

Circumpolar Special Issue: *Human Health at the Ends of the Earth*

ORIGINAL RESEARCH

Climate change, wellbeing and resilience in the Weenusk First Nation at Peawanuck: the Moccasin Telegraph goes global

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Submitted: 10 October 2009; Revised: 11 February 2010; Published: 18 June 2010

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Rural and Remote Health 10: 1333. (Online), 2010

Available from: <http://www.rrh.org.au>

A B S T R A C T

The Cree of Northern Ontario, Canada, have proved resilient and adaptable to social and environmental changes. However, the rapidity of climate change impacts in the Hudson Bay Lowlands of the Canadian sub-Arctic is challenging this resiliency. A collaborative project conducted with the Weenusk First Nation at Peawanuck and researchers at Lakehead University used the concept of wellbeing to explore the impact of climate change on current subsistence activities, resource management, and conservation strategies, while considering the implications of globalization on climate change awareness. This article describes the analysis of 22 interviews conducted with members of the Weenusk First Nation at Peawanuck. Findings indicate that residents are concerned with a variety of changes in the environment and their ability to use the land. For example, they noted changes in travel routes on water and land, often attributing these to geomorphic changes in the coastal landscapes along Hudson Bay. They also noted the disappearance of particular insects and bird species, and variations in the distribution of particular fauna and flora. Possible impacts of these changes on the community's wellbeing and resiliency are examined. Another major theme that arose from the analysis was the impact of traditional modes of communication (eg traditional knowledge, radio, newspaper) and newer forms (eg satellite television and the internet) on Indigenous people's understanding of climate change. Given that few researchers have



acknowledged or recognized the globalization of the moccasin telegraph (ie the traditional mode of communication between First Nations), a discussion of this phenomenon and its significance for understanding emerging knowledge systems in small, remote First Nation communities is central to this article.

Key words: Canada, climate change, collaborative research, First Nations, globalization, Northern Canada, technology, wellbeing.

Introduction

Change has always been a fact of life for people in the Canadian North¹. Since the 19th century, the social context of northern communities in Canada has changed from pre-industrial nomadic and semi-nomadic lifestyles, due to the centralised settlement of industrial resource exploitation in the mid-20th century^{2,3}, to the mobile, inter-connected, globalised world of the present^{4,5}. Issues of concern for Northern peoples today include climate change, individual and community wellbeing⁶, bio-magnification of toxins, erosion of traditional skills and knowledge, emerging inter-generational segregation, increasing dependence on technology, issues of self-governance, and reliance on outside financial support⁷. In terms of climate change, some of the challenges underway include less predictable weather and sea-ice conditions, increasingly difficult travel routes (ie along river corridors and winter roads), infrastructural damages, and reduced access to food and culturally significant species⁸. Traditionally, Northern communities such as the Weenusk First Nation at Peawanuck (hereafter Weenusk) located in Northern Ontario, Canada, have demonstrated high levels of resilience in the face of changes of this magnitude^{9,10}. Indeed, 'more than 70% of northern Aboriginal adults harvest natural resources through hunting and fishing and, of those, >96% do so for subsistence purposes'¹¹. Yet, the importance of these activities is being affected by the rate of such ecological change (the greatest being increasing temperatures and precipitation already affecting the Hudson Bay region⁸). These changes are severely challenging the flexibility that has traditionally sustained Northern communities^{12,13}.

This article explores the impacts of climate change on current subsistence activities, resource management, and conservation strategies while considering the implications of globalization on climate change awareness and wellness. An overview of the socio-ecological changes occurring in the Hudson Bay Lowlands of Northern Ontario is provided first, followed by a historical and contemporary overview of the Weenusk Cree population residing in this area of Northern Canada. The research approach describes the methodology and provides an overview of the challenges and opportunities associated with conducting collaborative investigations between post-secondary researchers and remote First Nations. In the findings and discussion section we present the salient themes from the analysis; these include climate change, adaptation and resilience, health and wellbeing, and the transformation of the moccasin telegraph into the moccasin network. The conclusion re-examines the adaptability of the Cree people in the face of these changes.

Climate change and social change in the Canadian Sub-Arctic

Warming temperatures will increase the vulnerability of many Northern communities by, for example, the migration of new species northward and the melting of permafrost and associated infrastructural damage¹⁴. The ability to adapt and 'overcome changes in access to or availability of country food resources [...] is significantly influenced by an individual's access to economic resources and technology'¹⁴. In the north, the ability to invest in new 'equipment for hunting and traveling (eg snow machine, four-wheel all terrain vehicle, flat bottom or larger boat)¹⁴ and access to new media or networks has the potential to increase the capability of an individual to access safe and healthy foods in the face of environmental changes.



Transformations have also come in the form of changing communications networks in the study community. Similar to other northern communities¹⁵, it was only about a decade ago that the internet (dial-up) and satellite television appeared in Weenusk. Before that, communication was provided through one radio station, one television station, and newspapers that arrived many days after publication. Today, access to information is provided through satellite television, wireless internet, and video conferencing. The conversion of the moccasin telegraph to the moccasin network and its impacts in the community are discussed further in this article.

The Hudson Bay Lowlands of Northern Ontario (Fig 1) is an area that has been recognised by climate change scientists as one of the areas in Canada most likely to be significantly affected by climate changes and related environmental impacts¹⁶. While the incorporation of new technologies (ie mechanization, Global Positioning Systems, internet) on traditional livelihood have been recognized^{14,17}, little research has addressed how technologies and the modern media and as a consequence the interpretation of what constitutes a healthy ecosystem, have impacted traditional subsistence patterns in Northern Canada. There is a perception, among the Cree of *Eeyou Istchee* (the traditional homeland of the Cree located in the Eastern James Bay area) that wild game, especially fish, is tainted with mercury, and is no longer clean¹⁸. Access to this information resulted in a decrease in fish consumption in the eastern James Bay Area. Similar concerns over abandoned military infrastructures in Northern Ontario, and the potential of these sites to contaminate the environment and the wildlife they consume, have been expressed by some members of the community¹⁹. For as resident stated, 'the caribou meat's starting to taste different, no like the way it did. I can't explain it to you, but it's a different taste. We know that'¹⁹. Recent clean-up efforts of these former military establishments throughout the Hudson Bay Lowlands, and the potential effects of these activities on harvesting practices could become more significant. Given that few researchers have acknowledged or recognized the globalization of the moccasin telegraph (ie the traditional mode of communication between First

Nations), and no studies examining ecosystem health have been conducted in this region of the province, the discussion around these phenomena and their significance in understanding emerging knowledge systems in small, remote First Nations in Canada is central to this article. Implications for community wellbeing and resiliency are also discussed.

Methods

Site description

The *omaske.ko.w* Cree (meaning muskeg or swamp people in the Cree language) have lived in the Hudson Bay Lowlands for countless generations. Although the Cree's traditional territory extended throughout the Hudson and James Bay Lowlands of Quebec, Ontario, and Manitoba, their subsistence activities were often focused in the coastal and waterway areas and guided by seasonal patterns of fishing, hunting, and trapping⁹. Fish such as whitefish and sturgeons were collected along major waterways in the spring and fall seasons²⁰, while river estuaries provided hunting (shorebirds, migratory birds), fishing, and foraging grounds in the spring and summer seasons¹². In the fall and winter, Cree families returned inland towards their traditional hunting grounds to hunt caribou and moose, ice-fish, and trap furbearing animals²¹.

European contact with the coastal Cree occurred relatively early (Table 1). Indeed, it was one solitary Cree individual in 1610 who welcomed Henry Hudson to *Wînipekwa* (the large muddy waters), the large body which would eventually bear his name²². In many instances, contact with Europeans provided the Cree with opportunities to adapt equipment and tools made available through the fur trade⁹. For example the 'coasters' or *Wiinibeyk Iiyuu* (salt water person) also known as the Home Guard²³, like the families of the Winisk and Sutton River areas have traditionally been dependent on harvesting coastal and marine mammals, activities that persist until today²¹. They also developed close relationships with fur traders, who built numerous posts in the area⁹.

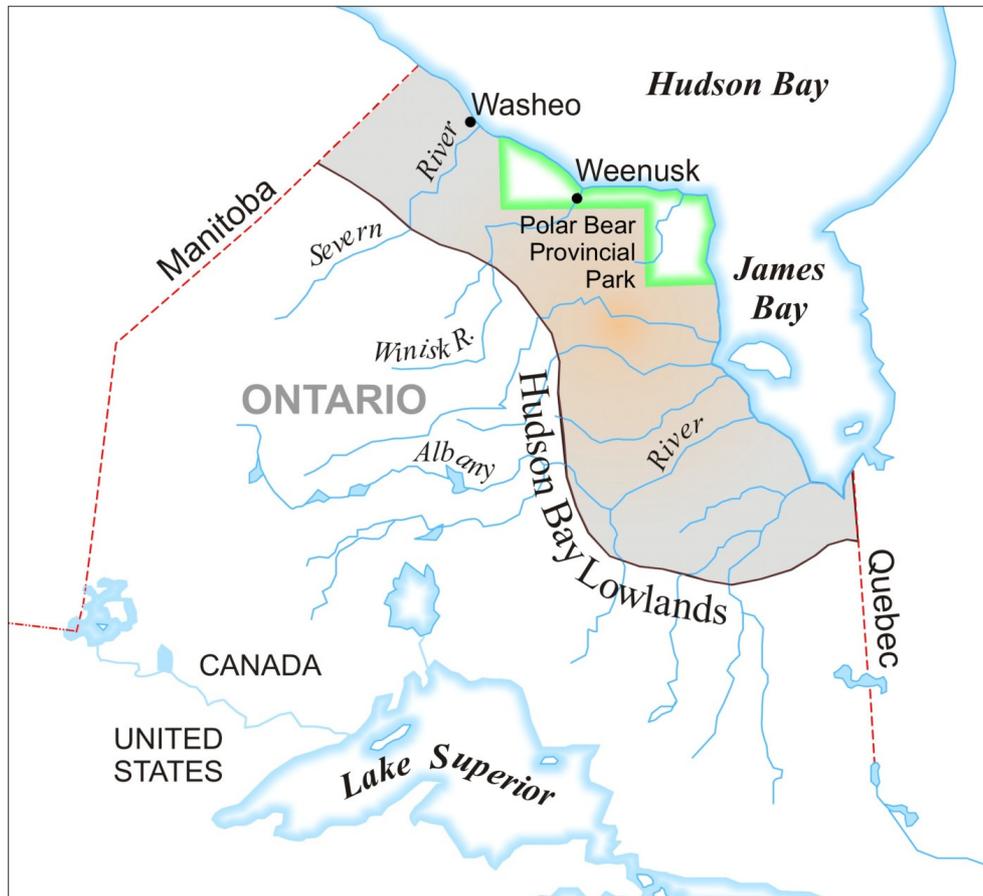


Figure 1: Map of the Hudson Bay lowlands.

Table 1: Chronology of major eras in Weenusk

Date	Era	Events in Weenusk
1610-1669	European exploration of <i>Winepwev</i> (Hudson and James Bay)	The Cree meet the crew of Henry Hudson
1670-1900	Fur era	The establishment of the Homeland Guards for the Hudson Bay Company
1910-1920s	Treaty era	Christian mission and semi-permanent community is established near the Winisk river
1940-1960s	Military era	Base is established
1965-1985	Protection era	Polar bear provincial park is established, several conservation initiatives are implemented
1986	Peawanuck era	The flood occurs Relocation to new community at Peawanuck
1986-present	The mixed-economy era	Traditional subsistence, government work



The *Weenusk* (ground hog in Cree) Cree First Nation once traded with the Hudson's Bay Company along the length of the Hudson Bay and James Bay coastlines from York Factory in the west, to Fort George in the east²⁴. The establishment of the trading post on the Winisk River in the late 19th century, and a permanent Roman Catholic Mission in the early 20th century encouraged some of the Cree families to become more sedentary and increasingly dependent on manufactured goods²⁴. Dealings with federal officials began after the ratification of Treaty 9 in the 1930s, while interactions with provincial officials began to occur after World War II²⁵. The military era (1950-1965) was a time when infrastructures, the wage economy and mechanization (eg outboard motors, snowmobiles) appeared and more localized lifestyles through permanent dwellings were encouraged; this era was followed by the conservation and protection era in the 1970s and early 1980s (highlighted by the establishment of Polar Bear Provincial Park in 1970).

Tragedy struck in 1986 when flooding destroyed the original permanent settlement of Weenusk (near the mouth of the Winisk River) and killed two people. This event forced the relocation of Weenusk to the present site of Peawanuck. The relocation provided an opportunity to build an energy efficient community and implement more efficient use of existing resources²⁶. For example, 43 energy efficient housing units with good insulation, tight envelopes, high efficiency windows and high efficiency wood stoves were designed, built, and installed²⁶. A decade later, dial-up internet services began. The installation of high speed internet and wireless were anticipated in the early 21st century; however, the system only became fully operational in the summer of 2009. Because the installation of a cable service had never occurred, television and radio station services were provided through the Canadian Broadcasting System (CBC). Therefore, when satellite television services became available in 2000, most people opted for this service. Today, it is hard to find a house that does not have at least one satellite dish and access to internet.

Weenusk is only accessible by plane, boat, and winter road (temporary roads that allow for transportation across rivers and muskeg when they freeze each winter). The community's economic welfare is based on a mixed-economy, where modern employment opportunities in government, health, education and tourism are complemented by traditional activities such as wood-cutting, hunting, fishing and trapping. Beyond local government (eg the band council) and seasonal employment opportunities in tourism, employment in the community is somewhat limited (the unemployment rate is estimated to be 84%). This small Cree community of 266 members also has a young population, with 64% under the age of 25 years²⁴. Education is provided locally up to grade 10. Students wishing to continue their secondary and post-secondary education must attend establishments in larger, urban areas to the south. In terms of local governance, the band council is quite small consisting of an elected chief and three band councilors. The community also belongs to larger political organizations including the Nishnawbe-Aski Nation (NAN) (the governance structure overseeing the administration of Treaty 9).

Since wild game such as snow geese, Canadian geese, brook trout, whitefish, sturgeon, caribou, moose, polar bears and black bears are plentiful in the area, hunting and fishing continue to be important activities in the community; furbearers such as beaver, marten, muskrat, fox, otter and mink are also trapped²⁴. The significance of traditional livelihood^{27,12}, and the subsequent sharing and distribution of wild foods acquired from these activities have been documented²⁸. The effectiveness of the mixed-economy of Weenusk has been praised by some researchers²⁴ and reporters²⁹ who claim that Weenusk is a First Nation that successfully blends the old (traditional harvesting practices) with the new (cooperatives and tourism). Several operations including the fuel station, the collection of firewood, and the operation of the winter road are managed by the band. Polar bear viewing and fishing opportunities offered through small local tourism operators in the community are also available.



These latter operations are relatively small and do not average more than 50-100 visitors per year.

Research approach

This research was guided by a research approach known as CREE (capacity-building, respect, equity and empowerment), that seeks to promote research accountability and transparency, while also attempting to regulate researchers and their findings. By giving participants some measure of control over the process, CREE facilitates their engagement in, rather than just subjects of, the research and potentially creates the kind of knowledge that will be more useful to individuals and communities^{30,31}. As is often customary in these types of projects, we also received a letter of support from NAN (the tribal council for Treaty #9). Despite these safeguards, and an initial pre-research visit by two members of the research team in the summer of 2007, a number of obstacles and concerns were initially voiced by some community leaders, including a lack of consultation with the community regarding the project. According to one band council member, this project and its topic were of little or no interest to them. That being said, some members of the community and Elders were impressed that a visit prior to the project had occurred. A further field trip conducted in the winter of 2008, provided another opportunity to discuss how the community could benefit from the research project. Some of the major concerns previously expressed were addressed through the creation of an informal advisory committee, consulting and hiring two gatekeepers (who also provided translation for the project), by developing research protocols vis-à-vis the interviews, and creating an information dissemination strategy. Since these are all components of CREE, these measures resulted in a greater acceptance of the project by community members.

During the summers of 2008 and 2009, 22 semi-structured interviews were conducted with Cree harvesters, trappers and Elders in Weenusk: 12 harvesters (8 men and 4 women), and 10 Elders (6 men and 4 women) participated in the interviews. Many of these individuals belonged to families

that have worked local trap lines for decades, often for several generations. Two additional participants, who initially demonstrated an interest in participating in the interviews, indicated that they wanted to talk with the researchers but declined to sign the consent form; while discussions went ahead with these individuals, their comments are not included in the findings. Although some participants chose the option of being identified in the interviews, in-order to remain consistent and maintain confidentiality of the other participants, it was decided, in consultation with the community, to use numbers to identify the interviewees (Table 2).

The 22 participants listed in Table 2 were segregated along three categories. They were divided by sex and age-status. While participants were not asked their age, the category of 'middle-age' here is defined here as 30-55 years, while Elders are defined as 55 years and older. Participants were also segregated based upon their involvement in harvesting activities. These include hunting, fishing and gathering as well as the preparation (ie skinning and butchering) of the harvested resources. Those who were considered to be 'very' active participated in harvesting activities at least four times a week. 'Fairly active' accounted for individuals who participated in harvesting activities three times a week on average. 'Occasionally active' refers to those individuals who participate in harvesting activities twice a week or only on special occasions (eg Spring Goose Hunt). 'Not active' refers to those who do not participate in traditional harvesting activities, but may still consume traditional foods.

In understanding Table 2 one should take into account the variables that affect the relationship/s among sex, age status, and participation levels. First, it is apparent that the majority of the females who participated in the study were almost as active as the vast majority of the male participants. However, types of participation did vary by sex depending on the animals being harvested: fishing and goose hunting were popular among female respondents; whereas, big game hunting such as moose and caribou were somewhat less common. However, most females were still involved in the harvesting of moose and caribou through preparation of



animal skins and meat. Second, Elders and those older in middle-age were far more likely to participate in trapping as a harvesting activity. Furthermore, younger respondents in the study were more restricted in the amount of time spent harvesting due to employment obligations.

Given the specific cultural contexts of the project, it was decided to use in-depth informal ethnographic interviews³² in order to 'provide a framework within which respondents can express their own viewpoints'³³. The interview schedule was flexible, open-ended and theme-based. A community research assistant was hired as both a cultural and language translator and to mitigate and limit cultural misunderstandings³⁴. Most interviews were conducted in English, while those conducted in Cree were translated with the help of local field assistants. All interviews were transcribed shortly after they occurred. Feedback and further clarification regarding key points of selected interviews was encouraged by the authors and the interviewees throughout the research process. Sampling was conducted with a snowball technique, which started with contacts with gatekeepers who identified potential participants who, in turn, recommended others³³.

Results from the 2008 and 2009 research seasons were discussed with the field assistant and members of the advisory committee; their initial feedback was that while they valued the findings of the research, they were not really surprised by them. To acquire a greater understanding of the participants' comments, the first author read the transcripts several times and coded the transcripts twice³⁵. After identifying the themes, grouping the themes into more general concepts occurred until saturation^{36,37}. The links between the concepts and themes were examined and re-examined with community partners. Finally, two other team members read all transcripts and evaluated the coding conducted by the first author³⁸. Community members were consulted throughout the process, and in recognition of this input, the community was included as a co-author. In the findings and discussion section below, quotations are used from the transcribed texts of the interviews to illustrate and highlight the themes derived through our analysis.

The analysis discussed in this article highlights the concepts of wellbeing, resilience, climate change, and the moccasin telegraph³⁹. By combining the knowledge systems of social scientists with those of Weenusk, the study attempted to understand how climate change and other changes (eg globalization) are viewed as affecting wellbeing and how the Cree people of Weenusk are adapting to these changes.

Findings and Discussion

Participants indicated that they are concerned with a variety of changes in the environment and their ability to use the land. For example, they noted changes in travel routes on water and land, often attributing these to geomorphic changes in the coastal landscapes along Hudson Bay. They also noted the disappearance of particular insects and bird species, as well as variations in the distributions of particular fauna (eg moose) and flora (eg berries). Another major theme that arose from the analyses was the impacts of traditional modes of communication (eg traditional knowledge, radio, newspaper) and newer forms (eg satellite television and the internet) on the community's understanding of climate change. These findings are discussed at greater length below.

Climate change

Due to centuries of adaptation and keen observation, the Cree of Northern Canada have recognized the sub-Arctic's inherent variability⁴⁰. As one Elder noted, 'The climate has always been changing, it is always changing' (Interviewee #1). Yet the Cree also recognized that something is indeed very different about the patterns they are observing at the present time. For example, changes in snow and ice conditions, shifts in the seasons, and unusual animal behaviour all exceed the familiar range of variability in their experience⁴⁰. As a result of their intensive use of the environment, the Cree like other sub-Arctic residents noted many subtle changes and intricate connections that technological instruments often miss or scientists are just beginning to appreciate and understand⁴¹. An example of this



phenomenon is the changes in precipitation. Most participants involved in the study indicated that precipitation, especially in the form of rain, was increasing. Potential negative impacts from increased precipitation noted by participants were erosion and changes in water table levels. Recent scientific studies examining precipitation trends and climate variability beyond the normative range in the western Hudson Bay area⁴² and elsewhere in the sub-Arctic⁴⁰ support these local observations.

Climate change creates a myriad of challenges for remote First Nations like Weenusk who are dependent upon the mixed-economy of traditional livelihoods and wage-based activities. Challenges include impacts on wildlife which are significant for sustenance (eg geese, caribou) and impacts on infrastructure that is needed to maintain current lifestyles (eg airport runways, winter roads). Depending on the rapidity and severity of these changes, they can potentially outpace the local capacity and resilience of these communities. Climate change issues are often cloaked in such terms as vulnerability with 'little attention paid to the various ways in which social groups, regions and societies are impacted'⁴⁰, and are adapting. To understand how climate change affects humans, we must examine the local level outcomes. This requires accessing community and individual responses, which reflect local conditions including, community-level aspects of culture, economy, history, and experience of change⁴³.

Whether it is the ice from the Hudson Bay and/or the Winisk River constantly eroding the river banks and creating new islands in the river estuary, or the changing landscapes of Hudson Bay shorelines through isostatic rebound, and the melting permafrost of the tundra, the land is always changing. These changes have had both positive and negative outcomes: some wildlife species such as, loons, eiders, and some types of berries are declining and even disappearing, while others like eagles and vultures are prospering and snakes, cowbirds, pelicans, pigeons, and starlings are being seen for the first time (Table 3).

The arrival of these new species (many of these do not have Cree names) in the Canadian sub-Arctic, in the short term at least, does not appear to be compromising traditional livelihood, for some species like moose and certain type of pike have replaced more traditional species like caribou and sturgeon. Of interest in the long term will be the role of species that have not been replaced, such as eiders, and the perceptions of competing species like eagles and pelicans for fish and geese.

Adaptation and resilience

Several participants spoke of resilience in their lifestyle. One common philosophy was to accept the changes noted above, meeting them head-on while remaining positive. An Elder's comments translated from Cree asserted that:

...we don't stop. We just keep going ... when things like that happen, we don't stop. Just like the animals. We don't starve. We always try to find a solution, you know? (Interviewee #17).

Another participant asserted that:

The Cree people have always adapted and they always will. Just like every other species out there. Some migrate. Some stay and adapt. Oh, yeah. I think we're still gonna be good either way, whatever happens. (Interviewee #6)

The need to adapt to modern conditions was summed up by one community member as:

It is very important to get the information out there about what is changing, so others can understand what is happening. Adapting to changes also includes social dimensions, especially in reference to education and being [able] to heal oneself. (Interviewee #15)



Table 2: Participant profile

Interviewee no.	Sex	Age group	Participation in harvesting activities
#1	M	Elder	Not Active†
#2	M	Elder	Very Active
#3	M	Elder	Fairly Active
#4	F	Elder	Fairly Active
#5	M	Elder	Very Active
#6	F	Elder	Occasionally Active
#7	M	Elder	Occasionally Active
#8	M	Middle-Age	Occasionally Active
#9	M	Middle-Age	Fairly Active
#10	F	Middle-Age	Fairly Active
#11	M	Middle-Age	Fairly Active
#12	F	Middle-Age	Fairly Active
#13	M	Middle-Age	Fairly Active
#14	F	Middle-Age	Occasionally Active‡
#15	F	Middle-Age	Not Active
#16	M	Middle-Age	Fairly Active
#17	M	Middle-Age	Fairly Active
#18	M	Middle-Age	Fairly Active
#19	F	Middle-Age	Occasionally Active
#20	M	Middle-Age	Fairly Active
#21	M	Middle-Age	Fairly Active
#22	F	Middle-Age	Fairly Active

†Due to poor health; ‡gathering only.

Table 3: Flora and fauna

Type	Status	Description
Geese, caribou, moose, trout, whitefish	Stable	Keystone traditional species Seasonally variability
Polar bears, black bears, wolves, foxes, grouse, ptarmigan, hare, beavers, muskrats, willows, birch	Increasing	Important species Doing well
Loons, eiders, ducks, minks, dragonflies, some berries	Disappearing	Decreasing
Eagles (golden, bald), vultures, wolverine	Increasing	More abundant
Pelicans, cougars, perch, carp, pigeons, startlings, snakes	Increasing	Appearing

Others described adapting and resiliency as acquiring information, 'being educated about what's going on' (Interviewee # 14).

Health and wellbeing

As with other studies on wellbeing in Northern First Nations^{44,45}, this study found that health from the Cree perspective is not merely the absence of diseases. Rather, it

is an overall state of wellbeing, encompassing the micro-levels of the cell to the macro-levels of ecological systems and spiritual dimensions. It is the ability to learn from and live off the land, for the land and the people are one and the same⁴⁴. Hunting and fishing are central to good health and wellbeing⁴⁶. They are also a key to re-connecting with the land and the ancient ways, and are thus central to adapting.

I think a lot of people here still live the traditional ways. There's a lot of them that go hunting. There's a



lot of them who preserve meat and cut-up animals, bring them back to the community and share.
(Interviewee #19)

The importance of hunting and fishing and sharing of wild foods in Weenusk should come as no surprise, for the Cree cycle of harvest is based on the seasonal harvest of wildlife similar to the Dene seasonal harvest cycle (Fig 3)⁴⁴.

A typical winter harvest (November-April) would consist of ice fishing, harvest of small game (ptarmigan, grouse, hare), trapping of fur bearers, and a caribou hunt, provided that the animals come close enough to the community during their annual migration inland. The spring (April-June) goose hunt is the most important social harvesting activity for the Cree. Enough harvested geese are smoked, dried, and canned to supply the entire year. Fishing (fresh-water and salt-water) also occurs during the spring and summer months. August is typically the time to harvest berries, while September and October are traditionally the fall goose and moose hunting months. These harvesting cycles, noted originally by employees from the Hudson Bay Company, have remained relatively stable (with some seasonal variations) until present times^{47,48}.

In common with other Indigenous groups located in the Canadian sub-Arctic, Elders in this community belong to the last generations to have lived most of their lives in the traditional way and to have retained the specialized knowledge, language, and skills needed to live off the land⁴⁹. Yet in Weenusk, a number of middle-aged participants (over half of the participants in this study) also noted how they were 'born in the bush' and love to return to the land whenever they could. The majority of these individuals still spend a great deal of time out on the land and at camps and cabins. To paraphrase one participant, time 'out on the land' is crucial to re-connecting to one's ancestral ways, to have access to good food, and just to be 'well'. It is during this time spent out on the land that harvesters and travellers need to pay particular attention to environmental cues, especially in the coastal area of the Hudson Bay where conditions can change rapidly. Since weather determines the day's activities

for most harvesters, it is a critical part of everyday life, and is monitored closely. Unfortunately, the skill of forecasting is diminishing in these changing times, when more time is spent travelling rapidly by snowmobile or motor boat resulting in less possibility or perhaps even perceived need for observation than was common in more traditional modes of traversing the land⁴⁹. The impact of this mechanization and its repercussion on health was not lost on one Elder who stated that:

...whereas a long time ago we used dog teams and we could move around a lot and run. [...] So by using the machinery all the time there's more traveling and less moving. People aren't as active anymore.
(Interviewee #7)

Some participants noted that: 'Health is basically your medicine and what it is to be healthy. The land is supposed to be healthy. That's how it works' (Interviewee #8). Another respondent stated that:

I love being out in the country, like with nature. It's beautiful and you're on your own. You're free. You can go, like out in the bush or out in the bay, just riding around or going hunting. You know, just being out there. It's part of my healing. (Interviewee #10)

Another community resident suggested that:

People are becoming aware of health issues - Yeah, after talking about all of this, the traditional ways - they're still eating traditional foods, which is healthy for them. I know a lot of people have gone from white bread to brown bread, you know, and staying away from grease where they use oil for smoking geese, which is healthy for them. And I know they're more aware of being overweight. I think they do really care about their health (Interviewee #7).

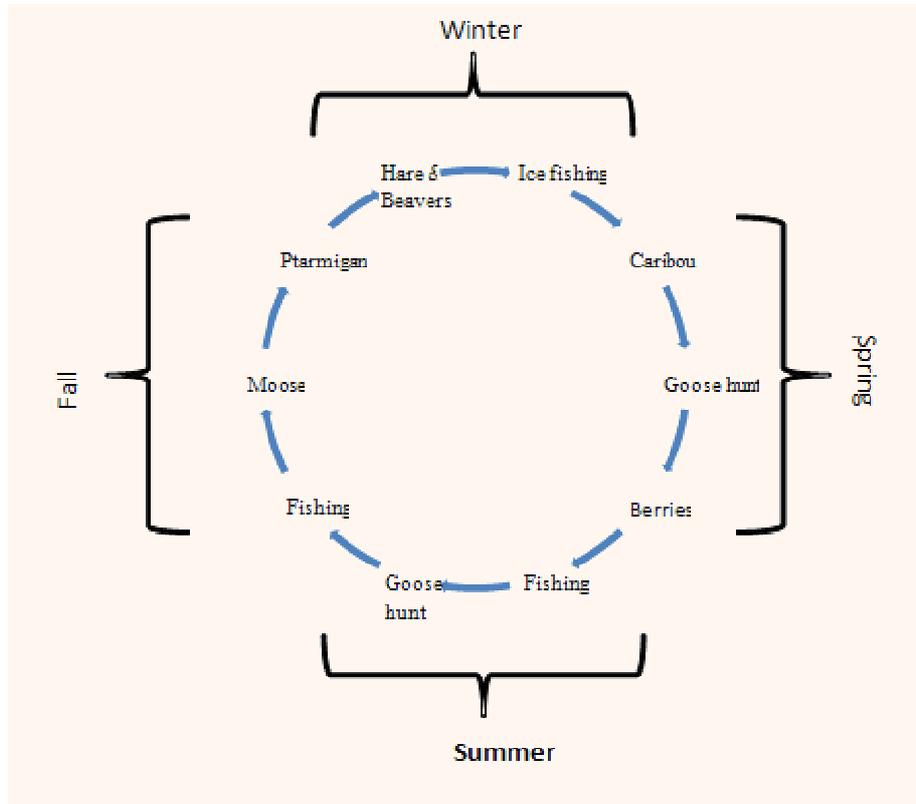


Figure 2: The Cree cycle of harvest.

This is not to say that participants did not discuss their concerns regarding declining health and diminishing subsistence activities like trapping, berry picking, and the use of traditional medicines. ‘Mechanization and the fact that people are always driving, even short distances, can’t be healthy’, according to Interviewee #15. One Elder, explaining through a translator, suggested that people a long time ago:

...were always on the move traveling. But now people are sitting in their houses and doing practically nothing. A long time ago, he doesn’t recall anybody being sick like that. [...] Now you see the people, they’re barely walking from door to door. They’re just always driving something. [...] In order to stay healthy, you have to move around all the time. If you can’t move around, you start having arthritis. People don’t go on foot anymore. If they are traveling, they

use the machine. [...] People, especially the Elderly, that they are not active (Interviewee #4).

Supporting this perspective, one Elder summarized his concerns by stating that a long time ago ‘we were less dependent on medication and mechanization’ (Interviewee #1). When asked to define challenges to wellbeing one participant explained it the following way, ‘people aren’t connected anymore – because they don’t go out – they don’t have the knowledge’ (Interviewee #2). When asked to state which ailments and diseases were most prominent in the community, one participant indicated that type 2 diabetes, respiratory ailments, and arthritis were the most common diseases.

Findings in this and other studies suggest that quantitative measures of health (eg access to medical care, medical



history), although important, do not provide the entire picture of wellbeing^{50,51}. Some researchers⁵² have suggested that a broader perspective is essential to fully understand the health and wellbeing of First Nations⁵³. Beyond this, it is critical to understand 'health' not simply as the absence of illness or infirmity, but rather, as a sense of 'wellbeing' arising from the positive interaction of an individual with the cultural and social practices and values of a community⁵⁴. Consequently, health and wellbeing in this article is interpreted broadly to encompass a sense of wellbeing that results from the interaction of an individual with the cultural and social practices and values of his/her community, encompassing physical, social/cultural, mental and spiritual values⁵⁵. From a Cree perspective, adapting means focusing on your strengths, not on your vulnerabilities and strength and resilience are the foundations of good health. From a symbolic perspective the 'land' is a metaphor for social-ecological health or ecosystem health, and humans are integral components of these living and transforming landscapes.

The Moccasin Telegraph goes global

The moccasin telegraph is the exchange of news or information through social networks, especially by casual informal conversation, rumour, gossip or the internet. The original meaning referred to Indigenous people relying on runners to carry messages between communities; now 'it has been adapted to the internet world'⁵⁴. The role of the ongoing development and continuing globalization of the moccasin telegraph through traditional modes of communication (eg traditional knowledge, radio, newspaper) and newer forms (eg satellite television and the internet) on Indigenous people's understanding of climate change and ecosystem wellbeing has rarely been addressed. Few researchers have acknowledged or recognized the globalization of the moccasin telegraph, but this phenomenon merits attention because it has significance in understanding emerging knowledge systems in Indigenous communities. For example, researchers⁵⁵ have noted that some Indigenous traditional harvesters (reindeer herders, hunters, fishers) in Siberia are being informed by the media about the potential

contamination of wild game. Others¹⁸ also noted a general perception among the Cree of *Eeyou Istchee* (the traditional homeland of the Cree located in the Eastern James Bay area) that wild game, especially fish is tainted with mercury. Two harvesters in our study did indicate that 'strange spots' were found on a few moose, and that they no longer consumed polar bears because they believed the meat to be contaminated, other concerns have been voiced over the potential environmental contamination from the various military sites that are found throughout the Hudson Bay Lowlands. Discussions and observations do however suggest that there is some evidence to suggest that the Cree are using the media to inform their patterns of consumption. How this information is influencing traditional harvesting practices or concerns for health in a present context remains unclear.

Most interviewees downplayed their knowledge of climate change:

We didn't know anything about climate change that's the thing. Only recently, about 10 years ago, did we begin to know what climate change means. (Interviewee #1)

Now, 10 years later:

People are saying they can tell that the climate is changing, whereas like every spring there's this sudden thaw and it gets very cold. That is unusual and that affects hunting. (Interviewee #7)

To paraphrase one Elder and harvester in particular, climate change, appears to provide a convenient and socially acceptable framework to define changes that have been, and continue to occur. The role of the internet, and interactions with members of various government agencies and post-secondary establishments who commonly use the term needs to be acknowledged as a potential factor in focusing attention, perhaps unduly, on climate change as the key driver of the changes that many in the community are apparently observing.



Exposure to global media has resulted in traditional culture based on Indigenous heritage becoming more contested and authority less certain in a world where outside information is more accessible through access to modern communication technology. Heritage and the authority of traditional governance are potentially eroded by exposure to national and global entertainment cultures and the lifestyles they portray, and traditional practices and knowledge are less dependable in the face of perceived climate-induced change⁴. Some participants also noted differences between themselves and the younger generation who 'know about climate change [but] it doesn't really concern them much' (Interviewee #1). The participant went on to state:

The old people like us, we think there's something wrong. We think that something is changing, that there's something funny going on. But there are many things also that are strange for us, the old people, than for the young people who don't know.
(Interviewee #1)

This Elder in particular is hinting that changes are occurring beyond environmental and climatic realms.

As one journalist noted in the 1980s, the introduction of satellite television in remote First Nations in Ontario has had profound ramifications on the socio-cultural fabric of these communities. Today, for example, English is becoming the language of choice with youth, and formally well-patronised community halls are now sitting empty⁵⁶. Today, information obtained via satellite television, wireless internet, and satellite conferences are all available in Weenusk. The impact of these modern forms of communications on lifestyles and health was recognised:

We have so much distracting us, like the first thing when you get up, you turn on the TV and watch it and end up sitting there for hours. And with kids, that's what I notice. That's the change I see. Kids play or stay indoors more than being out there. They do video games or TV or movies. [...] Even with Elders today. They don't visit each other anymore. (Interviewee #5)

Concerns regarding how much time was spent playing games and watching television were also noted. The costs associated with purchasing equipment and the monthly fees associated with access to this technology may also limit the financial resources to support traditional harvesting practices - thereby, exacerbating disconnection with traditional practices and the land.

From this perspective, it appears that Weenusk like most rural remote communities in Canada, is becoming increasingly well-connected, and these new connections are having a pervasive impact on the content, type and immediacy of available information, and on the social interactions, health, lifestyles and culture of these communities.

Climate change, health, and wellbeing in Weenusk: a review

The demands of the sub-Arctic are reflected in the resilient and enduring qualities of a people who continue to 'redesign [...] both the adaptive and expressive components of their way of life in response to opportunities and pressures'⁵⁷. Although these words were written in the context of the 'fur trade' of the Canadian north, they are as relevant today as they were then. Weenusk is a community increasingly exposed to global influences as the community moved from millennia-long isolation through initial contact to full exposure to the technological and cultural influences of the late-modern world.

What this assessment indicates is that the need to adapt to the challenges presented by environmental change. Throughout, the Weenusk Cree have consistently demonstrated a remarkable resilience and adaptive capacity. However, in recent times and with the proliferation of new technologies local governing bodies seem much less able to adapt and respond to these same challenges in time frames that are consistent with the rapidity of change being experienced by Northern communities.



Similar to other studies elsewhere in the Canadian sub-Arctic, changes in the environment are bound to affect other organisms, and Indigenous people throughout the sub-Arctic have reported changes that range from subtle to striking in a variety of species, including birds, caribou, moose, fish, insects, as well as some plants and berry species. In some cases, species like starlings and pelicans are turning up in unexpected places or at unexpected times of the year, often following shifts in seasonal weather patterns. Many of these observed environmental changes are made even more complex, as they intersect with social, cultural, economic, and political influences, often brought about by the forces of modernization and globalization⁴⁰.

Considering the widespread impact of these processes, it should be no surprise that Weenusk First Nation is showing the effects of these influences. The most significant factor may not be that change is taking place - after all, the Weenusk Cree have demonstrated that they are well adapted and resilient to change - but rather it is the rapidity and pervasiveness of both social and environmental change that is presenting the greatest challenge to their wellbeing and the sustainability of their livelihoods.

Conclusion

The year 2010 will mark the 4 hundredth anniversary date of Henry Hudson's arrival on *Winipekw* (the Hudson Bay) in Northern Canada. During this voyage, which would eventually cost the navigator his life, he would meet and trade with the Cree²². This initial meeting would prove quite beneficial for early European explorers and Euro-Canadians, and would profoundly change the Cree way of life over the next 400 years. Yet, despite this and the subsequent major upheavals brought about by the fur trade era, the military base, park designation, the advent of a mixed-economy and the increasing influences of globalization, the Cree people of Weenusk have persevered and adapted. They have, in fact, made the most of an 'environment' that could be defined by some as isolated, remote, and barren. Isolation and remoteness are often seen as detrimental to community

wellbeing and integration, and while we certainly do not want to dismiss these concerns there are, according to local residents, a number of benefits provided by the community's isolation and remoteness. This includes access to bountiful natural resources, independence, and community pride. The resilience of the Weenusk First Nation may also be attributed to 'living on the transitional edge' of several ecosystems (muskeg, boreal forest, tundra), these transitional areas, usually high in ecological diversity, provide numerous opportunities for communities to diversify and enhance socio-ecological resilience⁵⁸. A majority of interviewees noted that the remoteness of the community has mitigated some external influences and nurtured the maintenance of traditional lifestyles.

I would definitely say that we're pretty resilient, I guess. Like seeing and hearing about all these stories and what other people went through - friends, family, and how they got through it. [...] We can hold our own. You know what I mean? (Interviewee #12)

This notion of resiliency is founded in a fundamental notion that their resolve, which is based on centuries of resourceful adaptation to changing ecological and climatic conditions in Northern Ontario, has provided them with the wherewithal to adapt and be 'well' in their traditional territory.

Wellness is also rooted in the Cree worldview that change is always occurring and ever-present in the sub-Arctic, therefore, to define one particular era of time as 'changing climate' is, in the words of one participant 'simply misguided, and an inability by the non-Cree to understand that change is natural, constant, and a part of life' (Interviewee #16). While this particular interviewee and other residents recognize that the pace of change has increased, they are presently dealing with and adapting to these changes. At the heart of perspectives provided by Interviewee #16 is the suggestion that climate change is inherently a social construction based on the premise of 'balance.' While this notion of ecological balance has been discredited by researchers^{59,60}, very little critical reflexivity



on the impact of the notion of 'social balance' has occurred. The irony is that as communities like Weenusk become more connected to modern forms of community they become further disconnected from traditional worldviews.

The moccasin telegraph appears to be experiencing important upgrades which now make this form of community more of a network than a telegraph. The moccasin network, unlike previous agencies and actors, is not limited by isolation and remoteness; therefore, the repercussions of the moccasin network in Weenusk are only beginning and will continue to reverberate deep within this community for years to come. Influences from this technology regarding climate change, and the political implication of this heightened awareness have already being seen. Positive repercussions from the moccasin network include the ability to combine both traditional and current information sources to navigate landscapes and seascapes, access to information and awareness, connection to other Indigenous peoples elsewhere, and the possibility for satellite conferencing for health, research and educational purposes. The drawbacks include dependency, the quick introduction, with relatively little if any transition phases of technology, the noted disconnection between the generations, the cost associated to these technologies, and the sedentary patterns that are often associated with using such technology. In addition, the exposure to the moccasin network may also have implications on wellbeing and traditional harvesting practices. The impacts of these changes on the mixed economies and how this will influence consumption habits and food sources will require further research attention.

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