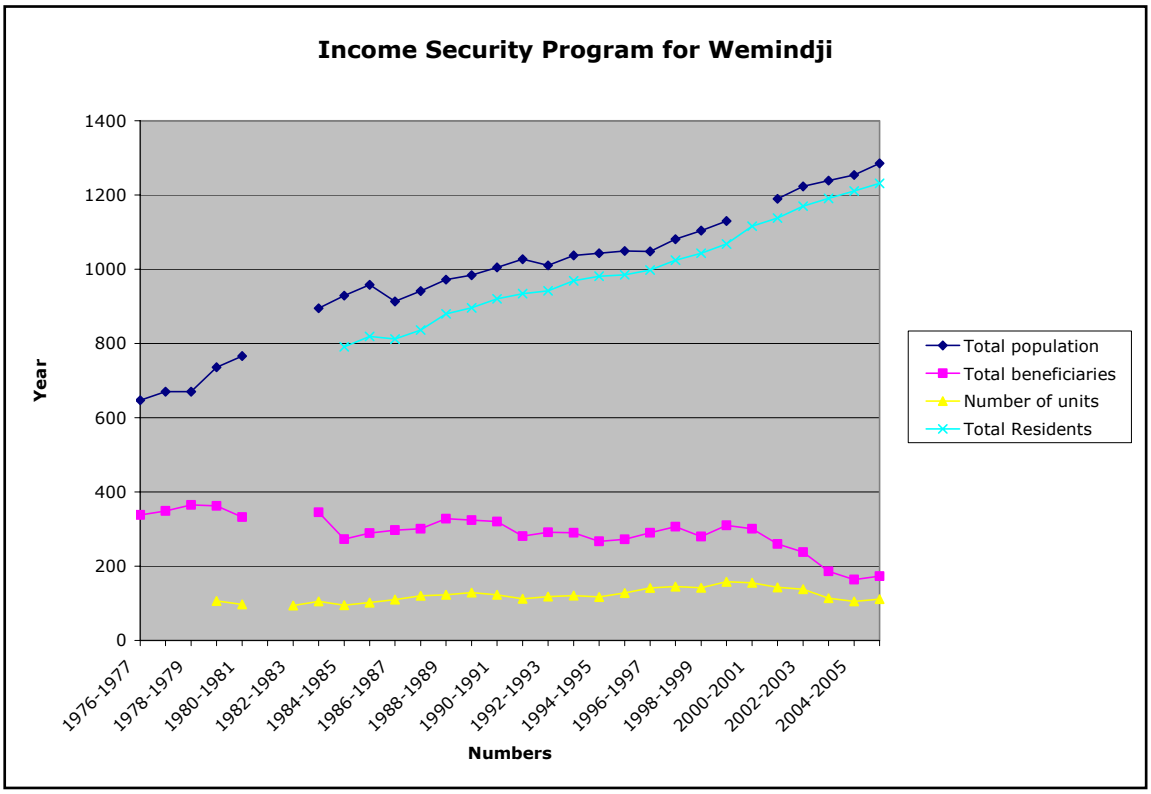
Appendix

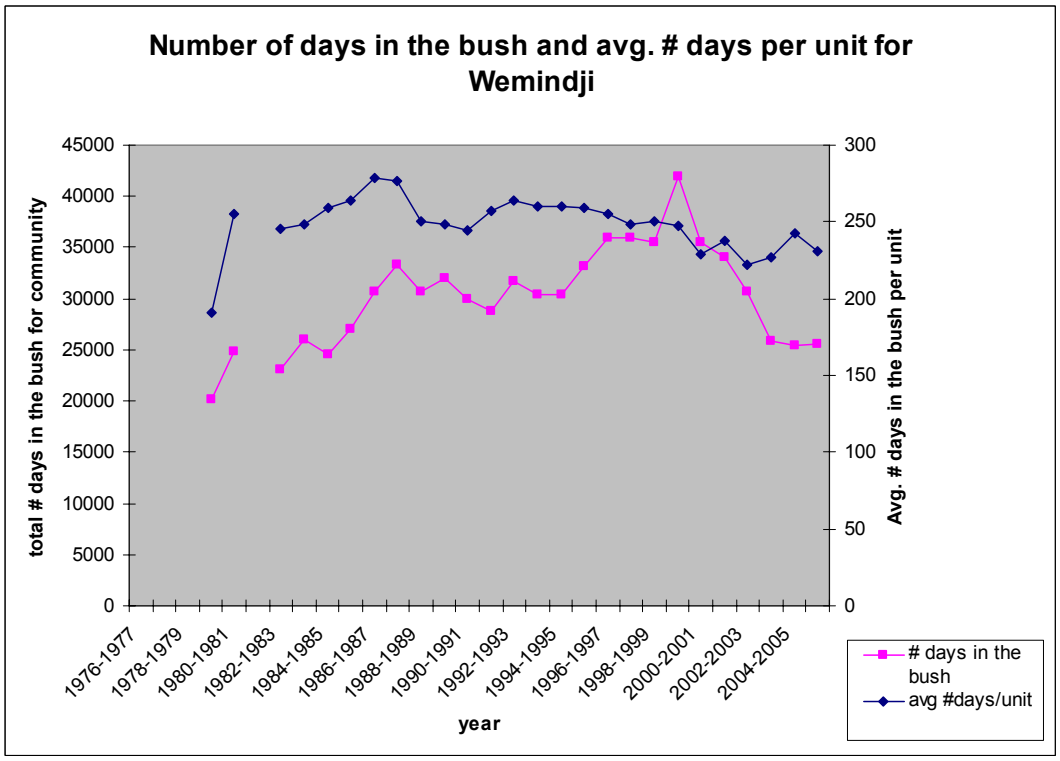
Participation in the Income Security Program for Cree Hunters and Trappers in Wemindji, 1976-2006

Year	Number of Units	Adults	Childre n	Total Beneficiaries	Total Population	Total Residents	% Benefi- ciaries	# days in the bush	# days paid	avg #day s/unit
1976-1977		159	179	338	647		52			
1977-1978		167	182	349	670		52			
1978-1979		171	194	365	670		54			
1979-1980	106	171	191	362	736		49		20197	191
1980-1981	97	156	176	332	766		43		24784	256
1981-1982										
1982-1983	94								23035	245
1983-1984	105	172	173	345	895		38.5		26028	248
1984-1985	95	147	126	273	929	791	34.5		24592	259
1985-1986	102	164	125	289	958	819	35.3		26957	264
1986-1987	110	172	125	297	913	812	36.8		30660	279
1987-1988	120	181	120	301	941	836	36		33291	277
1988-1989	123	191	137	328	972	880	37.27	34858	30715	250
1989-1990	129	196	128	324	984	896	36.1	37112	31961	248
1990-1991	123	189	131	320	1005	920	34.8	35159	29973	244
1991-1992	112	168	113	281	1027	934	30.1	32368	28800	257
1992-1993	118	175	116	291	1010	942	30.9	37424	31713	264
1993-1994	121	177	113	290	1037	969	30	34297	30354	260
1994-1995	117	169	98	267	1043	981	27.2	34199	30424	260
1995-1996	128	182	90	272	1049	985	27.6	36677	33155	259
1996-1997	141	198	92	290	1048	998	29.1	39302	35886	255
1997-1998	145	205	101	306	1081	1024	29.9	39437	36012	248

Year	Number of Units	Adults	Children	Total Beneficiaries	Total Population	Total Residents	% Benefi-ciaries	# days in the bush	# days paid	avg #days /unit
1998-1999	142	200	80	280	1104	1043	26.8	38430	35475	250
1999-2000	158	225	85	310	1130	1068	29	39046	41957	247
2000-2001	155	220	81	301		1116	27		35518	229
2001-2002	143	201	59	260	1190	1138	22.8	35495	34044	238
2002-2003	138	192	46	238	1223	1170	20.3	32026	30646	222
2003-2004	114	158	28	186	1239	1191	15.6	25893	25893	227
2004-2005	105	145	19	164	1254	1211	13.5	25497	25447	242
2005-2006	111	152	21	173	1285	1231	14.1	25605	25636	231

Source: Cree Hunters and Trappers Income Security Board, Annual Reports, 1978 to 2007. Quebec, QC, Canada.





Source: Cree Hunters and Trappers Income Security Board, Annual Reports, 1978 to 2007. Quebec, QC, Canada.