

CHAPTER 3
SUSTAINABILITY AND VULNERABILITY:
ABORIGINAL ARCTIC FOOD SECURITY IN A TOXIC WORLD
Shirley Thompson (University of Manitoba)

It is not so much that humanity is trying to sustain the natural world, but rather that humanity is trying to sustain itself. The precariousness of nature is our peril, our fragility.

– Amartya Sen, Nobel Laureate Economist

The central and most distinguishing feature of the modern Arctic indigenous economy continues to be its dependence on wildlife and the habitat that supports it.

– Arctic Indigenous Peoples' Secretariat, 2002

Environmental change impacts food security in Aboriginal communities in Canada's Arctic. Northern Aboriginal communities are widely recognized as having mixed, subsistence-based economies in which the harvesting of country food for primarily domestic consumption plays a significant role in their food security and culture (Usher *et al.* 2003). Since time immemorial, Canada's Aboriginal peoples were self-sufficient, through subsistence-based activities, in the harsh Arctic climate without causing degradation to their environment (Usher *et al.* 2003). However, colonization and modernization makes their food supply and subsistence activities vulnerable.

The undermining of sustainable societies, which preserve ecological capital, by unsustainable societies, which draw down ecological capital through trade (e.g., overfishing, fur trading, mining) and formulating government policies outside of ecological and cultural context, is discussed by a variety of authors (Churchill 1999; Parajuli 1997). This chapter focuses on the factors compromising sustainability and food security of Inuit in Nunavut. "Toxic" impacts in the Arctic that undermine sustainable livelihoods go beyond merely mercury and persistent organic pollutants (POPs) contamination and include climate change and Eurocentric autocratic government policy that has included relocating Aboriginal peoples. Hofrichter (2000, 1) applies the term "toxic culture" to show how social

arrangements encourage and excuse the deterioration of the environment, culture, and human health. Atmospheric pollution, over which northerners have little or no control, debases the sustainable lifestyles of Aboriginal peoples, as does depleting resources (*e.g.*, Peary Caribou are endangered in the high Arctic and in Banks Island and threatened in low Arctic), restricting hunting and gathering (*e.g.*, harvesting limits exist for polar bears, Beluga whales, etc.) and government policies that disregard place-based knowledge (*e.g.*, mandatory schooling focused on Euro-Canadian culture, and relocation) (Marcus 1995).

Inuit “traditional way of life,” modernized to include new technology such as snowmobiles, has a small ecological footprint. An ecological footprint is the number of hectares required to sustain individuals, communities, and nations based on population size, average consumption per person, infrastructure for housing, transportation, industrial production, and the resource intensity of the technology being used (Redefining Progress 2004). As most food in the global economy travels more than 5,000 kilometres, any subsistence activity reduces transportation and environmental impact. Today’s global food system is dependent on mechanization, large inputs of fertilizer and pesticides, monocropping, green revolution- and bio-technologies, processing or refrigeration, as well as vast transportation, marketing, and supermarket networks (Gottlieb 2002). In contrast, Inuit hunting and gathering derives food from local sources in the natural, unmanipulated environment.

Although environmental change is nothing new, the number of assaults and their magnitude are increasing with toxic contamination, ozone depletion, resource scarcity, and mass extinction of species, of which a number of Arctic species are at risk. Nature’s constant state of flux has accelerated, impacted by settlement, mining, industry, infrastructure, and military activity so that environmental change is described by Inuit elder Mabel Toolie as “the Earth is faster now” (Caleb Pungowiyi quoted in Krupnik and Jolly 2002, 7). Such changes alter the quality and quantity of environmental resources, thereby diminishing sustainability of Aboriginal Arctic communities. Dependence on a compromised local physical environment, without wealth to import resources from elsewhere, limits options for survival. Impacted by the toxic aspects of modernity, Inuit communities in Nunavut are vulnerable, as their coping capacity is severely limited by poverty and minimal infrastructure. This chapter first looks at the importance and vulnerability of food security and subsistence activities before looking at the impact of environmental change on food security in Nunavut’s Inuit communities due to: (1) poverty undermining food security; (2) contamination causing toxic impacts; and (3) government policies restricting access to land and resources.

FOOD SECURITY THROUGH SUSTAINABLE LIVELIHOODS

Chambers and Conway (1992) define sustainable livelihood as comprised of the capabilities, assets, and activities required to obtain a means of

living. Sustainable livelihoods require people to have an intimate knowledge of the land to engage in resource use. Knowledge and values of ‘ecosystem people’ (Parajuli 1997) who have a reciprocal relationship with their respective ecosystems is very different from those of ‘biosphere people’ who draw on resources from afar and often transform those resources through industrial processes. For Aboriginal peoples, this knowledge comes from cultural teachings, as well as generations of resource harvesting from traditional areas. Indigenous communities have unique lifestyles intimately adapted to local climate, vegetation, and wildlife and may be particularly threatened by environmental change (Parajuli 1997). Inuit peoples in Nunavut, as ecosystem peoples, have evolved knowledge about plants and animals, their habitat preferences, local distribution, life histories, and their seasonal behaviour, with an interest in ensuring the long-term availability of the natural resources of their own localities. The transmission of this knowledge from one generation to the next, along with a philosophy of sharing, has shaped customs that have promoted sustainability among nomadic peoples (Environment Canada 2003). Much of this knowledge is used to obtain food, medicine, and other necessities, and in avoiding crises caused by natural calamities (Berkes, Folke and Gadgil 1995).

Sustainable livelihoods are especially important in environments that are fragile, marginal, and vulnerable, like the Arctic (Chambers and Conway 1992). Inuit people in the Arctic live in a harsh climate, with wildlife and other natural resources forming the basis of Inuit society, culture, and economy (Environment Canada 2003). They describe their ancestors as “curious and inventive. They constantly searched for new ways of doing things to make their life more secure. Thus, they became very knowledgeable about the land and ways of hunting” (Northwest Territories Education 1991, 1). One Inuit hunter explains how good trappers practice sustainable trapping:

If you’re a good trapper, you know which animals to trap at certain times of the year, and you know which animals not to trap in a given year, because they’re at the bottom of their cycle. Most animals are in a seven-year cycle ... so if you know that, as a trapper, you can sustain your living. That’s what sustainable means. (Elmer Ghostkeeper quoted in Wuttunee 1995, 207)

Rather than serving the purpose of accumulation at the level of enterprise, country foods tends to be inseparable from the social system (Usher *et al.* 2003). Economic and social relations among households in a community are guided by kinship principles, which are the primary determinant of access to resources and the organization of labour for productive activities as well as of the distribution of goods and services for consumption, ensuring food security. Successful households do not accumulate wealth for their own private use; they share their produce with other households, distributing their excess production widely through the kinship system (Usher *et al.* 2003).

Country Foods Role in Food Security

Country foods play a vital role in food security, as well as the nutritional, social, cultural, economic, and spiritual well-being of Inuit communities in Nunavut. Egede explains that country foods form an essential basis of personal and community well-being for Inuit:

Inuit foods give us health, well-being and identity. Inuit foods are our way of life... Total health includes spiritual well-being. For us to be fully healthy, we must have our foods, recognizing the benefits they bring. Contaminants do not affect our souls. Avoiding our food from fear does. (Egede 1995, 2)

These foods are the product of a social system and spiritual relations connected with being on the land and hunting, representing far more than a meal, but rather a healthy culture (Usher *et al.* 1995). Among Aboriginal peoples of the Canadian North, the integration of the body (*i.e.*, physical actuality and functionality of the human body), and the soul (*i.e.*, spirit, mind, immediate emotional state, or even the expression of consciousness) (Borré 1994) is accomplished through capturing, sharing, and consuming country food. The following quotes by two Inuit people below speak to the necessity of eating country foods:

Whales and sea mammals are considered to be the best food to feed the [Inuit] body... Without these types of foods, we the Inuit would have been gone a long time ago. Therefore, in order to live a full and healthy life and to keep the generations going, we, the Inuit, need the food that has brought us to where we are today. (Angela Gibbons, Salliq (Coral Harbour), March 1995 quoted in Freeman *et al.* 1998, 48)

When one eats meat, it warms your body very quickly. But when one eats fruit or other imported food, it doesn't help keep you very warm. With imported food ... you're warm just a short time period. But [our] meat is different; it keeps you warm. It doesn't matter if it is raw meat or frozen meat ... it has the same effect. (Ussarqak Quajaukitsoz, July 1995 quoted in Freeman *et al.* 1998, 46)

Country foods are key to physical health and well-being, according to several studies with Inuit communities. More than 80 per cent of respondents in five Inuit areas (n = 1, 721 individual interviews) agreed that harvesting and eating country foods provided a wealth of nutritional and cultural benefits (Kuhnlein *et al.* 2000). Country foods are important sources of lipids, vitamins, minerals, and protein and other important nutrients (CACAR 1997). In dietary studies, days eating country food provided less saturated fat, sucrose, and total carbohydrate and provided more vitamin E, iron, and zinc than days without country food (Kuhnlein *et al.* 2001; Van Oostdam *et al.* 2003). Reduced country food con-

sumption in northern Aboriginal populations, coupled with decreasing physical activity, is associated with obesity, dental caries, anemia, lowered resistance to infection, and diabetes (Szathmary *et al.* 1987; Thouez *et al.* 1989).

Country food use, as a percentage of total dietary energy, varied from a low of 6 per cent in communities close to urban centres to a high of 40 per cent in more remote areas (CACAR 2003), according to twenty-four-hour dietary recall among Yukon Dene, Metis, and Inuit. The term "country food," or "traditional food," refers to the mammals, fish, plants, berries, and waterfowl/seabirds harvested from local stocks. More than 250 different species of wildlife, plants and animals were identified as making up the diet of Arctic peoples in workshops with 10,121 Dene and Metis, Yukon First Nation and 1,875 Inuit residents (Receveur *et al.* 1996; Kuhnlein *et al.* 2000; Van Oostdam *et al.* 2003), which provide a diverse and healthy diet. The most frequently mentioned country food items are caribou, moose, salmon, whitefish, grayling, trout, coney, scoter duck, cisco, walleye, spruce hen, pike, ptarmigan, Arctic char, Canada goose, muskox, eider duck, crowberry, beluga muktuk, ringed seal, narwhal muktuk, partridge, and cloudberry.

Hunting, fishing, trapping, and gathering in order to obtain country food is a nutritional necessity for most Inuit communities in Nunavut. In most northern communities, fresh, nutritious store-bought food is expensive and rare and must be imported from great distances.

Subsistence Activities in a Market Economy

Although wage employment and the market system are now quite familiar to northern communities, the "traditional economy" has not disappeared. In the traditional economy the household is a basic unit of both production and consumption, in contrast to industrial economies in which, typically, firms produce and households consume (Usher *et al.* 2003). Although subsistence hunting is still substantial, the rates are declining. This drop in hunting and fishing reduces the pressure on local carrying capacity, allowing the same resource base to sustain a larger population without stress (Usher *et al.* 2003). Unless a major and persistent harvest disruption has occurred, generally subsistence activities have evolved and survived, although lessened as people integrate market activities into their daily lives (Usher *et al.* 2003).

A balance between traditional and wage economies has yet to be achieved in many Inuit communities, as individuals and communities struggle to adapt to the demands of industrial employment in a boom-and-bust economy, while retaining their connection to the land and to their traditional way of life. The abrupt decline in oil and gas exploration in the Mackenzie Delta and Beaufort Sea during the 1980s and the recent closure of gold mines in response to falling world prices confirm that Aboriginal communities remain vulnerable to the boom-and-bust cycles of resource industries (NRTEE 2001).

As well as containing some of the richest fisheries, having extensive continental shelves over which shoaling fish congregate, the Arctic is rich in non-renewable



Caribou harvesting facilities in Coral Harbour, Nunavut. Photo by Steve Newton, 2001.

resources. It holds some of the world's largest deposits of coal, iron, copper, lead, and uranium, as well as oil, gas, and gold (Freeman *et al.* 1998). For almost three-quarters of the twentieth century, Aboriginal communities in the Canadian North had no control over non-renewable resource development (NRTEE 2001).

A legacy of social and cultural dislocation within Aboriginal communities is linked, in part, to non-renewable resource development. A recent study conducted by Pricewater Coopers in the Fort Liard area, Northwest Territories, found higher rates of alcohol consumption and alcohol-related crime to be associated with a recent increase in economic activity (NRTEE 2001). Clearly, a shift to a market economy creates a social and cultural disruption, without adequate supports in place to ensure cultural survival.

VULNERABILITY LIMITING FOOD SECURITY

Vulnerability represents the interface between threats to human well-being and the capacity of people and communities to cope with those threats (UNEP 2002). Both natural phenomena (storms, fires, etc) and human activities (using CFCs depletes the ozone, testing nuclear weapons releases radioactivity, employing cars and industries introduces toxic chemicals, etc.) pose threats. Although everyone is vulnerable to environmental risks, human exposure to environmental threats varies, as does the adaptive ability of societies and individuals. Often vulnerability is discussed only in the positive terms of resilience, capacity, and adaptive management. This management approach places

the responsibility on the Inuit in Nunavut to absorb and counteract negative environmental impacts caused by the industrial economy in the South, rather than focusing on the source of the problems and demanding change. In coping with environmental change, the World Health Organization includes socio-economic conditions and the social and physical environments as key determinants of people's health and well-being in its definition of health. Health is:

The extent to which an individual or group is able, on the one hand, to develop and satisfy needs; and, on the other hand, to change or cope with the environment. Health is therefore seen as a resource for everyday life, not the objective of living; it is seen as a positive concept emphasizing social and personal resources, as well as physical capacities. (World Health Organization 1984, 2)

The availability of resources (*e.g.*, wealth, technology, skills, infrastructure, education, management capabilities, demographic makeup, etc.) plays a role in people's adaptation and coping response (UNEP 2002). Indigenous and poor communities in isolated rural environments in the North are more vulnerable to environmental change, due to economic insecurity, inadequate drinking water, wastewater and transportation infrastructure, and reduced health and education services. The economic development strategy for Nunavut considers the many barriers to a better quality of life:

Physical infrastructure is limited, the workforce is under-skilled, essential services are under-developed. Government is by far the largest component of all economic activity. Although Inuit family and community ties are very strong in Nunavut, some of the most important supports underlying successful modern economies are under great strain, like the health and school systems. An economic development strategy for Nunavut must recognize that in developmental terms the Nunavut economy is far behind other jurisdictions in Canada. (Canada-Nunavut Business Service Centre 2003)

Archibald and Grey (2000) point to the underlying shortages of housing, infrastructure, and employment as the cause of the health and suicide 'crisis' in Nunavut: "Provide people with proper housing, water, sewage, jobs and the means to provide adequate food and health statistics would improve." (Quoted in Kinnon 2002, 12). Inadequate housing and homelessness are growing problems: one in six residents of Iqaluit lacks proper housing (Inuit Tapariit Kanatami 2002). Poor quality and overcrowded housing lead to family tensions and violence, poor health conditions, including high levels of respiratory ailments and communicable diseases (Assembly of First Nations 2001).

The inadequate facilities for water and sewage result in the Inuit in Nunavut, particularly children, having significantly higher incidence of water-borne diseases compared to other Canadians. Although the Canada food/water-borne illness rate is 97.8/100,000, in Nunavut it is triple that at 291/100,000 and in the

Kivalliq region of Nunavut it is quadruple that at 408/100,000 (Archibald and Grey 2000; Kinnon 2002). Contaminants in drinking water include organisms such as giardia, salmonella and *E. coli* bacteria, dissolved metals, pesticides, and industrial chemicals. Many water systems and sanitation systems are substandard (Kinnon 2002).

It is widely recognized that more needs to be done (*e.g.*, infrastructure development, upgrading of water treatment facilities, and increased training in many communities, as well as efforts in local communities to improve sanitation and decrease contamination) to broaden safety efforts to protect Inuit communities from water-borne health hazards (Kinnon 2002). Given its small population and large infrastructure needs, the North's share of overall infrastructure funding is inadequate. The government of Canada uses a per capita allocation formula as the basis for infrastructure funding, but this does not address the urgent needs of the North and provide a minimum threshold to allow communities to provide safe water supplies, health services and secondary education.

More than any other Aboriginal group in Canada, Inuit must travel far to access many health services, especially specialized services. Removal from home communities and family support is emotionally stressful (Hanarahan 2002). Suicide rates are five to seven times the national averages in Aboriginal communities, but particularly high in Nunavut. Compared to 13 deaths per 100,000 Canadians, overall Nunavut has 77 deaths per 100,000 and 94 deaths per 100,000 people in the Qikiqtani region of Nunavut (Kinnon 2002). While Aboriginal communities are gaining greater control over social and economic development and health programs, these programs are often based on non-Indigenous models.

Overall education levels of the northern population are lower than for the overall Canadian population. Of the adult population of Nunavut, only 1.4 per cent of Inuit have a university degree and 2.9 per cent of Inuit have high school graduate certificates (Statistics Canada 2001). It should be noted that many people attend trade school without completing high school, because schools in Nunavut frequently do not offer grade twelve. Also, within the formal education system there is little or no education provided on traditional knowledge, which isolates youth from the land and their elders. Traditional knowledge remains strong among the Inuit elders in Nunavut; however, its transmission to future generations faces many barriers because of the rift caused by Western education and colonialization:

The Western education system continues to fail to teach the values, beliefs and principles which underlie Traditional Knowledge. In addition, time spent in residential schools or day schools has limited the opportunity for Traditional Knowledge to be passed on to younger generations. . . . In the changing world where Euro-Canadian power and control appeared insurmountable, many elders questioned the

value of their knowledge to younger generations in the modern world. At the same time young people became less receptive to the language, the information and the style of traditional teachings which contradicted everything they were taught and learned in school. Young students have less time for year-round exposure to Traditional Knowledge on the land and much more exposure through the media to the dominant society. (Brockman 1997)

Traditional Ecological Knowledge is a body of knowledge built up by a group of people through generations of living in close contact with nature (Battiste and Henderson 2000). Traditional or indigenous knowledge is cumulative and dynamic, building on the historic experiences of a people (Battiste and Henderson 2000). While those concerned about biological diversity will be most interested in knowledge about the environment, this information must be understood in a manner that encompasses knowledge about the cultural, economic, political, and spiritual relationships with the land. UNESCO cites the importance of traditional ecological knowledge and the need for government to provide active support for its transmission – not just in isolated communities but in universities and other educational and international organizations.

Governmental and non-governmental organizations are encouraged to sustain traditional knowledge systems through active support to the societies that are keepers and developers of this knowledge, their ways of life, their languages, their social organization and the environments in which they live, and fully recognize the contribution of women as repositories of a large part of traditional knowledge. . . . Governments, in co-operation with universities and higher education institutions, and with the help of relevant United Nations organizations, should extend and improve education, training and facilities for human resources development in environment-related sciences, also utilizing traditional and local knowledge. (UNESCO 1999)

In the past, Indigenous coping mechanisms included adaptive behaviour, such as regular seasonal migration and changes in practices for hunting and gathering, to ensure food security. Although Inuit communities in Nunavut were once nomadic to ensure better hunting and fishing, enclosure in government housing and mandatory schooling requires that families settle down. Today, food security is limited by poverty, food contamination, and Eurocentric Canadian government policy.

Food Insecurity and Poverty

Food insecurity is a problem for Aboriginal people in Canada, particularly in isolated northern communities in the Arctic. Food security means being able to obtain a nutritionally adequate, culturally acceptable diet at all times through

local non-emergency sources. To ensure an active healthy life, both adequate food production or imports and economic access to food at the household level are required at all times (Canadian Dietetic Association 1991).

According to the Aboriginal People's Survey, half of all respondents over fifteen years of age ($N = 388,900$) reported lack of food availability once or twice per month during the previous twelve months (Statistics Canada 1993). Further, almost half of eight hundred women with children in eight isolated northern communities across Canada were extremely concerned about not having enough money for purchasing food from the store (Lawn 1994). In all of the communities more than half of the women reported running out of money to buy food between two and four times a month. This percentage rose to 80 per cent in four Inuit communities (Lawn 1994; 1995).

Amartya Sen (1992) writes that food supply is not the primary cause for famine, starvation, or food insecurity; rather the lack of entitlement (*e.g.*, lack of employment and income, lack of participation in decision-making, inaccessible and unresponsive government, etc) is the problem. Factors contributing to food insecurity include: low incomes, high food costs, unemployment, inadequate social assistance, and reduced access to country food related to concerns over food safety (Lawn 1994). Poverty curtails options to relocate, import food, or buy the necessary materials (*e.g.*, gas, guns, snowmobiles, boats) to hunt, trap, fish, or gather country foods. Trade is not available to poor people, who engage in subsistence activities, as most wild game has no value in the market economy that devalues subsistence economies and Indigenous cultures.

In many northern communities, country food eases hunger: country food is an economic necessity for most Aboriginal people in Nunavut, as poverty is widespread and nutritious store-bought food is very expensive. Up to 78 per cent of Inuit peoples state they could not afford to feed their families with only store-bought food (Fisk *et al.* 2003). The cost of a standard basket of imported food to provide a nutritionally adequate diet is prohibitively expensive in Arctic communities – with many healthy food choices being economically inaccessible. The cost of living in the North is 50 to 70 per cent higher than in urban centres in the South (Kinnon 2002). Relying on nutritious store-bought food to feed a family of four for one year would cost approximately \$12,000 (Fisk *et al.* 2003), as food prices are higher in the North due to transportation costs. As well as northern goods prices being higher (*e.g.*, white bread loaf was priced at \$2.60 and two litres of milk costs \$5.75 in 1999 in Iqualuit, Nunavut), there are more mouths to feed per family, as 41 per cent of the population is under fifteen years of age in Nunavut (Statistics Canada 2001). As the average earnings in Nunavut are \$20,011, less than two-thirds the average earnings for Canadians (\$31,757), it is difficult to put food on the table without subsistence activities (Statistics Canada 2001).

Eighty per cent of Nunavut's population relies on subsistence activities (hunting, fishing, gathering), to varying degrees, for food security (NTI 1999). Country food production in the Northwest Territories (NWT) is estimated to

have a value of \$55 million, or well over \$10,000 per Aboriginal household per year if replaced with non-country food (Usher and Wenzel 1989). Note this estimate is in 1989 dollars and applicable to Nunavut, which at that time was part of the NWT.

The North is impacted on by industrial activities in the South, causing contamination of country food from long-range transportation of toxic pollutants in the Arctic. The impact of contaminants on health is threefold: first is the direct impact of toxic contaminants on human health; second is the indirect impact of toxic chemicals diminishing wildlife populations, making country foods scarce (*e.g.*, eider ducks) (Robertson and Gilchrist 1998); and last is people's fear of toxic exposures reducing country food consumption.

Contamination

Toxic contamination by mercury and persistent organic pollutants (POPs) pose special risks for food security and the health of Nunavut and other Arctic communities due to the "cold effect" and biomagnification. Many contaminants travel long distances on prevailing winds from sources beyond the direct control of northerners, where they condense due to the cold weather in the North (CACAR 2003). In the cold climate of the North, persistent organic pollutants (POPs) disappear more slowly and persist longer than in southern regions. A chemical's appearance in the northern landscape, far away from local sources, indicates its persistence (as well as its volatility). A good example of the accumulation of chemicals in the North is the fact that the flame retardant, polybrominated diphenyl ethers (PBDES), is found at higher levels in the Arctic than over Chicago or the Great Lakes, where the chemical is extensively used (Fisk *et al.* 2003). Another example is chlorofluorocarbons (CFCs). Ozone holes are most pronounced in circumpolar regions as the interaction of CFCs, spring sunshine, and ice-crystals is very effective in destroying ozone. The ozone hole was first discovered in Antarctica in 1985 and then the Arctic.

Although local sources (*e.g.*, harbours, mines, and military sites) are not the primary reason for the widespread presence of contaminants in the Canadian North, they dominate in certain locations. Sites that exist in the North include two thousand military sites, abandoned mines, and exploration sites, former construction sites, and small industrial sites, which release PCBs, mercury, arsenic, and radionuclides (Fisk *et al.* 2003). For example, releases of arsenic from the Giant Gold Mine in the Northwest Territories need to be reduced to under 2,000 kg/yr to ensure there is no risk to fish, wildlife, or human health (Fisk *et al.* 2003). These sites should be a priority for cleanup.

Mercury and PCBs are the major concerns in the North for human exposure. Inuit are more at risk as they eat four times more fish per capita than other Canadians, and they eat the organs and fats of marine mammals, where lipophilic contaminants concentrate (Fisk *et al.* 2003). People who consume more fish or marine mammals are at higher risk because the toxic response is dose-dependent (Fisk *et al.* 2003; Kinloch *et al.* 1992). Many of the traditionally harvested fish,

as well as land and marine animals (*e.g.*, ringed seals, beluga whales, narwhal, walrus) are both long-lived, allowing toxics to bioaccumulate over time, as well as being from the higher trophic levels of the food chain, allowing toxics to biomagnify up the food chain.

These factors help explain why 68 to 70 per cent of Inuit mothers from the Nunavik and Baffin (Nunavut) regions exceed the new mercury guideline for maternal blood guideline compared to only a few Dene, Metis or non-Aboriginal women in the North (Fisk *et al.* 2003). At 5.8 µg/litre this level is set to protect the fetus and breastfeeding infant from contaminants. Most Kivalliq and Baffin communities have more than 25 per cent of their population consuming levels of mercury higher than the level considered safe, called the tolerable daily intake (TDI). This is much higher than in Labrador, Kitikmeot, and Inuvialuit, where 5 per cent of people are affected. The levels of mercury in maternal blood, hair, and umbilical cords share a similar geographic pattern to wildlife levels: 10 per cent of Baffin mothers and 16 per cent of Nunavik mothers have mercury blood levels falling in the “increasing risk” range. This stands in contrast with all Dene, Metis, and non-Aboriginal mothers, who have blood levels in the acceptable range of below 20 µg/litre (Fisk *et al.* 2003).

Grandjean *et al.* (1997) found that higher umbilical cord blood mercury concentrations corresponded with lower performance ratings for children on neurobehavioural tests, particularly in the domains of fine motor function, attention, language, visual-spatial abilities, and verbal memory. Since 1997, Nunavik mothers and infants have participated in a not-yet-published prospective longitudinal study regarding the neurobehavioural effects of perinatal exposure to methyl mercury, PCBs, and organochlorines.

Certain POPs, including PCBs, toxaphene, and chlordane are of concern as well: “levels of some POPs in Canadian Inuit populations are among the highest observed in the world, 5 to 8 times higher than women in southern Canada” (Furgal *et al.* 2003, 5). Those consuming the most country foods are exceeding the TDI levels by many times for toxaphene, chlordane, and PCBs. Inuit mothers have higher levels of PCBs, measured as Aroclor 1260, than Caucasians, Dene, Metis, and other mothers, with Baffin Inuit having the highest levels. Inuit populations that had the greatest levels of the TDIs also had greatly exceeded the PCB maternal blood guideline. Higher cord serum PCB concentrations were associated at birth with lower weight, smaller head circumference, and shorter gestation in a Michigan study (Jacobson *et al.*, 1990). Levels of PCB exposure two to three times higher than in Michigan are being studied in northern Quebec (Muckle *et al.* 2002): the negative effects of prenatal PCB exposure on birth weight and duration of pregnancy remained significant despite the protective effects of omega-3 fatty acids (Muckle *et al.* 2002). Exposure to PCBs was associated with less optimal newborn behavioural function (*e.g.*, reflexes, tonicity, and activity levels): adverse neurological effects of exposure to PCBs were found in infants up to eighteen months of age in a Netherlands study (Huisman *et al.* 1995).

There is solid evidence that mercury contamination has increased in Canadian Arctic animals from pre-industrial times to the present (CACAR 2003). Mercury levels in fish and wildlife, previously at high latitudes, are increasing in many species and locations important to the Inuit. Inuit peoples have high levels of contamination, close to consumption guidelines. While there are no guidelines or standards for human intake of contaminants in seals or other marine mammals, the consumption guidelines developed for fish for subsistence (0.2 µg/g) and for commercial sale (0.5 µg/g) are often surpassed in whale and seal organs. Mercury levels in beluga organs are high enough to damage the whales, if whales respond as other species (CACAR 2003). However, there may be a detoxification mechanism whereby whale organs store mercury in the less toxic form of mercury selenide. Mercury has increased four-fold in the past ten years in belugas from the Beaufort Sea and 2.5-fold western Hudson Bay, but not significantly at any other locations. For seals, the highest levels are from Qausittuq (Resolute, Nunavut) at 30 µg/g (Fisk *et al.* 2003) and have risen in many locations over the last twenty-five years, particularly three-fold in Mittimatalik (Pond Inlet, Nunavut) from 1976 to 2000. As walrus feed on ringed seals, as well as other foods high on the food chain, high concentrations of mercury are expected, although research on walrus is limited.

Populations of eider ducks have plummeted in the last few decades, and there are concerns about whether harvests are sustainable (Robertson and Gilchrist 1998). Though the rapid decline of eiders is attributed primarily to parasites, contaminants may be partly responsible, according to Robertson and Gilchrist (1998). High levels of cadmium and mercury are found in the liver and kidneys of eider ducks in Arctic and Subarctic areas (Wayland *et al.* 2001), possibly impacting the ducks’ immune system.

Across the Arctic, fish that eat other fish (*i.e.*, predatory fish) have higher levels of mercury than non-predatory fish, due to mercury biomagnifying up the food chain. Levels vary among different lakes and rivers, but burbot, trout, inconnu, lake trout, northern pike, walleye, and Arctic char were found above subsistence guidelines in at least one lake (Lockhart *et al.* 2003).

In the past, northerners were also exposed to radiocesium from the fallout of atmospheric testing of nuclear weapons, with higher exposures due to caribou meat consumption in the past. Even though doses have declined to an insignificant level now, past exposures warrant concern, as radionuclides cause intergenerational effects, as well as cancer. Doses to northern residents consuming a traditional diet of caribou and other country foods were high at 1,500 (bq/kg) in the 1960s, reducing to 110 in the 1980s before reaching insignificant levels (Tracy and Kramer 2000). The risk from continued consumption of caribou meat is very small (est. 3–4 mSv/year).

Another issue that Canadian Arctic peoples face is climate change and its effect on country foods, food security, and contamination. Over the past thirty-five years, temperatures increased by about 1°C per decade in the North, which

has resulted in permafrost thawing in many places (Cohen 1997). Ocean temperatures are predicted to change up to five degrees, which could lead to more precipitation, global erosion, and flooding that would result in greater amounts of contaminants making their way to the Arctic (Cohen 1997). Weather is both a key driver in the ecological dynamics of subsistence resources and in accessibility to harvesting areas.

All of these toxic impacts are made worse by Inuit having little control over development that affects them and little input into government policy, until recently.

Government Policies

The culture and subsistence activities of Inuit peoples have been challenged and influenced by interaction with European explorers, missionaries, whalers, traders, and government bureaucracy. The motive of outsiders, as described by Hugh Brody, was to enact change among the Inuit:

In the language of the missionary, the Eskimo must be 'saved'; in that of the administrator, he must be 'helped'; in that of most Whites, he must be 'civilized.' Each White justifies his own work by referring to the benefits, medical, moral, intellectual or material, that southern culture can give. (Brody 1975, 101)

For the most part, Inuit peoples were not consulted about the decisions made by outsiders that directly affected their lives (Brody 1975). Brody found that in 1975, Inuit peoples were expressing their desire to be consulted on issues that concerned them. Similarly, Tester and Kulchyski echoed that people should be allowed to "express their needs, define their problems, plan and institute action towards solutions" (1994, 301).

Perhaps the most profound effect of the newcomers was the decision of government administrators to relocate families to "securely establish Canada's title, occupation and administration" (Marcus 1995: 51) from the 1920s to the 1950s. For example, people were relocated to assert Canada's sovereignty to areas in the Queen Elizabeth Islands in Nunavut and Northwest Territories. Relocations were neither voluntary nor requested by Inuit peoples but were forced on community members. While police officers reported the Inuit to be happy and settled in their new homes, various Inuit peoples' stories are of hardship, struggling to find enough food, shelter, and warmth, relying on discarded materials and food at the local dump to support their needs (Marcus 1995). Relocation resulted in the loss of familiarity with the land and its resources. Relocated Inuit peoples had to make adaptations in diet and resource harvesting in order to survive. Sometimes, at the new location, the weather was too cold and wildlife too scarce, leading many people to request a return to more suitable areas. Some did leave the relocated settlements, while others never made it out of their place of exile.

Policy makers assumed that hunting and its associated ways of life would disappear as commercial production and wage employment became prevalent in northern and isolated areas (Murphy and Steward 1956). Migration from the traditional economy to the new economy was seen as the key vehicle for modernization and acculturation. As the notion of "development" came to dominate the purpose and objectives of government administration in the North, the measures of success, and of personal well-being, were those of the southern industrial model (NRTEE 2001). Early labour force surveys and environmental impact statements on northern resource developments used indicators entirely derived from an industrial economy that disregarded subsistence production or cultural survival entirely (NRTEE 2001).

The post-World War II period was one of rapid change in the Canadian North. Cold war defence activity and major resource developments, aided by both public and private investment in transport, energy, and town infrastructure, led to profound macroeconomic change (Usher *et al.* 2003). The wage economy is based largely on mining, oil, construction, and transport. The new resource and administrative towns are centres for economic growth, while the fur trade, which had been the economic mainstay of the small communities, is declining, leaving small communities in economic peril.

The development approach of industry and governments in Canada in the Arctic encourages large scale development projects (*e.g.*, exploitation of hydrocarbon reserves, mineral deposits), which have considerable negative environmental consequences and deplete non-renewable resources. For example, the Queen Elizabeth islands are underlain by oil-bearing rock and have been the subject of extensive drilling since the early 1960s. The government has provided large economic stimulus packages that offer incentives to large investors (NRTEE 2001). However, a focus on sustainability requires the government to shift from non-renewable resource development, jobs, and consumption to sustainable livelihoods. To ensure sustainable Aboriginal communities, a coordinated policy framework that addresses cumulative effects from local and long-range pollution and that prioritizes community life and subsistence activities is required. The most significant risks from non-renewable resource development in the future are likely to arise from the cumulative environmental, social, and cultural impacts of multiple exploration programs, mines, oil and gas facilities, and pipelines, along with the roads and other infrastructure required to support these projects (NRTEE 2001). Cumulative effects management, requiring assessment of the impacts of multiple projects and activities, including long-range pollution that may occur within a large geographical area over an extended period, was not previously carried out (NRTEE 2001).

Northern Arctic communities continue to be vulnerable to imposed Canadian government policies, which support the view of the Arctic as a source of potential wealth for outside development while ignoring the Arctic as the homeland of Aboriginal peoples. The resource-rich North represents to outsiders a potential source of jobs and economic wealth generated from development (Bone 1992). Lands



Ice-fishing through one-metre-thick ice in March. Lake near the Hudson Bay coast, north of Chisasibi, Quebec. Photo by Fikret Berkes.

and resources were developed for the “common good” without due consideration to local Inuit communities, who were regarded as “special interest groups” (Bone 1992). The frontier mentality of Canadian developers considers that northern lands and resources are not needed or will remain undeveloped or underdeveloped by Aboriginal peoples, in order to rationalize ignoring the environmental and health impacts on northern Aboriginal communities (Bone 1992). For the most part, developmental impacts that leave communities with physical and social illness are either regarded as part of the cost of development or as impacting a numerically and politically non-significant population segment (Bone 1992).

Many outside forces are weakening the fur trade and subsistence, including the anti-whaling, anti-sealing, and anti-trapping movements, as well as the government of Canada’s wildlife management (Freeman *et al.* 1998). These movements embody cultural imperialism and have led to policies and consumer movements that diminish the food supply and incomes of Inuit and other Indigenous peoples (Freeman *et al.* 1998). Establishment of protected areas and wildlife sanctuaries separate indigenous peoples from lands and resources they rely on for survival. Government policies and educational programming dismiss the cultural and nutritional significance of country foods in the urbanization and homogenization of cultures brought on by globalization (Freeman *et al.* 1998). Government management of resources imposes Western concepts and knowledge about animals as “stocks” and “wildlife” that are to be “managed” for “harvesting” (Freeman *et al.* 1998, 163) with hunting quotas, obliterating traditional Inuit concepts about the land and its resources. This policy undermines “dynamic, evolving, and effective systems of local management and the local knowledge that informs those systems” (Freeman *et al.* 1998, 164). For example, the federal

Department of Fisheries and Oceans failed to respect the rights of Inuit and the role of the Nunavut Wildlife Management Board with respect to the allocation of commercial turbot stocks off Baffin Island, forcing NITI to resort to litigation to obtain relief (NITI 1999).

To ensure meaningful Aboriginal involvement in the decisions that affect them, a devolution of authority over non-renewable resources from the federal government to territorial and Aboriginal governments has been recommended (NRTEE 2001). This should include Aboriginal peoples having direct decision-making authority concerning the availability of land for staking, rather than the current free entry system for mining that is enshrined in the *Canada Mining Regulations* (NRTEE 2001).

In government-Aboriginal relations, there is a growing trend of Aboriginal self-determination and involvement in decisions that affect them. The United Nations recognizes that Aboriginal peoples have an integral role to play in addressing any issue that affects their lands and peoples (UNEP 2002). Northern Aboriginal organizations struggled for participation in various inquiries and environmental impact assessments during the 1970s. They also lodged legal proceedings in respect of adverse effects of industrial development on their lands (NRTEE 2001). Since recognition of Aboriginal rights to land in the 1973 Calder case, Inuit peoples have successfully negotiated landmark agreements, signing three comprehensive land claim settlements (Nunavik, Inuvialuit, and Nunavut). The agreement for the largest land mass, the Nunavut Final Agreement and Articles, is a modern-day treaty, creating the territory of Nunavut on 1 April 1999.

The Inuit of Nunavut exchanged Aboriginal rights to all lands and waters for defined rights for 355,842 square kilometres of Nunavut, of which about 10 per cent includes mineral rights. Putting these facts in perspective, Nunavut covers more than two million square kilometres and has a majority population of Inuit peoples who have fee simple title ownership to 18 per cent of the total surface rights (317,972 square kilometres) and both surface and subsurface rights to a mere 37,870 (Peters 1999). The remainder is Crown land, where Inuit have unrestricted harvesting rights (Peters 1999) and development companies have unrestricted mineral rights (NRTEE 2001), although both are subject to government regulation. The basic principles of free entry, characterized as guaranteeing a “right to mine,” under the *Canada Mining Regulations* exist, except where subsurface minerals are owned by Aboriginal people. With non-Aboriginal-directed development options available for the vast majority of the land, cultural survival and subsistence activities of Aboriginals are vulnerable (NRTEE 2001).

In contrast to the federal government focus on non-renewable resource megaprojects, the Nunavut Land Claims Agreement clearly states as its priorities conservation and subsistence use before commercial use. Inuit Tapiriit Kanatami (2002) describes the role Inuit will play in the next phase of economic and political development throughout the Canadian North:

We cannot, however, assume that this new role [in economic and political development] will be developed at the expense of more traditional activities which characterize our mixed subsistence based economies that are so vital for the long term economic and social health of our communities.

Inuit communities have taken a very different approach to economic development than industry and governments in Canada. With a focus on community and the local level, almost every Inuit community has a marketing co-operative for Inuit carving and print making, and one in seven people consider themselves to be artists (Inuit Tapiriit Kanatami 2004). This is a lucrative activity without a large ecological footprint. As well, to support sustainable development a modest hunter support program has begun in Nunavut. This makes it economically viable for those wanting to pursue a hunting way of life to do so and, by doing so, contribute to the overall well-being of their communities and extended families (NRTEE 2001). NRTEE's consultations suggest widespread agreement among Aboriginal peoples and other northerners that significant powers, along with sufficient money to exercise them effectively, should be transferred from the federal government, based in Ottawa.

There have been a number of positive developments in Nunavut. Noteworthy have been: the establishment and operation of the Nunavut Wildlife Management Board; the harmonization of the bylaws of regional and wildlife organizations and hunters and trappers associations; the expansion of commercial fishing ventures in Nunavut; the revival of the bowhead whale hunt; and the beginning of a modest hunter support program. Recently, the National Contaminants Program and the formation of Canadian Arctic Peoples Against POPS (CAIPAP) have provided vehicles for Arctic people to have some input into environmental research, programs, and regulation that affect them.

CONCLUSION

Changes in the ecosystem, through chemical contamination, resource depletion, and ill-conceived government regulation jeopardize the food security of people in Inuit communities dependent, nutritionally and culturally, on wildlife harvested by hunting, fishing, and trapping. A look at food security of Inuit peoples, focusing on Nunavut, shows the toxic role of outside forces undermining sustainability through cultural imperialism and long-range pollution. The impact of environmental change on food security in the North on Aboriginal people is of heightened importance due to (1) widespread poverty, (2) contamination causing toxic impacts, and (3) government policies restricting access to land and resources. Northern communities, with their isolation, poverty, and limited infrastructure, have a vital need for country foods for food security. Discussing vulnerability only in the positive terms of resilience and capacity places the onus on Aboriginal people to absorb and counteract negative

environmental impacts caused by the industrial economy, rather than targeting the source of the problems to demand change.

This review of food security and vulnerability generated the following recommendations:

- 1 To ensure sustainable Aboriginal communities, a coordinated policy framework should address cumulative effects from local and long-range pollution, prioritizing culture, food security, community life, and subsistence activities. The need to follow the recommendation of the International Joint Commission to ban toxic, persistent chemicals is evident from human and animal contamination in Nunavut.
- 2 To support sustainable development the federal government should support Inuit community economic development (e.g., carving and print-making co-operatives, hunter support program) with a focus on sustainable livelihoods, rather than megaprojects that deplete non-renewable resources.
- 3 To ensure meaningful Aboriginal involvement in the decisions that affect them, a devolution of authority over non-renewable resources from the federal government to Nunavut, including sufficient money to exercise them effectively, should occur.
- 4 To reduce vulnerability of Arctic Aboriginal communities due to limited infrastructure not meeting basic needs, the federal government should set aside a block of funding to be used as a minimum threshold allocation. Basic human rights include the right to food, shelter, and safe drinking water. Infrastructure development, upgrading of water treatment facilities, and increased training in many communities, as well as efforts in local communities to improve sanitation and decrease contamination, are required to protect Inuit communities from water-borne health hazards.
- 5 To strengthen culture, a pro-indigenous education system is required that teaches Inuktitut and traditional ecological knowledge. Traditional knowledge shared by elders and others should be included in school curricula, in field trips to harvest and trap, in textbooks, and in government decision-making. Presently, the formal school system reinforces the devaluation of local knowledge systems, resulting in the loss of the intergenerational transmission and the erosion of such knowledge.

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