

The political ecology of health: perceptions of environment, economy, health and well-being among ‘Namgis First Nation

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Accepted 30 April 2004

Abstract

Informed by Mayer's (Progr. Hum. Geogr 20 (1996) 441) political ecology of disease framework, this paper investigates First Nation's perceptions of the links between environment, economy and health and well-being. A case study of 'Namgis First Nation (Alert Bay, British Columbia, Canada) is used to explore the risks and benefits of salmon aquaculture for British Columbia's First Nations. Analysis of interview data ($n=23$) indicates strong links between reduced access to environmental resources, marginal participation in the economy, and declining community health and well being. Results suggest that aquaculture development has further decreased the community's access to environmental resources, thereby restricting those economic, social, and cultural activities that determine good health and well-being for this community.

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Keywords: Political ecology of health; First Nations; Aquaculture; Health and environment; Community economic development

Introduction

In the years following the release of the report of the Royal Commission on Aboriginal Peoples (1996), First Nation's health and well-being have become a central focus for Canadian health researchers. Much of this research has served to underscore systemic health inequities between Aboriginal and non-Aboriginal populations (Young et al., 2000; MacMillan et al., 1996) as well as illustrate the links between Aboriginal health and environmental health (Canada, 1999; Wheatley and Wheatley, 2000; Hutchinson and Wallace, 1977; Wheatley et al., 1979; Rode and Shephard, 1994) shifting lifestyles and behaviours (e.g., addictions,

homelessness, accidents and violence) (Thouez et al., 1989; York, 1989; Canada, 1996), and access to health care (Newbold, 1998). However, there have been relatively few studies that explore the broader determinants of First Nations' health (Wilson, 2003; Benoit et al., 2002; Wilson and Rosenberg, 2002; Adelsen, 2000; Warry, 1998). That is, little examination has been made of the effects of the social, environmental, cultural, economic or political processes that have simultaneously shaped health conditions among First Nations (Waldram et al., 1995).

Situated within a health geography perspective, this research employs Mayer's (1996) political ecology of disease framework, a structural approach that attempts to connect large-scale political, social and economic processes to local health and well-being. More specifically, this research investigates the perceived effects on

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health and well-being of a single community as it resists a particular form of environmental resource development: salmon aquaculture. Through a case study of 'Namgis First Nation, this research addresses two objectives: (i) to investigate First Nations' perceptions of the links between environment, economy and health and well-being; and, (ii) to understand First Nations' perceptions of the risks and benefits associated with aquaculture.

This research forms one component of AquaNet, the Network of Centres of Excellence (NCE) for aquaculture in Canada. In conjunction with approximately 100 network institutes, industry affiliates and government partners, AquaNet currently supports 41 research projects across Canada, organized around three distinct themes: (i) animal production, (ii) environmental integrity, and (iii) social and economic aspects. The overall goal of AquaNet is to provide research in the natural, applied and social sciences capable of supporting an aquaculture industry that is productive, environmentally sound and acceptable within the context of social, cultural and political values of Canadian society. As part of the social and economic aspects theme, this research explores First Nation's involvement in aquaculture in British Columbia.

The remainder of the paper is organized into six sections. The following details the growth of aquaculture, followed by a review of the risks posed by the industry: environmental, human health, and control/ownership of natural resources. Herein, aquaculture is framed within its political context. In the next section, the research is situated within a 'political ecology of health' framework. Following this, a brief research context is provided, including Canada's colonial legacy and the impending consequences for the health and well-being of Canada's Aboriginal population. This section characterizes the study community with respect to place, population, economy, and health and well-being. The subsequent Section describes the study design and methods of this research, and the section thereafter outlines the results. Discussion and conclusions are provided in the final section of this paper, as well as directions for future research.

The political ecology of aquaculture

Over the past three decades, aquaculture has become the fastest growing food production sector in the world. 'The cultivation and harvesting (farming) of finfish, shellfish and aquatic plants,' (CAIA, 2002) aquaculture's potential contribution to global/local food securities and livelihoods can and has been significant, particularly in remote and resource poor areas (Jia et al., 2001). Since 1984, aquaculture's global production has increased from 10 to 38 million tonnes in 1998 (FAO, 2000), and is

on pace to surpass beef production by 2010 (Tidwell and Allan, 2001). Aquaculture has similarly become one of Canada's fastest growing economic sectors; combined, Eastern and Western Canada contribute an estimated 7 percent of cultured salmon globally (British Columbia, 1997), making Canada the world's fourth largest producer. In 2002, British Columbia's farmed salmon exports were worth a reported \$391 million, while wild salmon exports were worth significantly less at only \$129 million (Gardener and Peterson, 2003). Indeed, aquaculture provides a source of economic restructuring for the province as it faces decline in the commercial fishery, and other important natural resource industries (e.g. timber and mining; McKenzie, 2002).

Since the late 1980s British Columbia's aquaculture industry has become increasingly industrialized and global in nature. In 1988, 101 companies controlled the province's aquaculture industry. By 1996, this number was reduced to only 16, with the six largest companies—many of which are large multi-nationals headquartered off shore—accounting for 70% of ownership (British Columbia, 1997). In light of pressures to expand this fast growing industry, the provincial government placed a cap on marine salmon farm tenures of 121 in 1995 (British Columbia, 2002). Concerning the potential environmental risks and gaps in the scientific knowledge surrounding the industry, the aquaculture debate has been a feature of British Columbia since the mid-1980s (Gardner and Peterson, 2003). The risks associated with aquaculture can be organized around three themes: environmental risks, risks to human-health and well-being, and finally, risk to control/ownership of natural resources. Environmental risks result from the high density, open-ocean structure of salmon net-pens that increase the potential for disease outbreaks (e.g., infectious salmon anemia, bacterial kidney disease; McKenzie, 2002; Nash et al., 2000) not only within stocks of farmed Atlantic salmon, but between stocks of farmed and wild salmon. Spread of sea-lice from farmed to wild salmon stocks is also a risk to the health of wild species. Escapees, recovered in both saltwater fisheries and in coastal rivers and streams (Thomson and McKinnel, 1997; Thomson and Candy, 1998), may result in 'biologic pollution' (Naylor et al., 2000, p. 1021) should they breed with wild salmon. Biologic pollution is the term used to describe the potential effects of introduced aquaculture species on natural populations, particularly in the context of salmon (Naylor et al., 2000). The risk presented by biologic pollution, and its effects on the natural ecosystem are not clear, however they include the establishment of feral populations, hybridization with Pacific salmon, and competition during spawning and juvenile phases (Noakes et al., 2000). Beneath and surrounding net pen aquaculture sites, untreated water laden with uneaten food and fish feces presents a risk to

the marine ecosystem (Sutherland et al., 2001), as do pollutants associated with the industry (i.e., heavy metals such as copper and zinc, pharmaceuticals, pesticides; Nash et al., 2000).

The majority of (perceived) human health risks result from the consumption of cultured fish. More specifically, the concern stems from: heavy metal contamination of farmed products¹, genetically modified (GMO) ingredients used in fish feeds (Easton et al., 2002); rendered animal products in fish feed; residual medicines and drugs in farmed products; pigments used in feed (Fairgrieve and Rust, 2003); biological hazards in farm products and transgenic fish farms (Nash et al., 2000); the threat of contamination by persistent organic pollutants (POP's) and polychlorinated biphenyls (PCB's) (Easton et al., 2002); and finally, the risk of the potential biological hazards, parasites, bacterial infections, viral infections, or naturally produced toxins (Fairgrieve and Rust, 2003). While the risks that these varying sources present to human health are indeed biologically plausible, the literature outlining direct human health impacts resulting from consumption of aquacultured fish is as yet uncertain. Nonetheless, populations who live in and around aquaculture sites remain concerned. Populations whose dietary practices favour a high intake of fish protein are naturally concerned about these issues, and First Nations, historically so dependent on wild salmon are especially anxious. They may choose not to consume farmed fish, but they see themselves at risk of many kinds of diseases and poisoning from the harmful effects of aquaculture on the wild stocks.

Aquaculture is not only a technical issue; it is also a social one, influenced by structural forces (Bailey et al., 1996). Through this, the power of social groups interested in aquaculture production (or those contesting it) comes to be reflected in its organization. Therefore, aquaculture development is a political process in which governments clearly have an important part to play (Bailey et al., 1996). Fisheries management systems determine, allocate and regulate access to and participation in fisheries through devices such as license and quotas (Davis and Jentoft, 2001). Similarly, aquaculture development treats access and participation in the industry as regulated privileges, defined and allocated by the state, primarily to industrial interests. The history of both fisheries and aquaculture development suggests that governments have often refrained from making the decisions that would benefit those living on the margin (Bailey et al., 1996). And in fact, the lack of effective public participation in aquaculture development is a complaint heard with increasing

frequency in British Columbia, particularly among small, isolated communities. In late 1995, the provincial Environmental Assessment Office (British Columbia, 1997) undertook a Salmon Aquaculture Review (SAR) to investigate the potential environmental and social risks of the industry. Consequently, the SAR made 49 recommendations to reduce risks of the aquaculture industry. These recommendations focused generally on issues that harmed the health of British Columbia's natural ecosystem (e.g. the escape of farmed fish) and social environments (e.g. lack of community consultation in siting practices). Specifically, the SAR revealed conflicting interests and values in areas where shellfish and salmon aquaculture were developing (British Columbia, 1997). So-called 'upland' property owners objected to the visual intrusion of commercial shellfish operations with their lines of floats strung across a bay, or to the noise and activity introduced into an area whose earlier peace was its attraction. Recreational and commercial boaters were concerned about hazards or limitations to navigation, tourist operations of many kinds claimed that aquacultural activities compromised their efforts to encourage coastal tourism (British Columbia, 1997). In 2001 the environmental group, the David Suzuki Foundation funded the Leggatt Inquiry, a series of public hearings convened by a former British Columbia Appeal court judge, to explore the environmental impact of aquaculture. Both the SAR and the Leggatt Inquiry revealed public frustration at what was seen as the failure of government and industry to conduct serious consultations and to accommodate interests other than those of the aquaculture industry. The Leggatt Inquiry gave particular prominence to the voices of First Nations whose traditional fishing and shellfish gathering activities and rights to marine resources, it was claimed, were being destroyed, denied or restricted by the growth of aquaculture. With Aboriginal land claims covering the entire province, the failure to consult First Nations or acknowledge their rights to harvest aquatic resources was an accusation that reverberated widely.

A political ecology of health

In attempting to understand the structural processes that underlie the complex relationship between health, environment and economy (i.e., those of politicized environments; Bryant, 1998) this research employs Mayer's (1996) political ecology of disease framework. This framework provides an effective theoretical merger of population health and political ecology. While the population health literature provides a broad definition of the determinants of health, it provides a limited means for understanding the socio-political dimension underpinning health inequalities (Corin, 1994; Young,

¹E.g. contamination from nearby industrial and municipal waste discharge, anti-fouling paints and various organic pesticides, herbicides and hydrocarbons.

1998; Poland et al., 1998; Hayes, 1999). Conversely, political ecology identifies the dimensions of a politicized environment and focuses explicitly on the role of power relations as a source of environmental debate (Peet and Watts, 1996; Moore, 1996; Bryant and Bailey, 1997; Bryant, 1998; McCarthy, 2002), yet seldom addresses how the health of populations is affected (Mayer, 1996, 2000). Mayer's (1996) framework extends the growing discourse on the political ecologies of health through the exploration of large-scale social, economic and political influences that shape local context.

Although thin, this literature includes an interesting range of examples, focussed primarily on third world countries. Hughes and Hunter (1970) were among the first to explore the relationship between large-scale development in Africa, and the transmission and propagation of diseases such as malaria and schistosomiasis. Through her work on the political ecology of disease in Tanzania, Turshen (1984) considered the implications of political structures on health and disease. In this work, she demonstrated how the forces of colonialism and labour migration detrimentally impacted the health of residents of two districts of Tanzania. Kalipeni and Oppong (1998) examined how the political ecologic circumstances underlying the refugee crisis in Africa influence health service delivery and the problems of disease and health in refugee camps. Echoing Turshen (1984), Kalipeni and Oppong (1998) discussed the centrality of human agency and structure to health and disease. Similarly, through his work in Mozambique, Collins (2002) concluded that studies of disease ecologies in changing landscapes and places require ongoing interpretation of a web of causation. That is, health must be considered as more than the consequence of biology and the physical environment; social and political processes also must be given due consideration. More recently, Hunter (2003) has explored the long-term community health consequences of an agricultural development project implemented in the late 1950s in Ghana's Upper Region. Despite the economic and nutritional benefits of the development, an explosion of genito-urinary pathology has occurred in the years following, and the rate of urinary schistosomiasis has increased three-fold. Hunter (2003) argues that the unexpected and unpredictable disease outbreaks that result from large-scale development are not the result of lacking knowledge of parasitic disease. Rather, he states that these problems emerge as a result of failure to coordinate knowledge, and its application to ecological and environmental problems (Hunter, 2003).

This paper seeks to explore the relationship between the macro-dimensions of political economy (increasing globalization of aquaculture development) and the micro-conditions of specific contexts (communities immersed in economic restructuring as a result of a

declining resource based industry). While much important work has been done on the political ecology of health, its primary focus and application has been among third world as opposed to first world countries. This research attempts to fill this gap in the literature by highlighting the relevance of the political ecology of disease framework for understanding the relative impact on the health and well-being of marginalized communities in first world countries as they encounter large-scale development projects. McCarthy (2002) claims the tools of political ecology to be particularly relevant to the study of First World resource conflicts. He argues that many assumptions regarding state capacity, individual and collective identities and motivations, and economic and historical relations in advanced capital countries are often incomplete, thereby leading to the neglect of important dimensions of environmental conflicts in such locales. Nesbitt and Weiner (2001) contend that material-discursive struggles over the meaning and use of environmental resources should not be viewed as relevant only in settings outside of the core (i.e. the Third World). Rather, they argue that the theoretical constructs and methodological framework of 'third world' political ecology are equally applicable to peripheral regions within advanced capitalist economies (Nesbitt and Weiner, 2001), for instance marginalized populations of the First World such as First Nations communities. This research seeks to apply these frameworks in a first world context, among a community experiencing a substantial environmental resource issue, that of salmon aquaculture development.

Research context

Defined under s.35 of the *Constitution Act* (1982) to include Indians, Inuit and Métis, Canada's Aboriginal population constitutes 4 percent of the nation's population, at approximately 1,300,000 (Canada, 2001). Of this population, registered and non-registered Indians (hereafter referred to as First Nations) are characterized as the youngest and fastest growing segment of the Canadian population, with a current populace of 640,000 (Assembly of First Nations, 2003); by 2010, this number is expected to increase to 822,200. Approximately 58% of First Nations live on reserves. Through historical circumstance and geographic location, many Aboriginal communities have experienced the full force of the government's assimilationist policies (e.g., the Indian Act, residential schools, disenfranchisement), many of which have left Canada's Aboriginal peoples with inadequate access to natural resources, capital, or education. These historical and contemporary injustices have been well documented in the Canadian literature (Frideres, 1993; Dickason, 1992; York, 1989; Miller, 1989). Resulting from the socio-political

marginalization enforced through Canada's colonial legacy, Canada's Aboriginal people continue to cope with a standard of living far below that of their non-Aboriginal counterparts; this is so regardless of the metric used (i.e. health; education; employment levels; income).

Aboriginal peoples today experience the kinds of health problems most closely associated with poverty, and also suffer from problems linked to a marginal position within the Canadian social system (Waldram et al., 1995). Stark differences exist in both life expectancy and rates of infant mortality between Aboriginal and non-Aboriginal populations in Canada. In 1990, the life expectancy of male and female Registered Indians was 66.9 and 74.0 years respectively; for the total male and female Canadian population, life expectancy was 73.9 and 80.5 years (Canada, 1996). Infant mortality rates averaged for the years 1986–1990 were 13.8 per 1000 live births among Indian infants, 16.3 per 1000 among Inuit infants, and 7.3 per 1000 among all Canadian infants (MacMillan et al., 1996). As with many other populations in the world, Canada's Aboriginal population have undergone an "epidemiologic transition," characterized by the precipitous decline in the incidence of infectious diseases, followed by the rise of chronic, non-communicable diseases, accidents and violence (Young, 1994). The most significant of these chronic, long-term diseases is diabetes (Young et al., 2000). For example, using data from the Canadian Mortality Database, Mao et al. (1992) identified a greater than five-fold risk of death from diabetes among women residing on reserves, compared to non-Aboriginal Canadians. While increased surveillance and new health initiatives have contributed to the dramatic decline in many infectious diseases since the Second World War (Waldram et al., 1995), they have not ceased to exist among the Aboriginal population. Rather, this population is still exposed to high rates of infectious diseases such as meningitis, hepatitis, pneumonia, sexually transmitted diseases (Young, 1994), and more recently, HIV/AIDS (Wood et al., 2000).

In 1990, 28% of all Aboriginal people (greater than 15 years old) relied on social assistance for at least part of the year; this is markedly disproportionate to the Canadian average of only 8.1% (Canada, 1991). Further, the unemployment rate among the Aboriginal population was 19.4%, twice that of the general population of Canada (Miller and Vodden, 2001). The Department of Indian and Northern Development (DIAND) reported rates of on-reserve unemployment even higher at 31% (DIAND, 1997). These statistics provide disturbing evidence of a distinct social gradient between Aboriginal and non-Aboriginal Canadians that indicates disproportionately low participation in the workforce, persistence of poverty, and reliance on welfare. It has been suggested that this relationship is

linked not only to marginal socio-economic status, but is the direct result of long-term oppression, systemic racism, and discrimination (Canada, 1996b; Warry, 1998), as well as unequal access to resources such as education and training, social and health care facilities, and most importantly, control over lands and environmental resources (Peters, 1996; Scott, 2001).

Long standing opponents to aquaculture development in their traditional territory, 'Namgis First Nation² are members of the Kwakiutl tribe. The political jurisdiction of 'Namgis First Nation is defined by the Indian reserves of Alert Bay 1 and Alert Bay 1A, by which the population is legally enumerated (Canada, 1996a). Both reserves are located on Cormorant Island, in the Broughton Archipelago, just north of Johnstone Strait (Fig. 1), wherein more than 20 salmon farms have been sited in the past three decades (Fig. 2). Only four square kilometers in area, Cormorant Island is also home to the Whe-la-la-u Area Council and the village of Alert Bay. As a percentage of Cormorant Island's tiny landmass, 'Namgis First Nation occupies roughly 30%, and the village of Alert Bay occupies the remaining 70% (Namgis, 2001). In 1996, 'Namgis First Nation had a total population of 1413 members; of this total population, 743 lived on reserve and 670 lived off-reserve (Canada, 1996a). 'Namgis First Nation is a young and quickly growing population; 60% of the 'Namgis population is less than 45 years of age, and approximately 23% of the total population is less than 14 years of age.

Not unlike the meagre economic conditions that typify First Nation communities nation-wide, 'Namgis First Nation experiences poor labour force participation and high rates of unemployment. Compared with British Columbia's unemployment rate at 9.6%, Alert Bay 1A's unemployment rate is 35.9%, and Alert Bay 1's unemployment rate is 40% (Canada, 1996a). Moreover, median total income earned by residents of Alert Bay 1A³ is nearly \$10,000 less than the provincial average of \$19,982. As the 'salmon people' (Cranmer, 1998), coastal First Nation communities have historically been an important source of labour for the commercial fishery and cannery industries (Fisher, 1977; Newell, 1993). With a cannery at Alert Bay, 'Namgis First Nation played an active role in the commercial fishery until fisheries regulations⁴ reduced their participation in

²Namgis First Nation is a member of the Musgamagw Tswatainuk Territorial Council (MTTC).

³Because Alert Bay 1 has a population less than 250, its income data has not been released by Statistics Canada.

⁴In 1968, British Columbia regulators attempted to revitalize the province's commercial fishery through a fleet rationalization plan called the 'Davis Plan.' Named after then British Columbia's Minister of Fisheries, Jack Davis, non-productive boats were retired from the fleet. License stacking (the purchase

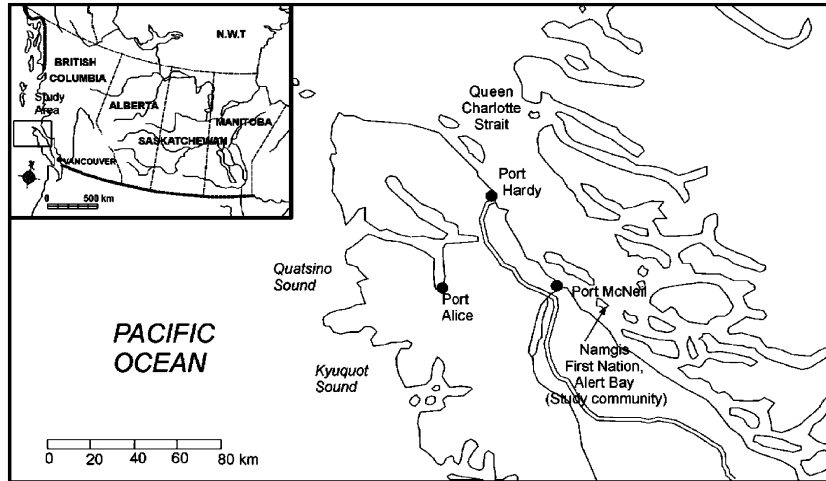


Fig. 1. Namgis First Nation (Alert Bay, British Columbia).

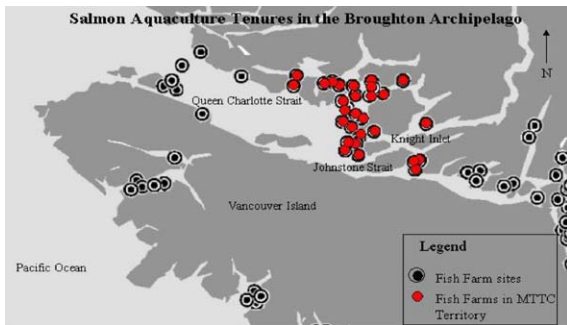


Fig. 2. Salmon aquaculture tenures in the broughton archipelago.

the 1990s. In the years following, the distribution and characterization of the community's labour-force has undergone significant change, with government services

(footnote continued)

of additional licenses) meant that industrial pressure on the resource was never actually reduced, however. Rather than revitalizing the fishery, the Davis Plan instead devastated coastal communities thereby magnifying the socio-economic and environmental problems that had initially prompted the Davis Plan. The Mifflin Plan was another fleet rationalization implemented through a voluntary retirement of licenses. The impact, particularly in some of the native communities, has been devastating with fleets reduced from more than a hundred boats in some instances to fewer than ten. A substantial concentration of ownership has occurred, and with that, the 'migration' of boats and licenses from the poorer, more heavily aboriginal settlements on the north and central coast, to the affluent, urbanized areas of the Lower Mainland and Southern Vancouver Island.

(i.e., Band administration⁵) now the primary employer (Canada, 1996a).

The health and well-being of First Nations is broadly defined and shaped by social, cultural and political processes (Waldram et al., 1995; Warry, 1998; Wilson and Rosenberg 2002), that may form norms or institutions by which the population is organized. Related to this is control over and access to environmental resources. For instance, the potlatch (i.e., the recognition of social status though commodity exchange) formed the institution through which Kwakiutl social structure was most vividly displayed, reinforced and modified (Drucker and Heizer, 1967; Weinstein, 2000). The potlatch maintained an effective management of human and environmental resources, acting as a fully integrated monitoring and public accountability system (Weinstein, 2000). As colonization of North America ensued however, First Nation's traditional use and enjoyment of environmental resources was inconsistent with colonial forms of development, thereby causing numerous conflicts (Fisher, 1977; Newell, 1993). In 1871, the federal government assumed direct control and responsibility over First Nations. Section 91(24) of the *Constitution Act* (1876) gave Ottawa legislative jurisdiction in relation to "Indians and lands reserved for Indians" (McKee, 1996) and it was at this time that the *Indian Act* was established with the fundamental goal of 'civilizing the Indians' (Miller, 2000). As a result, the ability of First Nations to participate in such cultural institutions was much reduced, and later, prohibited by law. As the colonial process continues to unfold in

⁵The term 'Band' is a legal term that recognizes Aboriginal interest in the land (Canada, 2000), and is the means through which First Nations communities are governed and organized.

Canada, First Nations remain wards of the Federal government under the *Indian Act*. This political marginalization and varying other political and economic structures have significantly reduced First Nations' use and enjoyment of environmental resources, thereby inducing a shift in environmental resource use from the principle of sustainability (e.g., as in the potlatch) to one of competitive resource use. This has mutually impacted on the physical, social and cultural fabric of First Nations' health and well-being. These structural forces have had a considerable impact on every day life in 'Namgis First Nation. These are discussed below in the context of environment, economy and health and well being.

Study design and methods

Qualitative research methods were employed within a case-study of 'Namgis First Nation. 'Namgis First Nation was selected as the study community because of its long-standing 'no tolerance' policy for aquaculture. Entrance to the community was facilitated through pre-existing ties established by earlier AquaNet investigators. nineteen in-depth interviews (11 women, 8 men) were conducted among community members of 'Namgis First Nation in the summer of 2002. Varying in age from 25 to 72, the sample included both employed ($n=15$) and unemployed ($n=4$) members of the community. All but three employed respondents worked for 'Namgis First Nation. All unemployed respondents were displaced fishermen and none of the respondents had ever gained employment from or been involved in aquaculture. In order to situate the community interviews within a larger economic, political and environmental context, key informant interviews ($n=4$) were conducted (October, 2002) with organizations representing various positions on First Nations involvement in aquaculture in British Columbia. Organizations represented included the Department of Fisheries and Oceans (DFO), the Living Oceans Society (LOS), the Canadian Aquaculture Industry Alliance (CAIA, 2003), and the British Columbia Aboriginal Fisheries Commission (BCAFC).

All interviews were tape-recorded (with permission) and transcribed verbatim. Once in electronic format, the interviews were uploaded to N.VIVO, a qualitative data analysis program. This allowed more efficient management of the data and consistent application of the theme code set established by the researcher to describe the phenomena explored by the interviews (e.g., descriptions of use and enjoyment of the environment, changing environmental conditions, and so on). These codes captured themes contained in specific text segments (Bernard, 1994; Gorden, 1992; Miles and Huberman, 1994). The results are organized around the two research

Table 1
Determinants of poor health

Descriptors (unhealthy)	# of mentions (%)	# of respondents mentioning ($n=19$) (%)
<i>Political Power</i>		
Colonialism	72 (43) ^a	15 (79) ^b
<i>Environment/Economy</i>		
Desolate economy	27 (16)	15 (79)
Resource depletion	17 (10)	11 (58)
Environmental degradation	8 (5)	6 (32)
<i>Social-cultural</i>		
Addictions	19 (11)	13 (68)
Food consumption	12 (7)	9 (47)
Boredom	5 (3)	5 (26)
Low levels of education	2 (1)	2 (11)
<i>Disease</i>		
Chronic disease	6 (4)	6 (32)
TOTAL	168	

^aPresents number of mentions of variable, and percentage of total mentions.

^bPresents number of respondents mentioning variable from total sample (also as a percentage).

objectives: (i) to investigate First Nations' perceptions of the links between environment, economy and health and well-being; and, (ii) to understand First Nations' perceptions of the risks and benefits associated with aquaculture. Quantitative counts of key themes are punctuated by quotations from the interview respondents. These counts, presented in Tables 1–4, allow a media through which emergent themes may be compared and contrasted among respondents and/or between separate case studies

Results

Links between environment, economy and health

Community respondents generally perceived the health of their community to be poor as a result of four primary determinants: political power, economy/environmental links, social behaviour and disease. These determinants are listed in Table 1.

Most community respondents indicated that the community suffers poor health as a result of the process of colonialism, which has resulted in lacking control over and participation in government decisions that affect them as First Nations:

If you think about every aspect of how it is to be a Native person today, it's never about sitting with

Table 2
Environmental change: impact on use and enjoyment

Descriptors of environmental change	# of mentions (%)	# of respondents mentioning (n = 19) (%)
<i>Environmental degradation</i>		
Salmon farms	33 (19) ^a	15 (79)
Over-fishing	13 (7)	13 (68) ^b
Sport fishery	12 (7)	11 (58)
Forestry operations	10 (6)	7 (37)
<i>Resource depletion</i>		
Polluted waters	15 (8)	7 (37)
Forests reduced	16 (9)	9 (47)
Depleted fishery	27 (15)	12 (63)
<i>Reduced access</i>		
Little access to resources	18 (10)	11 (58)
Political regulation	18 (10)	9 (47)
Traditional activities limited	13 (7)	8 (42)
TOTAL	175	

^aPresents number of mentions of variable, and percentage of total mentions.

^bPresents number of respondents mentioning variable from total sample (also as a percentage).

someone before a decision is made about us. It's always that the decision has been made and now we will send up our little window dressing review committee to talk to your community and make it seem like you are having a voice, but really, you aren't (*Dana*⁶).

Respondents explained that the process of colonialism has actively marginalized their community from the resources of their traditional territory:

We come from the [Nimipkish] Valley... Our people camped in the valley and we were just placed here. This island... It is a reserve. All of the villages came here when the residential school came here. The purpose for all of us coming here and being here, was to take everything that we naturally had, away (*Craig*).

Respondents identified explicit, dependent relationships between environmental resource use, economic choice and opportunity, and outcomes for health and well-being. Seventy-four percent of the community sample reported traditional activities as their main use of the environment, (e.g., gathering of foods and medicines, hunting, trapping and fishing, and the collection of bark and other materials for ceremonial

⁶In all cases, pseudonyms have been used to protect the identity of individual respondents.

Table 3
Determinants of a healthy community

Descriptors of a healthy community	# of mentions (%)	# of respondents mentioning (n = 19) (%)
<i>Political power</i>		
Autonomy	19 (15) ^a	13 (68) ^b
<i>Environment-economy</i>		
Economic viability	21 (17)	13 (68)
Healthy environment	19 (15)	12 (63)
<i>Social-cultural</i>		
Community cohesion	19 (15)	11 (58)
Culture	18 (14)	11 (58)
Empowerment	16 (13)	11 (58)
Strong families	10 (8)	9 (47)
Physical exercise	3 (2)	3 (16)
TOTAL	125	

^aPresents number of mentions of variable, and percentage of total mentions.

^bPresents number of respondents mentioning variable from total sample (also as a percentage).

purposes). Respondents described their ability to use the environment for traditional activities, as central to their native way of life:

The way our people talk, the woods, bushes, mountains, land – those are basically our cupboards, right. Whatever we need, we get out of it, just like our cupboards at home. That is where we keep our food and stuff. Whatever we need is in the woods, right? The seas are our refrigerator. So, if I want to get fish any time of the year, I can go get it. Fish are always in stock... If you listen to the old people talk about legends and stuff, basically all the mountains and rivers and stuff are people in the family... It is part of us (*Corey*).

However, community respondents reported a significant change in the way they are able to use and enjoy environmental resources. This change is a consequence of three key features of environmental change: environmental degradation, resource depletion, and reduced access to natural resources. This environmental change, and its impact on the community's ability to use and enjoy their surrounding environmental resources, is illustrated in Table 2.

Respondents defined reduced *access* to environmental resources in terms of three main features: increased government control (e.g., fisheries regulations), decreased physical access to resources (e.g., as fishing

Table 4
Risks of Aquaculture

Risks of aquaculture	# of mentions (%)	# of respondents mentioning (n = 19) (%)
<i>Environmental change</i>		
Threats to wild species	20 (36) ^a	14 (74) ^b
Contamination of benthic environment	18 (33)	14 (74)
Disease of wild stocks	8 (13)	8 (42)
Limits use of Environment	5 (9)	5 (26)
Drugs spread to natural environment	4 (7)	4 (21)
<i>Economic opportunity</i>		
No economic benefits for us	13 (36)	10 (53)
Industrial-scale operation	9 (25)	9 (47)
At what expense?	8 (22)	7 (37)
Greed rules	6 (15)	5 (26)
<i>Human health and well-being</i>		
Uncertainties for physical health (i.e., GMO, PCB's, POP's)	10 (48)	8 (42)
<i>Modify traditional</i>		
Activities	6 (29)	5 (26)
Contaminates traditional foods (i.e., clam beds)	5 (23)	4 (21)
<i>Process concerns</i>		
Not our decisions	42 (48)	16 (84)
Manipulation	19 (22)	10 (53)
Corporate control	7 (8)	6 (32)
Government control	7 (8)	6 (32)
Disrupt treaty	6 (7)	2 (11)
Social problems	3 (3)	3 (16)
TOTAL	198	

^aPresents number of mentions of variable, and percentage of total mentions.

^bPresents number of respondents mentioning variable from total sample (also as a percentage).

areas are reduced), and limitations on traditional activities (e.g., inability to carry out the food fishery⁷):

We are limited in what we can gather...we now need licenses to gather. Now, because of the impact of other such things as fish farms and other types of natural resources that have been taken from our

⁷The Aboriginal right to fish for food has been given constitutional protection under s. 35(1). In *R v. Sparrow*, the Supreme Court of Canada held that the right to fish for food pre-existed the enactment of the British Columbia Fisheries Act, which sought to significantly limit this right, and affirmed the Musqueam Indian Band's right to fish food, social and ceremonial purposes.

land, we are restricted as to how much we can take and when... we get one bag of clams...two crabs a day...prawns, we are only allowed to set two or three traps...so...in that way of gathering food, we are limited in our needs and economically, our people can't survive without that industry [food gathering] (*Craig*).

This decreased access to environmental resources has devastated the community's economy. In the past decade, most local commercial fishermen sold their licenses back to the province via the Mifflin Plan, thereby dwindling the number of active fishermen in the community from hundreds to only a few:

I was forced to sell my license. The last time my boat went fishing it cost \$14,000 to get it out there.... When they offered me some money for the license I took it. I took a \$10,000 tie up and then I just retired. It was absolutely insane to think that you could make a living at it anymore (*Clarence*).

Respondents connected reduced access to environmental resources and declining economic opportunity explicitly to declining community health and well-being. This was most evident within the changing social fabric of 'Namgis First Nation. Respondents spoke not only of declining community support and cultural practices, but also of growing political and family divisions:

We were taught to share... to help people. Basically, we have a system of borrowing... I'll lend my family something knowing deep down inside I might not get it back, but that's the way it is. You help, and that's just the way it is. It's getting more difficult to live like this these days though (*Corey*).

There is less trust among and between community members as meagre access to employment opportunities translates into increasing competition for scarce environmental resources, thereby lessening sense of community:

Our way of life is changing. At one time, you just went out and took what you needed. We would fish 5 days a week and did food fishing on the weekend. Now only one boat goes out. At one time, it was different guys from different families—and everyone got some. Now only four families get that fish. It's getting to the point where people are stealing fish from the smokehouse (*Shannon*).

Among those interviewed for this study, there was a widely held perception that access to jobs and economic resources is less than equitably distributed, that personal connections 'who you know, rather than what you know' determines access. Some respondents were of the opinion that band council members and other community members in positions of power (managers and

business owners, for instance) have acted in ways that exacerbated the decline in sense of community. As participation in the environmental resource-based economy has dissipated, the community has become less self-sufficient, with increasingly apathetic attitudes that have resulted in a systemic dependency on government support. There is lessened pride and increasing despair as community members struggle with the cultural, economic and social loss associated with environmental change, in particular that which has reduced their participation in the commercial fishery:

The loss of the fishing industry has had a really bad impact on our community—there are no jobs and there is no money. We have increased crime—people are in a desperate situation. There is lacking trust in community—we have to lock the doors on our homes now when we leave. We never used to have to do that when everyone was fishing and everyone had what they wanted and needed (*Shannon*).

The loss of the opportunities in the commercial fishery means much more than the loss of a job. It means that for the younger generation a whole series of possible ways of making a living are grossly attenuated. A community with a large number of fishing boats needs a vertically integrated economy to support the fishery (e.g., mechanics and electronics technicians, boat builders and repairers, and a host of ancillary local business). What is threatened is a whole way of life, and central elements of a culture. The loss of such a central aspect of a culture brings with it a literal ‘demoralization’ and it is in such circumstances that alcohol and drugs become serious problems, particularly among the young; these health problems were identified by community respondents.

When asked about the determinants of a ‘healthy community,’ respondents focused on three familiar dimensions – political, economic and social/cultural (Table 3). Respondents identified a broad spectrum of determinants. While some focused more generally on those determinants that produce a vital, economically sound and socially cohesive community, others talked more specifically about those factors affecting their own community. The majority of responses focused on the importance and vitality of linkages between community members and their economy, their environment, their culture, their families and their fellow community members. For many, the key determinant was the capacity of the community to govern itself, to have some measure of self-determination or autonomy over the ways in which environmental resources are used:

Our people are not being empowered... It has always been Indian Affairs telling us what to do and we have abided by every single bloody rule. I think its time for us to go back to some levels of government that are

traditional to us. I think that would bring a model of a healthy community... And bring some of the principles of governance up to 2002 (*Dana*).

Moreover, respondents articulated environment-economy-health links (Table 3), underscoring the importance of economic viability and healthy environment:

The rivers are our bloodstream. There are so many sick people here because the rivers are sick. That’s the bloodstream of mother earth (*Clarence*).

There are always concerns about the health of our people and I think the health of the environment goes a big way towards the health of our people too. I think if your forests and the oceans die, I think the people are going to die along with it. There have got to be measures and steps taken to ensure that we have a healthy land and healthy people (*Robbie*).

Community health was also linked strongly to economic viability:

You start putting people to work, you start to bring that community back together, and you start bringing the dollars back into the community. I think that’s the key. It’s hiring the right people, our own (*Gordon*).

Moreover, there was a substantial link made by respondents between community empowerment and the pride associated with an economically productive community. Using the fishery as an example:

The thing that was so good about the fishing industry was that it made a person feel good that they were fishing and earning a living. They were out in their boats, working hard and earning money. There was a lot of pride attached to that work (*Marianne*).

I think we need to empower our people. It [development] needs to be about empowering our own and giving them the confidence in themselves to become business people (*Dana*).

What we really need is some sort of plan to carry us into the future. We need to wake up and see that there are opportunities beyond the fishery. I think the confidence of our people has decreased, and this has turned us against one another. That’s really one of the main factors holding us back (*Heather*).

Perceived risks and benefits of aquaculture

The second objective of this research was to understand First Nation’s perceptions of the risks and benefits associated with aquaculture. Respondents of ‘Namgis First Nation overwhelmingly oppose aquaculture development in their community and in their traditional territory. The results of the community interviews reveal the perception that aquaculture poses an explicit threat

to the natural environment, the local economy, and health and well-being. The key informants were divided in their perceptions of the risks and benefits of aquaculture for British Columbia's First Nations. These results are summarized in Table 4.

The risk of aquaculture to wild species was mentioned several times in the context of escaped Atlantic salmon as an exotic species, and the impact they might have on local salmon species (Table 4). There was concern about the potential for displacement of wild species, particularly the concern that competition between escaped farmed and wild species might ensue:

I know people have worked their butts off to try to get the natural salmon back... to get the natural runs back, but not the aquacultured salmon. It's too foreign—Atlantic salmon in the Pacific? Come on! (Marianne)

There were also concerns raised about the threat of contamination of wild stocks by diseased [farmed] fish:

It's a really sad industry for me to watch because I see the impact every time I am out on my boat. I see the changes in the clam beds; I see the changes in wild stock. Lice everywhere and it is going to be the major killer of the wild species (Gordon).

The potential risk posed by exotic species and displacement of wild species was followed closely by the risk of contamination to the benthic environment, including the ocean floor beneath the farms and in areas proximal to farm sites, as uneaten food pellets (containing drugs, dyes and pesticides) and fish feces float from the farm sites:

We'd probably lose our crabs, because the biggest impact that we have been trying to promote awareness on is the damage to the floor bed... the sea bed. That would mean our crabs would more than likely suffocate or just go away... what we know so far is that it's not just underneath the farms. It spreads out (Marianne).

Compared with the community's perceptions of aquaculture's environmental risks as real and impending, two key informants (representing Federal Government and Industry) focused instead on the means through which salmon aquaculture *could have* an impact on the natural environment. That is, both claimed that the environmental risks of aquaculture are dependent on site husbandry and technique:

If the proper husbandry techniques are not maintained with respect to their stocks, or if the farms are not sited properly, there are risks. Or with handling as well, if people are not trained in the appropriate manner. Say they don't look after their nets and there are lots of escapes, things like that (Deborah, DFO).

Another key informant suggests that the natural environment in fact benefits from aquaculture:

There are risks, but honestly, my response is that there are risks to not having aquaculture, because aquaculture provides, at a minimum, for the production of fish that would otherwise have to be harvested from the sea. The demand for fish is increasing but the ability of the sea to produce, as a result of fish management programs, is just not there (Walter, CAIA).

Community respondents expressed apprehension concerning the uncertainties posed to physical health by salmon aquaculture, due to the consumption of farmed salmon and/or other sea foods exposed to associated environmental risks:

Small communities like us are put at risk by it [salmon aquaculture]: everybody that lives off the water, and everybody that eats anything from the water. It's just that we don't know what those risks are right now. Do you have to wait 10 years down the line to find out that there's something wrong with us, are there going to be deformities, is there going to be sicknesses because of the antibiotics in the water? (Robbie).

We are finding out more about effects from the chemicals to make their flesh pink...they might have side effects on humans... the antibiotics they are given, might have side effects on humans allergic to antibiotics (Marianne).

Concerns and worry about it [salmon farming] are very high. This is because it threatens our natural food sources. Threatens our diet... that's what we have relied on for generations (Craig).

Community respondents also spoke of those social-cultural behaviours and traditional activities that are put at risk by aquaculture. For instance, increased salmon farming activity has limited the ability of community members to practice (and transfer to younger generations) traditional activities related to harvesting and fishing for sea-foods:

DFO regulations say that you've got to dig at least one mile away from the farms. The problem with that is that the farms are moving into the good clam areas. The further you move from one farm, the nearer you get to another farm. You can't win. They are so close to one another that there are no places to dig for clams. Where are we going to get our clams? (Darren)

Moreover, the community is deeply concerned that the potential environmental and human health costs of the industry far outweigh the economic benefits. Respondents illustrated the perception that the

economic benefits of aquaculture development would accrue not to community members, but to high-ranking members of industry:

There are none [benefits of aquaculture]. Well, I imagine that there are probably benefits, but I think those benefits will happen for a limited number of people and at the expense of our environment (*Shannon*).

There was diversity in responses between key informants as they discussed the economic benefits that could accrue from First Nation's involvement in aquaculture. While all key informants indicated that the economic benefits of the industry are important for First Nation's communities, there was disagreement over the expected quality of these benefits. The industry representative indicated that the industry will provide solid economic development for the community as a whole:

The overall benefit is that you get solid economic activity that hopefully leads to community self-esteem and development of the various things that come with solid, healthy communities (*Walter, CAIA*).

Another key informant was less explicit in her assumptions about the precise economic benefits that could be expected:

The BCAFC hears that some First Nations involved in finfish aquaculture experience economic benefits in their communities, reduced unemployment, training, and the social/psychological well-being that goes along with these things (*Sandra, BCAFC*).

Carol (LOS) was skeptical that communities could attain any economic benefits as they become involved in aquaculture. She argued that while there are certainly jobs within aquaculture for First Nations, they are often low-paying and that the environmental cost far outweighs the economic benefit:

Finfish aquaculture will provide low paying jobs to some, but the bulk of the profit goes to multinational companies. The risks of finfish aquaculture outweigh the benefits by far (*Carol, LOS*).

Given that aquaculture is generally a highly mechanized operation, there are in fact few jobs available. These industrial characteristics of aquaculture development therefore limit the benefits available for community members who might be interested in taking up employment in the industry:

There are only a handful of people that are going to get paid. It's not going to benefit us at all. It is too small an amount to benefit a whole community of people (*Melanie*).

In addition to risks related to the operation of aquaculture itself, respondents raised concerns regarding the political regulation of the industry (i.e., decision-making and control):

We've never been consulted once. The Fisheries Minister came here 20 years ago and told us that if we didn't want farms in our area, they would not be put there. Twenty-five farms later, we're still not being consulted (*Gordon*).

Community respondents expressed frustration with the fact that industry and government have ignored Aboriginal perspectives and recommendations on aquaculture development:

We were totally ignored at the community meeting that we had about a specific site. A lot of people came out and a lot of people had concerns and a lot of people said 'no' outright, and it was all ignored (*Marianne*).

Therefore, there is frustration that all control and decision-making concerning the siting and expansion of salmon farms rests with industrial and government interests:

There are a lot of outside forces that will reap the benefits down the road... I can't see a lot for this community, but I can see how the big companies and the government will push aquaculture forward as it suits their needs (*Graeme*).

The Industry key informant expressed conviction, however, that the only way to advance aquaculture in Canada is through meaningful engagement with local communities:

In terms of working with First Nations, anyone that believes that the nature of our society in Canada means that we can do something that doesn't engage First Nations communities, and engage them in a meaningful way, is wrong. The old standard of operation, 'the company knows best,' whether over a First Nations or non-First Nations community—that's gone. We need to be able to deal in a much different fashion, not only with First Nations communities, but with all communities in terms of resolving the perception issues and any real problems that exist so that they are a part of that (*Walter, CAIA*).

At the same time, he emphasized the importance of 'choice' for local communities in the creation of economic development:

It will be their [First Nations] choice... The choice must be well informed. We [Industry] do what we can to provide the facts but, then they [First Nations] must do what they can to separate myth from reality,

and therefore resolve some of these perception issues [of the risks of aquaculture]. It gets back to this business of economic generation. I'm assuming they want to see their communities grow and prosper. Like I said, it's their choice (Walter, CAIA).

However, there is a significant divergence in the way that 'economic choice' is perceived between industry and community. While Walter conceives aquaculture development as the only means through which economic development, and therefore health and well-being might be achieved, community respondents expressed concern that a high rate of community unemployment is in fact prompting industry to utilize their economic situation as an excuse for siting farms in their traditional territory. That is, members of the community see government and industry manipulating community members who are desperate for any form of economic development:

I feel bad for the people that are involved because they don't have any other option, any choice. They still have to put bread on their table, right. They've got kids that they need to provide for. It's sad, I know, they know the dangers and the bad things that are going on. I just feel bad, because they feel it is the only thing they can do. And these farms know they can get cheap labour from Indians who need work (Melanie).

One of my sons worked on a farm for a little while. I asked why and he said "If you can get me a better job dad, I'll gladly move." I'll tell you who is benefiting—it's the big companies that own these sites. They can afford to pay little wages, especially in places like this where people need jobs. On paper it looks good and that's all the companies need to keep the government interested (Darren).

Discussion and conclusion

This research has identified a number of structural processes through which 'Namgis First Nation has experienced decreased access to and control over environmental resources within its traditional territory, thereby impacting detrimentally community health and well-being. These structural processes include, but are not limited to: assimilative efforts of the Indian Act (e.g., reserve formation, imposed governance, prohibition of the potlatch); reduced fisheries and other sources of environmental change (e.g., aquaculture development, forestry, sport fishery); and, commercial fishing boat license requirements (e.g., the Davis and Mifflin Plans). These structural processes have acted to significantly limit the ways in which 'Namgis First Nation can use and enjoy environmental resources within its

traditional territory (e.g., traditional, ceremonial and recreational activities).

The most manifest of the negative effects arising from decreased access to environmental resources has been that of declined economic choice and opportunity. Consistent with Dahl's (1993) "healthy worker effect," respondents repeatedly communicated how integral the presence of an economy is to their sense of a healthy community. Up until the early 1990s, the community relied heavily on the commercial fishery as its main form of economic development. During this time, the community was reportedly self-sufficient, hard-working and proud. Since that time however, a good many fishermen have been displaced from the fishery and forced instead to rely on government assistance, given few other employment options on the tiny island. Today, unemployment sits at approximately 26.7% and 35.7% among males of Alert Bay 1A and Alert Bay, respectively (Canada, 2001). Respondents indicated that the effect of unemployment on the health of their community is most evident within the changing social fabric of 'Namgis First Nation, as community support and cultural practices decline, and family and political divisions grow. There is less trust among and between community members as meagre access to employment opportunities translates into increasing competition for scarce resources, thereby producing a polarization of the community into "haves" and "have-nots" (Boltd, 1993). This competitive spirit has encouraged and maintained clear divisions within the community as individuals endeavour to protect their political and familial interests. The key findings of this research suggest that community perceptions of health and well-being are intricately connected to local economic development. Following this, we might assume that *any form* of economic development, including aquaculture, should serve to enhance health and well-being among economically starved communities. It appears this is the main assumption upon which aquaculture development has gained support in the past few decades: *any development is better than no development*. This assumption is seriously flawed however, as it does not give credence to the role of *choice* by local people in community economic development. That is, good health and well-being is dependent not only on economic development, but also on participation in the political decision-making that fundamentally undermines environmental resource development (Feit and Beaulieu, 2001). Autonomy over environmental resources allows local communities the choice and opportunity to create economic development that empowers the community, thereby impacting community health and well-being.

Application of Mayer's (1996) political ecology of disease framework to First Nation's involvement in aquaculture in British Columbia provides a conceptual lens through which we can understand the importance of

political-environmental struggles, and the impending consequences for economic development and health and well being. ‘Namgis First Nation have not accepted aquaculture as a viable form of economic development, and the key findings of this research suggest it is the structural process (i.e., political regulation) through which aquaculture has been established that forms the basis of this resistance. More accurately, ‘Namgis First Nation may perceive aquaculture development as an extension of Canada’s colonial legacy, that which has continually dismissed First Nation’s claims to environmental resources, and the cultural and material sustenance inherent to these claims.

Mayer (1996, p. 454) suggests that the utility of the political ecology of disease framework “will ultimately be judged by how useful it is in explaining and interpreting disease in its societal and environmental frameworks.” The key findings of this research support and extend Mayer’s (1996) theoretical framework; a conceptual framework for understanding health-environment relations of politicized environments, Mayer’s (1996, 2000) work combines the strengths of the political ecology and population health discourses to connect local environments explicitly to larger national and international structural processes.

The framework for understanding that emerges from this research contains four key components: autonomy (in this instance, the power to make political decisions); use and enjoyment of environmental resources; economic choice and opportunity; and, health and well-being. It is an iterative framework whereby each construct is dependent on the presence of its predecessor. Autonomy—as indicated by this research—is the central construct upon which all other determinants of health and well-being are intrinsically dependent. Related intimately to autonomy is the use and enjoyment of environmental resources; this construct represents the ability of the community to self-determine how environmental resources should be used and enjoyed. This leads to the third construct, economic choice and opportunity; the political right to determine how environmental resources are to be used and enjoyed forms the fundamental basis from which economic choice and opportunity may be born. And the final construct of this framework is health and well-being, dependent on the presence of each of the constructs described above. This framework therefore makes explicit the links between autonomy and health and well-being. Moreover, these constructs are concomitantly interacting; that is, health and well-being enhances autonomy and similarly reinforces the other two constructs, thereby strengthening the fundamental constructs upon which the political ecology of health relies. What this framework does not suggest however, is that autonomy over environmental resources necessarily translates into good economic choices or enhanced health and well-being. Rather, this

framework represents the cyclical and inter-dependent relations of each of these constructs that comprise the political ecology of health, and informed by the results of this research.

This research points to key areas in which more research is necessary. In terms of the geographies of Aboriginal health, it is important that geographers continue to explore how health is a function not only of *place*, but of underlying social-structural, political processes as well (Hayes, 1999; Poland et al., 1998; Corin, 1994). Future directions for Aboriginal health research in geography must focus not only on the identification and measurement of poor health outcomes. Rather, and concurrent with the shifting health geography discourse (Kearns and Gesler, 1998; Elliott, 1999), Aboriginal health research must expand its scope and epistemology toward an understanding of the social and political processes that drive these health inequities, particularly those processes that remove or limit the autonomy of populations over environmental resources. Application of the political ecology of health framework (Fig. 3) may provide insight to how differing political structures enable certain First Nation’s communities with differential access to and control over environmental resources, thereby influencing outcomes for health and well-being. Lastly, there remain research gaps regarding the practical application of economic development schemes that combine bottom-up and top-down approaches. A heterogeneous population, social, economic and political contexts vary widely across Canada’s First Nations. Economic development schemes must therefore conform to these local contexts. Successful examples of such development arise from First Nation and Native American communities in Canada and the United States (Chataway, 2002), for instance, the Meadow Lake Tribal Council (MLTC) of the Churchill River Basin in Saskatchewan (Anderson,

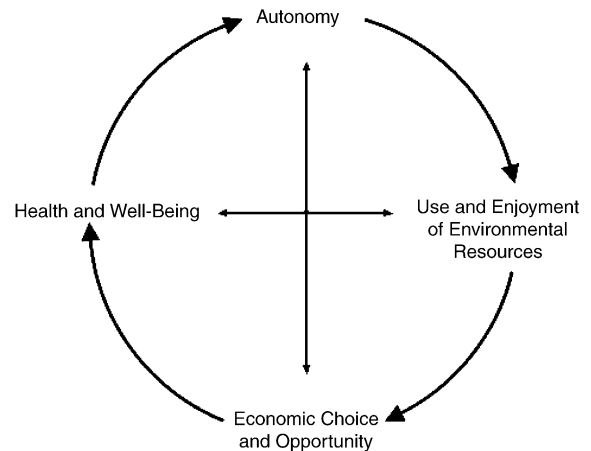


Fig. 3. The political ecology of health.

1999) and the Menominee reservation in Northern Wisconsin (LaDuke, 2002). Future research in this area should identify and explore the capabilities and relevance of traditional and scientific knowledge as a foundation for successful economic development.

Acknowledgements

Funding for this research was provided by AquaNet, the Network of Centres of Excellence for aquaculture in Canada. The authors are grateful for insightful comments made by two anonymous reviewers.

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