

Position on the Environment as a Context for Health

An Integrated Settings Approach

Version 2: July 25, 2012
10-420-6043 (07/12)



northern health
the northern way of caring

“... Sometimes it feels like this. There I am standing by the shore of a swiftly flowing river, and I hear the cry of a drowning man. So I jump into the river, put my arms around him, pull him to shore and apply artificial respiration. Just when he begins to breathe, there is another cry for help. So I jump into the river, reach him, pull him to shore, apply artificial respiration, and then just as he begins to breathe, another cry for help. So back in the river again, reaching, pulling, applying, breathing and then another yell. Again and again, without end, goes the sequence. You know, I am so busy jumping in, pulling them to shore, applying artificial respiration, that I have no time to see who is upstream pushing them all in.”

J. McKinlay, 1979

For further information about this position statement, please contact:

Dr. Ronald Chapman, Chief Medical Health Officer
Northern Health
Telephone: 250-565-7653
Email: Ronald.Chapman@northernhealth.ca

Northern Health Corporate Office
Suite 600, 299 Victoria Street,
Prince George, BC Canada V2L 5B8
General enquiries: 1-866-565-2999 or 250-565-2649
www.northernhealth.ca

Acknowledgements:

This position paper was a collaboration between Northern Health and the University of Northern British Columbia. It is directly informed by the “Ecohealth & Watersheds in Northern BC” Knowledge to Action Project, funded by the Canadian Institutes for Health Research. We would like to acknowledge and thank the people who have helped to compile this position statement: Dr. Margot Parkes,¹ Courtney LeBourdais,¹ Lindsay Beck,¹ Joanna Paterson,¹ Christopher Rose,¹ Chelan Zirul,² Kelsey Yarmish² and Dr. Ronald Chapman.² We would also like to thank Colleen Stevenson for her artistic contributions.

¹ University of Northern British Columbia

² Northern Health

1.0 Introduction

This paper outlines the position of Northern Health regarding the environment as a context for health. Health is tied to social, economic and personal development and these can be determined by the settings where we live, work, learn and play.ⁱ This paper highlights that these settings are embedded in the physical environment. Using a population-health approach, we will engage with communities and individuals to move toward increased health and wellness for people and their environments. This will be accomplished by supporting and promoting that the health and well-being of (current and future) populations depends on healthy environments. We will work with community partners to improve the health, well-being and quality of life of those living, working, learning and playing in Northern BC.

Human health cannot be considered in isolation. It depends highly on the quality of environment in which people live: for people to be healthy, they need healthy environments.

-Lebel 2003

2.0 Background

There is growing recognition that all living systems are interconnected. Highlighted in the *Ottawa Charter for Health Promotion's* call for reciprocal maintenance, there is need to take care of each other, our communities and the natural environment.ⁱⁱ However, conversations about the environment largely remain isolated from conversations about health and community. This position paper responds to this disconnect and is supported by research, education and practice that addresses the interdependence between health, communities and the ecosystems in which they are embedded.^{iii,iv,v,vi}

The relationship between health and the environment is complex and a complete review of this evidence is beyond the scope of this position paper. The intent of this paper is to introduce approaches and evidence that links the environment with social, economic and developmental influences on health, and to present Northern Health's position on the environment as a context for health. We focus on promoting safe and healthy environments in a way that complements, but does not specifically address, the full range of important and technical issues addressed by health protection and environmental health.

To better understand the complexity and connections between health, the environment and society, it is important to introduce key terms that will be used throughout this paper. For the purposes of this position paper, we want to highlight the following connotations:

- **Environment:** The physical environment makes reference to the built and natural environments.^{vii} We use different terms, such as: *landscapes*, *ecosystems* and *ecology*, to focus on the living systems on which human survival, livelihoods and well-being depend.^{viii,ix,x,xi}
- **Community:** A group of people with common rights, privileges, or interests or residing in the same place under the same laws and regulations.^{xii} Community is linked to *society* through the social structures and relationships that determine development over time.^{xiii}
- **A socioecological approach to health:** A way to explicitly link environment and society as a context for health.^{xiv}

2.1 Connecting Health, Environment and Society

When considering *health*, we commonly focus on health and socioeconomic factors *or* health and environmental influences, but tend to overlook the interrelationships among health, socioeconomic *and* environmental factors. One way of understanding these interrelationships is through the field of *ecohealth* (Box 1). With origins informed by the *Ottawa Charter for Health Promotion*, and recognized as a Canadian Milestone in Population and Public Health Research in 2010,^{xv} *ecohealth* focuses on interrelationships of health, ecosystems and society.^{xvi}

Box 1: Ecohealth as an Emerging Collaborative Approach

Numerous approaches have been grouped under the title *ecohealth*, all of which aim to link conversations about the planet's support systems with the health and well-being of all living and non-living things. Ecohealth approaches have been described as "participatory, systems-based approaches to understanding and promoting health and well-being in the context of social and ecological interactions".^{xvii} Examples of work that has informed or links to the development of ecohealth include:

- Ecosystem approaches to human health.^{xviii,xix,xx}
- Ecosystem sustainability and health.^{xxi,xxii,xxiii}
- Systemic approaches to addressing health, environment and development.^{xxiv,xxv,xxvi}
- *One health* and related approaches linking the health of humans, animals and ecosystems, especially in the context of (re)emerging infectious diseases.^{xxvii,xxviii,xxix}

Words beginning with *eco* (such as *ecohealth*, *ecology*, *ecosystem* and *economy*) all have origins in the Greek word for *house* (*oikos*) and the Latin word for *household* (*oeco*).

Ecohealth is one way to consider how health is situated in (and influenced by) social and environmental contexts.^{xxx,xxxi} In theory and in practice, it can help us to integrate how we understand the different settings where people live, work, learn and play, and draw attention to the connections between health, the environment and society.^{xxxii}

2.2 Healthy Settings

Healthy settings-based approaches reorient thinking from health service-based approaches towards the promotion of health by all sectors and organizations involved in upstream determinants of health.^{xxxiii} The *Ottawa Charter's* focus on creating health where we live, work, learn and play has led to a focus on healthy settings. The bulk of healthy settings work has focused on institutions, such as healthy schools, workplaces, hospitals, prisons and care facilities. When considering the physical environment of these healthy settings, the focus has typically been on urban or built environments with less attention to the natural environment and the landscapes and ecosystems on which cities and economies depend.^{xxxiv,xxxv}

Considering the physical environment as a context for all healthy settings-based approaches allows us to see connections between the different settings in which we live, learn, work and play (e.g., schools within communities within watersheds). Attention to how settings are integrated provides an opportunity to highlight both socioeconomic and socioecological connections and their combined impact on the health, well-being and quality of life in Northern BC. Given the diverse ecosystems and physical environments of Northern BC, it is especially important to understand healthy settings in a broader context.

3.0 Northern Environments and Health

Physical geography plays an important role as a context for health. In Northern BC, this geography consists of diverse landscapes, including vast wilderness, rugged mountains, dense forest cover, fertile valleys, diverse flora and fauna, extensive coastlines, islands, inlets, bays, river systems and streams.^{xxxvi,xxxvii} These natural features offer opportunities and present challenges to settlement, development and the maintenance of health.

3.1 Understanding Northern BC Landscapes

Northern BC is home to urban, rural, remote and Aboriginal communities. Complex topography has resulted in regionalized settlement patterns and limited transportation corridors.^{xxxviii} Northern communities are closely tied to specific regions and places; therefore, the characteristics of these communities cannot be understood through generalized understandings of *rural* or *remote* derived from other contexts in Canada or elsewhere.^{xxxix}

The abundance of natural resources have influenced how Northern BC has developed economically, culturally and socially in the past and continues to develop today. As the economy is closely tied to natural resource extraction (e.g., forestry, mining, agriculture, fishing and hydroelectric development), volatile fluctuations in global demand for these resources has resulted in *booming* and *waning* cycles.^{xl,xli,xlii} The economic and social stress associated with these cycles threatens the viability, sustainability, health and well-being of Northerners.^{xliii} These cycles are examples of social and ecological changes and the complex relationships between health, ecosystems and society.^{xliv} Table 1 highlights some features of Northern Health’s service delivery area that need to be taken into account as a context for health.

Table 1: Northern Health Service Area as a Context for Health

Population	289,974 (2011)
6% of BC's total population	
Land Area	617,271 km ²
64% of BC's total land area	
Notable Demographic sub-groups	
< 25 yrs	34%
> 65 yrs	11%
Aboriginal ¹	18%
Employment	
Service Sector	24%
Tourism	4%
Resource Industry:	
-Forestry	24%
-Mining	12%
-Construction	7%

Sources: ^{xlv}, ^{xlvi}, ^{xlvii}

4.0 Approaches to Link Health, Environment and Community

The trends of social and ecological change in Northern BC highlight the importance of understanding the linkages between health, environment and community and the need for different sectors, disciplines and organizations to work together. Two approaches to integrating health, environment and community are referred to as *top-down* and *bottom-up*. Both are approaches that encourage intersectoral action and highlight the importance of working and learning together to address shared challenges rather than working in isolation from each other. Each is introduced in the following sections.

¹ Unless otherwise specified, Aboriginal in this paper refers to First Nations, Métis and Inuit peoples in Canada. Reference to First Nations will sometimes distinguish between populations and individuals whose residence is on or off First Nations reserve.

4.1 Top-Down: A Focus on Policies and System Structures

Efforts that foster health, environment and community require diverse sectors working together for systemic change.^{xlviii} This principle aligns with the *Ottawa Charter for Health Promotion*, especially the call to build healthy public policy, create supportive environments and strengthen community actions (Section 7).^{xlix}

Healthy public policy requires recognition that responsibility for long-term health is shared across different sectors and that, in some cases, policies in other sectors may be better suited to achieve improvements in health.^l This has led to calls for (and action towards) aligning a *health in all policies* approach by ministries and other organizations.^{li,lii} In this, health is a shared goal and a shared responsibility that is approached in a collaborative way.^{liii} The recognition that intersectoral action can achieve more efficient, effective and sustainable health outcomes has broadened the health sector's vision. Collectively, this vision has shifted from a focus on controlling disease and protection from hazards, toward health promotion and a health system that promotes prevention, self-care and addresses determinants of health. For collective action to be effective, there is a need to identify challenges and opportunities faced by non-health sectors and identify ways to coordinate, to mitigate and/or remove barriers to health.^{liv} Integrated approaches to indicators are one example of this (Box 2).

In a top-down approach, where the focus is on policies and system structures, the health sector often takes a leading role by delegating priorities and setting targets for other sectors. However, successful intersectoral action is flexible and adaptable. As such, it is appropriate for the health sector to lead intersectoral processes where it has the greatest level of knowledge, experience and control. Alternatively, the health sector can take a supportive role when cooperating with other sectors.^{lv,lvi} The health sector can also be a policy partner when addressing social, environmental and upstream determinants of health that may not be directly influenced by the health care system.^{lvii}

Box 2: Indicators as a Tool for Intersectoral Action

One response to the need for intersectoral action has been a call for indicators that can integrate health information about social and environmental factors to get a more complete picture of the context for health.^{lviii} State of the watershed reports in Canada are one example of an attempt to integrate health-related indicators to social and environmental factors on a watershed-scale.^{lx, lxi, lxii} Beyond quantitative health and/or socioeconomic measures, these indicators reflect a variety of health-promoting behaviours and activities undertaken in watersheds, such as recreational opportunities accessible to residents, proximity to natural or protected areas, and stewardship programs active in the watershed. Watershed indicators are also linked with community capacity building that meets health promotion and sustainability objectives. Such tools have relevance to many settings described in Figure 1. A Northern BC example is the integrated watershed stewardship initiative of the City of Dawson Creek, which is working to link environment, community and health objectives through indicators, monitoring and the [Kiskatinaw Watershed Program Atlas](#).

4.2 Bottom-Up: Grassroots Initiatives & Reciprocal Maintenance

Despite the call for a socioecological approach to health in the *Ottawa Charter for Health Promotion*, environmental stewardship activities initiated by natural resource management or conservation efforts have traditionally been overlooked for their contributions to health, well-being and overall community building benefits.^{lxiii, lxiv} Revisiting the Ottawa Charter's socioecological understanding of health encourages understanding the connections between health, environments and community goals and the opportunity of place-based actions.^{lxv} An example of grassroots initiatives progressing from environmental to community and health objectives is provided in Box 3.

Box 3: Murray Creek Rehabilitation Project

In 2008, the Murray Creek Rehabilitation Project was formed with the objective of facilitating stream restoration by working with landowners in a cooperative and conciliatory way in the Nechako Valley, near Vanderhoof, BC. The activities of this water stewardship project have made a range of environment, community and health connections by:

- Promoting stream restoration through educational signs on walking trails and pathways.
- Establishing partnerships and working relationships with agricultural, environment, health and community groups including BC and the Nechako Valley Cattleman's Associations, the District of Vanderhoof, Fraser Basin Council, Department of Fisheries and Oceans, Ministry of Environment, Nechako White Sturgeon Community Working Group, the Nechako Fisheries Conservation Program and Northern Health.
- Facilitating educational tours for over 500 elementary and high school students,
- Including Murray Creek as a case study within School District 91's *Project Agriculture* which builds awareness of links among food production, economies, community & the environment
- Partnering with researchers and graduate students at the University of Northern British Columbia (UNBC), and inclusion as a case study of community, environment and health connections within the UNBC-Northern Health "Ecohealth & Watersheds in Northern BC" Knowledge to Action Project (see Box 4)

In promoting water stewardship as mutually beneficial to landowners, the ecosystem and healthy living in the wider community, the Murray Creek project demonstrates how grass-roots initiatives can improve the environment as a positive context for health.

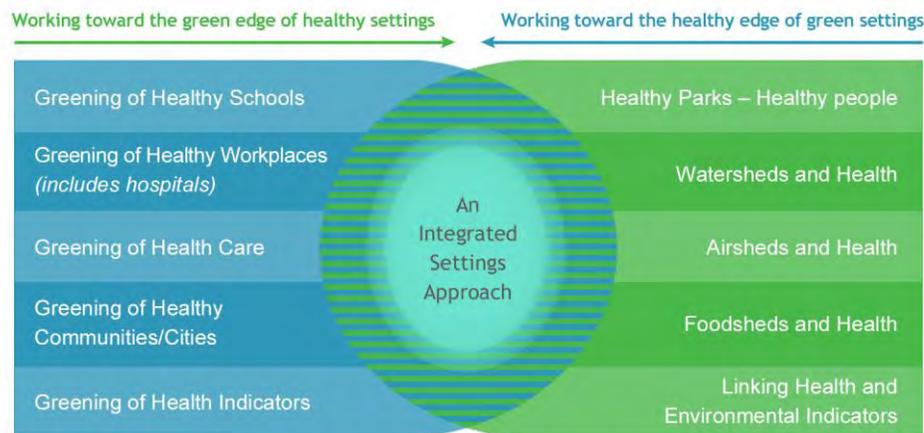
Sources: ^{lxvi, lxvii}

Grassroots initiatives typically have the common objective of promoting ecological and human health through community-driven activities in local landscapes. Initiatives involve knowledge building and action among community members, organizations, practitioners and decision-makers typically outside of the traditional health service sector.^{lxviii} Beyond conserving the local ecosystems, these initiatives have benefits for human health and well-being.^{lxix} For example, contact and engagement with the natural environment can promote a range of benefits, including: physiological (e.g., reduces risk of chronic disease), psychological (e.g., decreased stress) and social (e.g., improves social interaction and reduces crime).^{lxx, lxxi} As well as improving health and wellbeing, connection to nature on a daily basis is also believed to reinforce values of care and respect for the ecosystem, a requirement for a healthy and sustainable society.^{lxxii, lxxiii} In Aboriginal communities, initiatives are emerging that rekindle and support connectivity among land, community, culture and health, rather than focusing only on deficits, contaminants and disease.^{lxxiv, lxxv} These projects highlight how goals for ecological sustainability and human well-being can be connected through supporting connections to the land/nature, promoting dignity and identity/self-determination, and building community strength and opportunities for sustainable development.^{lxxvi, lxxvii}

5.0 Integrating Healthy Settings

Settings-based approaches encourage intersectoral collaboration, including groups and organizations outside of the health sector.^{lxxviii} Integration among different settings is particularly beneficial to overcome the tendency for setting-based approaches to happen in isolation from each other.^{lxxix, lxxx} In this section we highlight opportunities for integrating different settings-based approaches and working together toward *an integrated settings approach* (Figure 1).

Figure 1: Integrating Healthy and Green Settings



Northern Health already demonstrates the value of healthy settings approaches, including their [Position on Healthy Communities](#) and other work that focuses on fostering healthy places to live, work, learn and play. In addition to the traditional focus on institutional settings (e.g., healthy schools, workplaces, hospitals, prisons and care facilities), attention has shifted to include wider jurisdictional and socioecological settings (e.g., healthy communities, cities, islands and watersheds).^{lxxxix, lxxxix} Of interest are health-oriented setting initiatives that are inclusive of the environment (e.g., the *green edge* of traditional healthy settings) and environment-oriented initiatives with explicit health linkages (e.g., the *healthy edge* of green settings). The interface between healthy and green settings (Figure 1) is explored in the following examples, providing the basis to work towards an integrated settings approach.

5.1 Greening of Healthy Schools

Relationships are well-established between education and improved health outcomes and, conversely, the relationship between health and enhanced learning outcomes.^{lxxxiii} The recognition of this interdependence between health and learning is also linked to an ecological and sustainability-oriented approach to health promotion in schools.^{lxxxiv} Many opportunities for children to experience nature are now likely to occur at school and the incorporation of nature into school settings may impact health and well-being, particularly mental health. School-based projects are also a strong focus for the growing attention to *healthy by nature* principles, referred to in phrases such as *green time, not screen time; nature deficit disorder* and, in the context of mental health, *shifting from “blue” to green*.^{lxxxv, lxxxvi}

5.2 Greening of Healthy Workplaces

Environment and health considerations in the workplace are often restricted to concerns about occupational health and safety or individual behaviour modifications.^{lxxxvii} However, workplaces influence health in many ways, including socioeconomic, organizational and environmental impacts.^{lxxxviii} Creating healthy workplaces is critical for health and well-being.^{lxxxix, xc} Physical and mental health and wellness depend on psychosocial working conditions, the physical environment and social relationships in the workplace.^{xc} A more integrated understanding of workplaces, health and the environment helps to frame the workplace as a setting that can promote health, social and environmental responsibilities. As such, healthy workplaces may recognize the health benefits of nature, the importance of socially-equitable and sustainable development and protection of the surrounding environment.

5.3 Greening of Health Care Settings

Many advances towards *greening* healthy workplaces occur in health care settings, including a growing attention to the environmental impact of health services and the development of guides and toolboxes for the greening of healthcare settings.^{xcii,xciii,xciv} A related movement towards greening health care, also called *green care*, is at the intersection of health care and agriculture/animal keeping, gardening and landscape/nature conservation.^{xcv} *Green care* is used in many contexts and for various medical conditions, including: therapeutic applications of green exercise, healing gardens and ecotherapy. Healing gardens are typically gardens associated with a health care facility and are intended to improve physical, mental or social health for people. Ecotherapy supports vulnerable people to work with nature as a form of therapy with the specific aim of conserving or establishing a local habitat or green space.^{xcvi,xcvii}

Health care institutions that serve traditional foods (e.g., wild meat/fish, local berries) may offer a way for Aboriginal and non-Aboriginal people to reconnect with the land or ecosystem, traditions and community. This connection may help to heal individuals, communities and the environment.^{xcviii} For example, the Whitehorse General Hospital in Yukon serves traditional foods because they are an important part of the lives of the local First Nations people and connect health, culture and identity.^{xcix}

5.4 Greening of Healthy Communities/Cities

Healthy Communities and Healthy Cities are at the core of the healthy settings approach and have been implemented across Canada and the world with a focus on municipal planning and local decision-making.^{cci} The BC Healthy Communities initiative is an active and ongoing example that includes communities throughout northern BC.^{cii} Many Healthy Communities/Cities initiatives are closely linked with other social and environmental health objectives, including promoting the health and environmental benefits of local foods, addressing climate change and focusing on the social, environmental and health benefits of public transportation.^{ciii,civ,cv} For example, the City of Prince George's active transportation plan's vision statement links social, economic and environmental goals: "...to develop, enhance and implement models of active transportation to promote health, quality of life and economic development, while reducing negative environmental impact."^{cvi}

Healthy Communities/Cities approaches are informed by the social and environmental dynamics and disparities playing out at the neighbourhood level.^{cvii,cviii} The extensive work focused on the neighbourhood context for health is largely focused on urban areas, but is well-suited to inform future work seeking to understand the links between health, environment and communities.^{cix,cx} Valuable insights into links between healthy communities and the environment can also be found in the long-standing connections between family, community, society, culture and the land that are prioritised in Aboriginal communities, with holistic views of health and well-being developed through generations.^{cxii,cxiii} Projects are emerging that promote holistic community health in the context of positive relationships with the environment (e.g., [Healthy Land, Healthy Ice, Healthy People](#)). These projects aim to protect and promote health and well-being by understanding the relationships between environment and health and mapping *sites for health* (e.g., places and pathways for activities such as hunting, camping and fishing that are important to the physical and mental health of community members).^{cxiv}

5.5 Healthy Parks Healthy People

The value of green spaces for meeting emotional, psychosocial and spiritual needs and the health benefits of integrating nature into daily lives, has combined to fuel a growing movement focused on Healthy Parks Healthy People.^{cxv,cxvi} As visible public meeting spaces, parks are ideal demonstration sites for the connections between human, environmental and community health.^{cxvii} As one of the few publically accessible green space in many densely populated centres, the establishment, protection and use of parks and other green spaces is increasingly linked to public health benefits.^{cxviii,cxix} Parks offer shared spaces for like-minded health, environmental and community advocates to work together to create safe and healthy environments for communities.

Health benefits most commonly associated with parks are linked with physical activity.^{cxv} However, there are also benefits to recreating or simply being in nature that support many features of a healthy life and are recognized to promote physical and mental health and healing in a variety of contexts.^{cxvi} For example, simply seeing landscapes rich with plant life and water reduces stress and was reflected in the location of early hospitals and sanatoriums being established in lush, secluded settings that exposed patients to natural settings.^{cxvii} These insights support an expanding network focused on parks as settings for health.^{cxviii}

5.6 Watersheds and Health

As water is an essential element of life, watersheds² are a natural scale in which to understand health and well-being. Watersheds also provide a way of understanding *upstream* and *downstream* determinants of health.^{cxviii} Because watersheds are not bound by jurisdiction or built environments, they highlight the value of collective action and mutual reciprocity that promotes both health and sustainable development.^{cxv} Box 4 provides an example of intersectoral action focused on watershed governance in Northern BC.

Watersheds are increasingly considered the most appropriate unit to undertake cross-jurisdictional water and resource management objectives.^{cxvii,cxviii} Watersheds are also a meaningful landscape in which to evaluate and address determinants of health.^{cxviii,cxix} Ecohealth approaches to integrated water resources management support a *double dividend*, where both social and environmental improvements in watersheds can positively influence human health.^{cxv}

² Watersheds are also known as river basins or catchments and represent the area of land drained by a river system. All landscapes and settings are part of a watershed, influenced by the water cycle and climatic factors as well as social and developmental processes in the watershed area. Links among watersheds and other healthy settings are shown in Figures 1 and 2.

Box 4: UNBC-Northern Health “Ecohealth & Watersheds” Knowledge to Action Project

The UNBC-Northern Health “Ecohealth & Watersheds in Northern BC” Knowledge to Action Project is a collaborative knowledge translation initiative that endeavours to strengthen capacity for intersectoral action by focusing on integrated water governance at the scale of the watershed, as a vehicle to improve the social and environmental determinants of health in Northern BC. Funded by a Canadian Institutes for Health Research *Knowledge to Action* (KTA) grant, this project recognizes the particular need for intersectoral action at the nexus of water governance and the determinants of health, and enables a diverse range of researchers and knowledge-users to collectively design, apply, and evaluate collaborative tools, KTA workshops, and case-studies.

The project expands on prior collaborations, common questions, and a solid research partnership between Northern Health and the University of Northern British Columbia (UNBC). Informed by the emerging field of ecohealth and a focus on health, ecosystems and society, the project is building understanding of knowledge integration, multi-stakeholder participation and collaborative learning.

The overarching research project question is: *What can be learned by working together to link knowledge of the health benefits of integrated watershed governance with the experience and practice of intersectoral action for health?*

The Ecohealth & Watersheds project is led by an interdisciplinary and cross-sectoral steering committee and partnerships with three watershed case studies in Northern BC. This work has led to new conversations about health, environment and community through a workshop focused on utilizing spatial technology to integrate health, environment, and community information in watersheds, and a Water Day Celebration and Community Gathering in Vanderhoof. Upcoming workshops, collaborative initiatives and publications will profile opportunities for intersectoral action, learning and knowledge translation, including the development of this position paper.

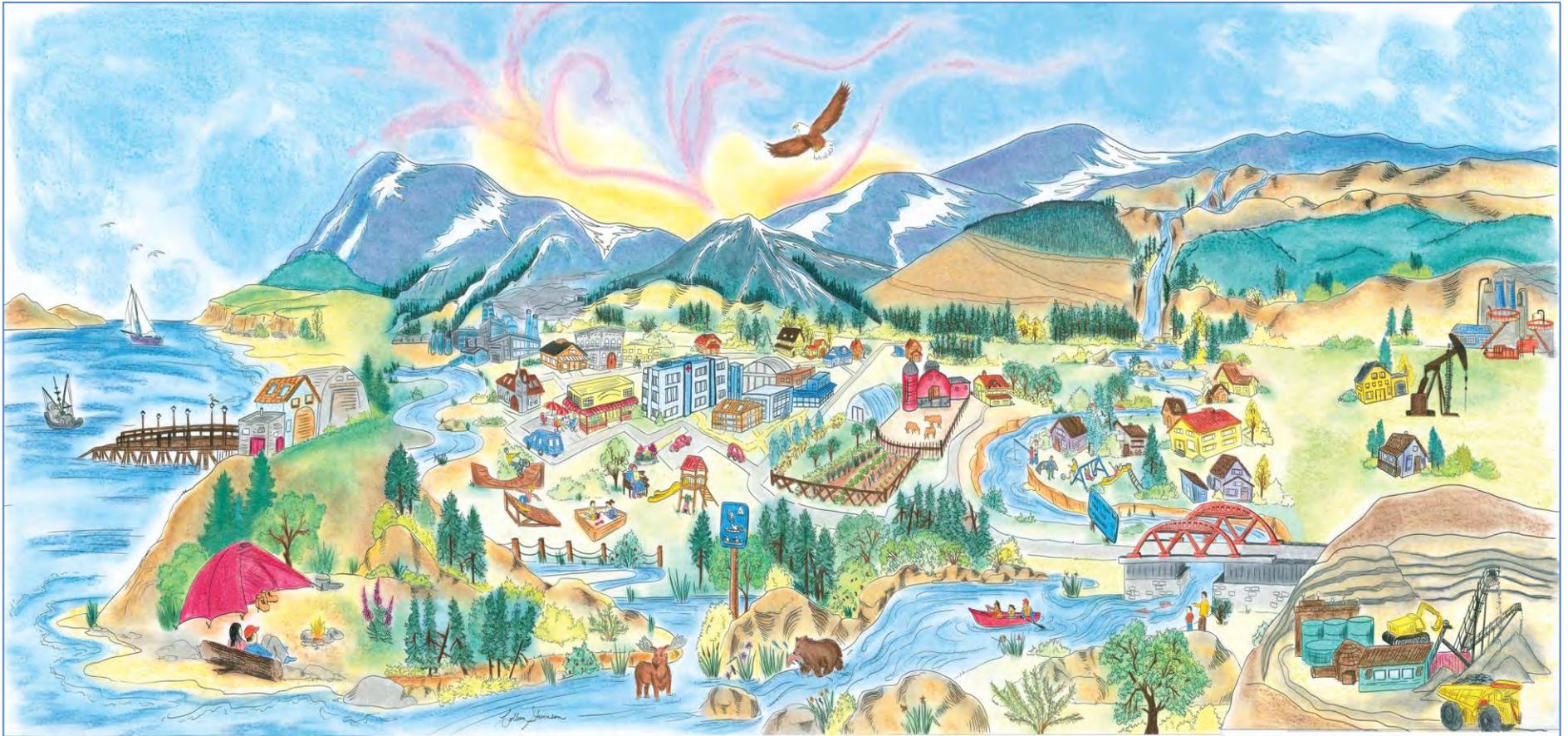
For more information on this project, please visit: <http://www.unbc.ca/parkes/kta.html>

Connections between watersheds and health provide a backdrop to other healthy settings approaches; *upstream* social and environmental changes have *downstream* influences that influence the cities, communities, parks, schools, workplaces where we live, learn, work and play. Integrated watershed governance³ encourages collaboration and integration among sectors to improve health, enhance ecosystem management and foster broader community development.

Our increased understanding of watersheds and health encourages a view of health and well-being that is embedded within the wider landscapes in which we live, work, learn and play. Figure 2 helps to visualize how watersheds and waterways are linked with other healthy settings. This image also highlights that airsheds and foodsheds are important components of the environment as a context for health.

³ Governance “is a process whereby societies or organizations make their important decisions, determine whom they involve in the process and how they render account.” (Graham 2003, p.1), and should be distinguished from government.

Figure 2: The Environment as a Context for Healthy Settings



5.7 Airsheds and Health

Like watersheds, airsheds do not align with political boundaries.^{cxxxix} They are naturally influenced by geography, weather conditions and temperature inversions. In Northern BC communities, airsheds are commonly defined by mountain ranges or river valleys. Specifically in this region, frequent temperature inversions (cold air sinks in low-lying areas and winds are too light to move the air) and the close proximity of industrial sites to populated areas can negatively impact air quality.^{cxxxix}

Clean air is a public good to which everyone should have unlimited access. In BC, air quality is monitored and maintained by government, environmental and health agencies. Industry and other sources of pollution, such as car emissions and home fireplaces, can lead to poor air quality and present health risks, especially for those with pulmonary conditions. The Environmental Burden of Disease index, developed by the World Health Organization is one index that measures the mortality and morbidity (DALYs)⁴ associated with air pollution.^{cxxxix}

Airsheds have become settings for intersectoral action to improve and protect health. Poor air quality and exposure due to proximity to industry and other development (and combined with the geography and weather conditions that characterize airsheds) has motivated stakeholders to take action to mitigate air toxicity and other factors that detract from quality of life.^{cxxxix}

There are many examples where community concerns and dissatisfaction with regulatory compliance and enforcement have spurred intersectoral action. Partnerships have formed to coordinate and implement programs for air toxics reductions and build community capacity for sustaining improved air quality. Initiatives such as [Healthy Air for North Denver](#) and the [Cleveland Urban Air Toxics Pilot Project](#) are facilitated and funded by the United States Environmental Protection Agency (EPA) and have representation from municipal or regional public health departments. The Fraser Basin Council's Community Action on Energy & Emissions (CAEE) initiative is an active example of policy and planning tools to advance energy efficiency, energy conservation and emissions reductions in BC.^{cxxxix}

Much of the focus on air quality has traditionally focused on protection from hazardous exposures. However, a focus on airsheds as settings for creating supportive and healthy environments has the potential to support community actions and offer an integrated sense of the interactions among health, environment and community. For example, the EPA has created the [Community Action for a Renewed Environment](#) guidebook for local partnerships to improve community environment and health.

5.8 Foodsheds and Health⁵

Foodsheds are another way to conceptualize healthy settings.^{cxxxix} Understanding the context of foodsheds helps us to go beyond *healthy eating* to consider the lifecycle of food production and consumption from *field to plate*, including producers, hunters and harvesters in the ecosystem. There are important social, cultural and environmental dimensions to all stages of the food chain and each has the potential to support or undermine individual, community and cultural health.^{cxxxix} Decreasing reliance on distant, industrial food systems may improve human and

⁴ DALYS's are Disability Adjusted Life Years, a measure developed by the World Health Organization to compare 'burden of disease' (morbidity and mortality) impacts of different influences on health, including the environment. DALYs represent the sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability.

⁵ A *foodshed* is as geographic area that feeds a population centre. For more information on Northern Health's engagement with food, please see the [Northern Health Position on Healthy Eating](#).

environmental health. For example, it can improve regional food security, reduce consumption of processed foods, reduce vehicle crash injuries and emissions that are harmful to human health and constrain foodborne illness outbreaks. There may also be benefit for local economic development.^{cxxxviii} Local food and food systems can also promote diverse health functions. Participation in food procurement and preparation can serve as a premise for sharing, celebrating and maintaining traditions, and strengthening social networks and promoting awareness of individual roles and responsibilities in the community.^{cxxxix}

In BC and in Northern Health, community food security⁶ is a platform for developing and delivering a range of population health initiatives and comprehensive food policy. A number of innovative initiatives are underway in Northern BC and sustainability is a key criteria, including:

- [Planting the Seeds of Health: From the Farm to You](#) Initiatives, across the North that encourage access and connections to farmers and locally produced foods through community, farmers markets and local schools.
- Progressing from Farm to School Initiatives (e.g., an early pilot at Quesnel's Dragon Lake School) to develop Farm to Cafeteria, Farm to Home, Farm to Workplace, Farm to Hospital efforts, supported by Northern Health's [Healthy Eating Active Living \(HEAL\) network](#).
- Supporting a trial initiative to determine challenges, barriers and the feasibility of supporting locally produced foods in Northern Health facilities.
- Supporting municipalities to engage community dialogues to ensure community food security and food policy goals in Official Community Plans.
- Supporting numerous capacity-building initiatives, such as community gardens, good food box initiatives and others.
- Emerging opportunities to support community dialogues for bioregional food policy and healthy sustainable food systems concepts.

Foodshed-based initiatives can target the broader community to enhance local social networks/ties, and both mental and physical health, while positively impacting ecosystems and local economies.^{cxl}

6.0 Northern Health Position

Northern Health wants to improve quality of life by promoting the understanding that the health and well-being of populations depends on healthy environments. This will be achieved by working with individuals, organizations and community partners to support and promote efforts to:

- Promote a fundamental shift from protection to safe and healthy environments.
- Support social and environmental developments as important contexts for health.
- Develop integrated settings approaches to support interaction and connections among the settings for health (where people live, work, learn and play).
- Engage in new partnerships with non-traditional partners to achieve these goals.

⁶ Community food security is defined as "a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes self-reliance and social justice." (Hamm, M. W., & Bellows, A. C. (2003). Community food security: Background and future directions. *Journal of Nutrition and Education Behavior*, 35, 37-43.)

7.0 Strategies to Achieve this Position

The Ottawa Charter for Health Promotion is an international resolution of the World Health Organization. Signed in Ottawa, Canada in 1986, this global agreement calls for action towards health promotion through five strategic areas: build healthy public policy, create supportive environments, strengthen community actions, develop personal skills and reorient health services. In concert, these strategies can create a comprehensive approach to promote that health and well-being depends on healthy environments.

This section presents examples that support the five strategic action areas of the Ottawa Charter to achieve the goals outlined in this position paper. This approach will benefit from close collaboration between the traditional domains of health protection and health promotion to enable a transition from prevention and protection to creating safe and healthy environments. Examples are evidence-based and come from a review of strategies proven to be effective in other places.

7.1 Build Healthy Public Policy

A broad range of local, regional, provincial and federal organizations have a role in building healthy public policies that promote the notion that health and well-being is dependent on healthy environments. Some examples include:

- Promote policies that support social, health, and environmental goals informed by the latest developments in [health in all policies](#), including building on long-term links with less obvious partners (e.g., [Act Now BC](#)).
- Build awareness and encourage policies that increase access to public or active transportation (e.g., BC Transit's [Free Fare for Clean Air](#), community bicycle programs) and healthy urban planning (e.g., [Green, Active and Healthy Neighbourhoods project](#) in Parc-Extension).
- Foster capacity for *health impact assessments* to assess health, socioeconomic and environmental impacts of developments in other sectors (e.g., transportation, housing, agriculture, land and energy development) informed by work in Australia ([HIA Connect](#)), the United Kingdom ([Health Impact Assessment Gateway](#)), the United States ([Health Impact Project](#), [Health Impact Assessment Project](#)) and internationally ([Health Impact Assessment: Putting health at the heart sustainable development at Rio+20](#)).
- Support and enhance existing initiatives that promote intersectoral communication and exchange regarding health, environment and communities issues (e.g., establishment of [Regional Drinking Water Teams](#) that support interagency coordination for drinking water protection and [Smart Planning for Communities](#) programs).
- Support the recognition of long-term health and well-being benefits of [community resilience](#) and [disaster preparedness](#) that adopt an integrated, proactive and partnership-based approach to preventing negative health, environment and social impacts (e.g., case studies that [bridge food security, climate change adaptation, and disaster risk reduction](#); and that demonstrate [effective partnerships](#) to reduce disaster risks and increase resilience).

7.2 Create Supportive Environments

People interact daily with a variety of settings where they live, work, learn and play. People are inextricably linked to their environment and this is the foundation of a socioecological approach to health, which allows us to better understand the changing patterns of life, work and leisure. By recognizing that all settings for health are embedded in the ecosystems that we depend on, we also identify opportunities to promote connections between health, environment and community. Some examples that expand on the healthy settings outlined in Section 5 and depicted in Figures 1 and 2, include:

7.2.1 Watersheds, Foodsheds, Airsheds

- Support and engage initiatives that foster the linked environmental, social and health benefits of integrated watershed governance, source water protection and monitoring (e.g., [City of Dawson Creek](#)'s Kiskatinaw Watershed Stewardship and Atlas initiatives; intersectoral conversations in [Regional Drinking Water Teams](#) throughout BC; [Ecohealth and Watersheds](#) initiatives in BC, Canada and beyond).
- Support policies that encourage 'urban' agriculture and community gardens (e.g., keeping of [backyard hens](#) was approved in the municipalities of Prince Rupert and Terrace; the [BC Food Security Gateway and Produce Availability in Remote Communities](#) Initiative is supporting community gardens, greenhouses and food preservation training; an old arena in the NWT was converted into [the Inuvik Community Greenhouse](#)).
- Promote local food system or land-based stewardship/restoration initiatives that also link with water, health and environment concerns (e.g., the [Aboriginal Land Stewardship Program- Native Education College](#); the [Manitoba Alternative Food Research Alliance](#); the [Robson Valley Growers Cooperative](#); McBride, Valemount, Dunster).
- Find ways to support links and synergies between green settings and healthy settings (e.g., link [airshed initiatives](#) to healthy cities and healthy schools, and link [watersheds governance](#) initiatives with healthy parks, healthy active communities, and healthy school projects).

7.2.2 Home

- Participate in local initiatives that encourage household waste reduction (e.g., composting, recycling) and resource conservation (e.g., using reusable bags, rain barrels) (e.g., [Northern Environmental Action Team](#) [NEAT]; [Recycling and Environmental Action Team](#) [REAPS]; Prince George Public Interest Research Groups [PGPIRG]).
- Encourage involvement in and development of local and sustainable goods by supporting farmers markets and local food producers (e.g., [Eat Drink Be Local](#) [EDBL]; [Beyond the Market](#)).

7.2.3 Work

- Introduce local and traditional foods in institutions (e.g., Yukon's Whitehorse General Hospital's [Traditional Diet Program](#); Farm to Cafeteria).
- Promote awareness of environmental impacts of workplace practices and strategies for greening the workplace (e.g., [Living green, living well](#) or the health, social and environment benefits of alternatives to bottled water).
- Support industrial policies that promote and support healthy environments in work sites, work camps and the communities that are home for employees.

7.2.4 School / Campus

- Support experiential programs and activities that engage youth in the natural environment (e.g., [Take Me Outside](#), [Carp Ridge Forest Pre-School](#), [Camp Trapping](#)).
- Promote learning and engagement with local food systems in schools (e.g., [Farm to School programs](#), [elementary school gardens](#), [schoolyard orchards](#)).

7.2.5 Leisure

- Facilitate engagement with parks and trails in a variety of creative ways (e.g., [Art in the Park](#); [Outdoor Fitness Park in Tumbler Ridge](#); promoting the social and health benefits of community trails [e.g., [Telkwa Trails](#)]; [Healthy by Nature](#), and [Healthy Parks Healthy People](#) initiatives; Parks Canada's [Palisades Stewardship Program](#)).
- Encourage experiences that promote physical activity, healthy eating and respect for local ecosystems (reciprocal maintenance) (e.g., [Dinosaur tours of Tumbler Ridge](#); [Wildwood Ecoforest](#)).

7.3 Strengthen Community Action

Successful actions to promote the environment as a context for health need to be planned and implemented through partnerships and collaborations. Public, private and non-governmental organizations may be involved at local, regional, provincial and federal levels. Examples of community capacity building to promote the health of people and environments include:

- Support community events that raise environmental awareness, promote healthy active lifestyles and reconnect people with their natural environment (e.g., Vanderhoof's [World Water Day Community Event](#); the [Driftwood Foundation](#)'s long history of public involvement activities; [Active Transportation: BC Bike to Work Week](#); [BC Rivers Day Festival](#)).
- Partner with local governing bodies, First Nations representatives and regional agencies to support shared goals of health and environment at the community level (e.g., [PG Air Improvement Roundtable](#) [PGAIR]; [Omineca Beetle Action Coalition](#) [OBAC] efforts to respond to mountain pine-beetle impacts through sustainable land-based activities and economic alternatives; the UNBC-Northern Health ['Ecohealth & Watersheds' Knowledge to Action Project](#)).
- Profile and support healthy sustainable livelihood initiatives that support social, environment, health and cultural values, including through innovative First Nations and community efforts (e.g., [Likely Xat'súll Community Forest](#); [Connecting Industry, the Environment and First Nations](#) [Prophet River First Nation, Northeast BC]; efforts to raise awareness of traditional medicines and plants through gardens and educational initiatives, such as the [First Nations Garden](#) [Montreal] and school workshops focused on [First Nations connections](#) [UBC Farm]; [Kakwa Ecovillage Cooperative](#) [west of McBride]).
- Create and support partnerships to deliver programs aimed at educating the public, including specific groups such as youth and First Nations, on health and environment issues (e.g., Fraser Basin Council's [Engaging Aboriginal Youth on Air Quality and Health Issues in the Upper Fraser Region](#) program and upcoming air quality curriculum, PGAIR's [Transportation Dialogues](#)).
- Encourage place-based health and environment initiatives driven by communities, especially those that involve long-term cooperation among multiple stakeholders, to work towards sustainable health and environmental goals (e.g., [Lake Ōmāpere Project Management Group](#) initiated by Maori community leadership in New Zealand; [Caring for our Country](#) led by aboriginal communities in Australia; Community Action for a Renewed

Environment (CARE) projects including [Reducing Toxic Risks](#) In L.A. Community of Pacoima).

7.4 Develop Personal Skills

A variety of resources and systems are available to support individuals, families and communities to improve health outcomes through awareness, engagement, education and capacity building. Stakeholders should focus on the various levels of behaviour change and construct programs accordingly. Examples of programs and campaigns that may encourage the development of personal skills that connect health and well-being with healthy environments include:

- School-based education that focuses on ecosystems, food origins and school-based gardens that promote healthy eating and sustainability-focused behaviours (e.g., Haida Gwaii school gardens that are linked with [School Garden Network](#); agriculture in the classroom [Take a Bite out of BC](#) programs; [Action Schools! BC](#); [Making it Happen: Healthy Eating at School](#)).
- Promote awareness of the health benefits of environmental restoration and stewardship through experiential education in schools, universities and as part of career development. Site-visits and field schools help to build skills in listening, collaborative learning, healthy relationships, resilience, anti-obesity behaviours, respect and care for the natural world and stress relief (e.g., [Changing Currents](#); [Ecosystem Approaches to Health Field School](#) hosted by the Canadian Community of Practice in Ecosystem Approaches to Health).
- Promote respect and care for ecosystems through public education about the natural environment (e.g., BC Conservation Foundation's [Bear Aware](#) program).
- Encourage and educate parents and children about the benefits of nature (e.g., [replace screen time with green time](#), [Healthy by Nature](#)).
- Support programs that balance economic development and sustainability goals (e.g., [Storyteller's Foundation](#)).

7.5 Reorient Health Services

A broad range of people are available to assist with reorienting health services. For example, health professionals, local government, community planners, sport and recreation professionals, general practitioners, allied health professionals and volunteer groups can all work to promote that health and well-being depends on healthy environments. Examples of these strategic approaches could include:

- Refer patients to activities and initiatives outside the health sector (e.g., write a [green prescription](#) or encourage a patient to be physically active in the outdoors).
- Encourage healthcare services and providers to demonstrate best practices in linking health, environment and community concerns (e.g., through use of guides and toolboxes for the [greening of healthcare settings](#) and awareness of the [ecological footprint of hospitals](#)).
- Integrate and support the healing power of nature into hospital/healthcare facilities (e.g., [Healing Garden in Chetwynd](#)).
- Integrating health services to support and encourage *non-health* community-based projects, stakeholders or organizations where there are common mandates (e.g., [green care](#) where patients or vulnerable populations are connected with community gardens, farms, stewardship programs, parks, etc).
- Support and encourage physical activity in green spaces for improved physical, mental and social health outcomes (e.g., [green exercise](#)).

- Support and encourage simple exposure to green space, parks, and nature to enhance other healthy settings or initiative (e.g., integrating a dose of [Vitamin G](#) into healthy schools, healthy hospitals, healthy workplaces).
- Continue programs that support connections among local health, environment and community concerns (e.g., the range of initiatives enabled by the Northern Health [Healthy Eating Active Living](#) [HEAL] network).

8.0 Conclusion

Northern Health is adopting a position on the environment as a context for health as a way to improve the quality of life for Northerners. The messages in this document are consistent with provincial and national messages, strategies and initiatives. This paper presents research and evidence-based strategies that have been implemented in other places and are proven to support that health and wellness are dependent on a healthy environment. The integrated settings approach proposed in this position paper encourages healthy settings to be seen within the broader context of a safe and healthy environment. Adopting an integrated settings approach encourages the health sector to look *upstream* and find new ways to learn and work together to promote a healthy society. These strategies build on the comprehensive framework presented in the *Ottawa Charter for Health Promotion* and support Northern Health's position.

- i World Health Organization. (1986). *The Ottawa charter for health promotion*. Ottawa, ON: World Health Organization.
- ii Ibid.
- iii Hancock, T. (1993). Health, human development and the community ecosystem: three ecological models. *Health Promotion International*, 8(1), 41-47.
- iv Rapport, D., R. Costanza and A. J. McMichael . (1998). "Assessing Ecosystem Health: Challenges at the interface of social, natural and health sciences." *TREE (Trends in Ecology and Evolution)* 13(10): 397-402.
- v Webb, J., D. Mergler, M. W. Parkes, J. Saint-Charles, J. Spiegel, D. Waltner-Toews, et al. (2010). "Tools for Thoughtful Action: the role of ecosystem approaches to health in enhancing public health." *Canadian Journal of Public Health* 101(6): 439-441.
- vi Hancock, T. (2011). "It's the environment, stupid! Declining ecosystem health is THE threat to health in the 21st century." *Health Promotion International* 26(2): ii168-ii172.
- vii Segall, A. and Fries, C. (2011). *Pursuing Health and Wellness: Healthy Societies, Healthy People*. Oxford, UK: Oxford University Press.
- viii Butler, C. (2006). "Ecosystems and Health Promotion." *PLoS Medicine* 3(10): 1692-1695.
- ix Parkes, M. W. and P. Horwitz . (2009). "Water, Ecology and Health: Exploring ecosystems as a 'settings' for promoting health and sustainability." *Health Promotion International* 24(1): 94-102.
- x Parkes, M. W., K. E. Morrison, M. J. Bunch, L. K. Hallström, R. C. Neudoerffer, H. D. Venema, et al. (2010). "Towards Integrated Governance for Water, Health and Social-Ecological Systems: The Watershed Governance Prism " *Global Environmental Change* 20: 693-704.
- xi Hancock, T. (2011). "It's the environment, stupid! Declining ecosystem health is THE threat to health in the 21st century." *Health Promotion International* 26(2): ii168-ii172.
- xii Segall, A. and Fries, C. (2011). *Pursuing Health and Wellness: Healthy Societies, Healthy People*. Oxford, UK: Oxford University Press.
- xiii Nutbeam, D. (1998). Health promotion glossary. *Health Promotion International*, 13(4), 349-364.
- xiv World Health Organization. (1986). *The Ottawa charter for health promotion*. Ottawa, ON: World Health Organization.
- xv Webb, J., D. Mergler, M. W. Parkes, J. Saint-Charles, J. Spiegel, D. Waltner-Toews, et al. (2010). "Tools for Thoughtful Action: the role of ecosystem approaches to health in enhancing public health." *Canadian Journal of Public Health* 101(6): 439-441.
- xvi Parkes, M. W. (2011). Diversity, emergence, resilience: guides for a new generation of ecohealth research and practice. *EcoHealth*, 8(2), 137-139.
- xvii Waltner-Toews, D. (2009). Food, Global Environmental Change and Health: EcoHealth to the Rescue? *McGill Medical Journal*, 12(1), 85-89.
- xviii Forget, G., & Lebel, J. (2001). An ecosystem approach to human health. *International Journal of Occupational and Environmental Health: Supplement*, 7(2), S3-S38.
- xix Lebel, J. (2003). *Health: An ecosystem approach*. Ottawa, ON: International Development Research Centre.
- xx Charron, D. F. (Ed.). (2012). *Ecohealth research in practice: Innovative applications of an ecosystem approach to health*. Ottawa: International Development Research Centre.
- xxi Waltner-Toews, D. (2004). *Ecosystem sustainability and health: A practical approach*. Location, Cambridge: Cambridge University Press.
- xxii Brown, V., Grootjans, J., Ritchie, J., Townsend, M., & Verrinder, G. (2005). *Sustainability and Health: Supporting global ecological integrity*

- in public health*. Sydney: Allen and Unwin.
- xxiii Talbot, L., & Verrinder, G. (2010). Ecological sustainability and health. *Promoting Health: The primary healthcare approach*. Sydney, AUS: Elsevier.
- xxiv Hancock, T. (1997). "Ecosystem Health, Ecological Introgenesis, and Sustainable Human Development." *Ecosystem Health* 4(3): 229-234.
- xxv Kay, J. J., Regier, H. A., Boyle, M., & Francis, G. (1999). An ecosystem approach for sustainability: addressing the challenge of complexity. *Futures*, 31(7), 721-742.
- xxvi Hanlon, P., S. Carlisle, M. Hannah, A. Lyon and D. Reilly (2012). "A perspective on the future public health: an integrative and ecological framework." *Perspectives in Public Health*. Available Online First: DOI: 10.1177/1757913912440781. Paper accessible at: <http://rsh.sagepub.com/content/early/2012/04/02/1757913912440781>
- xxvii Zinsstag, J., Schelling, E., Waltner-Toews, D., & Tanner, M. (2011). From „one medicine’ to „one health’ and systemic approaches to health and well-being. *Preventative Veterinary Medicine*, 101(3-4), 148-156.
- xxviii Aguirre, A. A., Ostfeld, R. S., & Daszak, P. (Eds.). (2012). *New directions in conservation medicine: Applied cases of ecological health*. New York, NY: Oxford University Press.
- xxix Zinsstag, J., Schelling, E., Waltner-Toews, D., & Tanner, M. (2011). From „one medicine’ to „one health’ and systemic approaches to health and well-being. *Preventative Veterinary Medicine*, 101(3-4), 148-156.
- xxx Morrison, K. E., Parkes, M. W., Hallstrom, L. H., Neudoerffer, R. C., Bunch, M. J., & Venema, H. D. (2012). *Ecohealth and watersheds: Watersheds as settings for health and well-being in Canada*. Winnipeg, MB: International Institute for Sustainable Development.
- xxxi Parkes, M. W. (2011). *Ecohealth & Aboriginal health: A review of common ground*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- xxxii Parkes, M. W., & Horwitz, P. (2009). Water, ecology and health: ecosystems as settings for promoting health and sustainability. *Health Promotion International*, 24(1), 94-102.
- xxxiii Barten, F., Mitlin, D., Mulholland, C., Hardoy, A., & Stern, R. (2007). Integrated approaches to address the social determinants of health for reducing health inequity. *Journal of Urban health: Bulletin of the New York Academy of Medicine*, 84(1), i164-i173.
- xxxiv Parkes, M. W., & Horwitz, P. (2009). Water, ecology and health: ecosystems as settings for promoting health and sustainability. *Health Promotion International*, 24(1), 94-102 .
- xxxv Hancock, T. (2011). "It's the environment, stupid! Declining ecosystem health is THE threat to health in the 21st century." *Health Promotion International* 26(2): ii168-ii172.
- xxxvi Welcome BC. (2011). *The geography of British Columbia, Canada*. Retrieved from <http://www.welcomebc.ca/wbc/immigration/choose/province/geography.page>
- xxxvii Church, M., & Ryder, J.M. (2010). Physiography of BC. In R. G. Pike, T. E. Redding, R. D. Moore, R. D. Winkler, & K. D. Bladon (Eds.), *Compendium of Forest Hydrology and Geomorphology in British Columbia* (pp.17-44). Kamloops, BC: Forum for Research and Extension in Natural Resources.
- xxxviii Barman, J. (1991). *The west beyond the west: A history of British Columbia* (rev. ed.) Toronto, ON: University of Toronto Press.
- xxxix Halseth, G., Markey, S., & Bruce, D. (Eds.). (2010). *The next rural economies: Constructing rural place in a global economy*. Oxfordshire, UK: CABI International.
- xl McGillivray, B. (2000). *Geography of British Columbia: People and landscapes in transition*. Vancouver, BC: UBC Press.
- xli Bone, R.M. (2002). *The regional geography of Canada* (2nd ed.). Oxford, UK: Oxford University Press.
- xlii Statistics BC. (2011). *Population by Age and Sex*. Retrieved from <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationEstimates.aspx>
- xliiii Sullivan, L. M. (2004). *The geography of community crisis: a case of Tumbler Ridge, British Columbia* (Unpublished thesis). University of Northern British Columbia, Prince George.
- xliv Bunch, M. J., K. E. Morrison, M. W. Parkes and H. D. Venema. (2011). Promoting health and well-being in watersheds by managing for social-ecological resilience: the potential of integrating ecohealth and water resources management approaches. *Ecology & Society* 16(1): 6.
- xlv BC Stats, Population Projections. Available at: <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationProjections.aspx>
- xlvi Northern Health. Community Health Information Portal. What is Rural? <http://chip.northernhealth.ca/CommunityHealthInformationPortal/OtherTopics/WhatIsRural.aspx>
- xlvii Welcome BC. (2011). The geography of British Columbia, Canada. Retrieved from <http://www.welcomebc.ca/wbc/immigration/choose/province/geography.page>
- xlviii Hansen-Ketchum, P. A., & Halpenny, E. (2010). Engaging with nature to promote health: bridging research silos to examine the evidence. *Health Promotion International*, 26(1), 100-108.
- xliv World Health Organization. (1986). *The Ottawa charter for health promotion*. Ottawa, ON: World Health Organization.
- I Nutbeam, D. (1998) Health promotion glossary. *Health Promotion International*, 13(4), 349-364.
- II Puska, P. (2007). "Health in all policies." *European Journal of Public Health* 17: 328.
- III Kickbusch, I. (2009). *Healthy Societies: Addressing 21st Century Health Challenges*. Adelaide, Government of South Australia. Online at: www.thinkers.sa.gov.au
- IIII Kickbusch, I., McCann, W., & Sherbon, T. (2008). Adelaide revisited: from healthy public policy to Health in All Policies. *Health Promotion International*, 23, 1-4.

- liv Public Health Agency of Canada (PHAC). (2008). *Health equity through intersectoral action: An analysis of 18 country case studies*. Ottawa, ON: Public Health Agency of Canada.
- lv Nutbeam, D. (1998) Health promotion glossary. *Health Promotion International*, 13(4), 349-364.
- lvi Public Health Agency of Canada (PHAC). (2008). *Health equity through intersectoral action: An analysis of 18 country case studies*. Ottawa, ON: Public Health Agency of Canada.
- lvii Parkes, M. W., K. E. Morrison, M. J. Bunch, L. K. Hallström, R. C. Neudoerffer, H. D. Venema, et al. (2010). "Towards Integrated Governance for Water, Health and Social-Ecological Systems: The Watershed Governance Prism " *Global Environmental Change* 20: 693–704.
- lviii Hancock, T. (2011). "It's the environment, stupid! Declining ecosystem health is THE threat to health in the 21st century." *Health Promotion International* 26(2): ii168-ii172.
- lix Hancock, T., R. Labonte and R. Edwards. (1999). "Indicators that Count! Measuring Population Health at the Community Level." *Canadian Journal of Public Health/Revue Canadienne de Santé Publique* 90, Supplement 1.
- lx Milk River Watershed Council Canada (MRWCC). (2008). Milk River state of the watershed report 2008. Milk River Watershed Council Canada. Milk River, Alberta. 155 pp
- lxi Battle River Watershed Alliance (BRWA). (2011). Our battle: state of the battle river and sounding creek watersheds report 2011. Battle River Watershed Alliance, Camrose, Alberta. Available to download from <http://www.battleriverwatershed.ca/publications/111/view>
- lxii Bow River Project Research Consortium. (2010). Bow River project: Final report. Alberta Water Research Institute. Retrieved from: http://www.brbc.ab.ca/index.php?option=com_content&view=article&id=84&Itemid=232. Accessed on: May 10, 2012.
- lxiii Hancock, T. (2011). It's the environment, stupid! Declining ecosystem health is the threat to health in the 21st century. *Health Promotion International*, 26(S2), ii168-ii172.
- lxiv Hansen-Ketchum, P. A., & Halpenny, E. (2010). Engaging with nature to promote health: bridging research silos to examine the evidence. *Health Promotion International*, 26(1), 100-108
- lxv Parkes, M. W. (2011). *Ecohealth & Aboriginal health: A review of common ground*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- lxvi Personal Communication, Wayne Salewski, Murray Creek Stream Rehabilitation Project
- lxvii Murray Creek Rehabilitation Project. (2011). Newsletter and Selected Project Information. http://www.thinksalmon.com/fswp_project/item/murray_creek_stream_rehabilitation2/
- lxviii Dooris, M. (2004). Joining up settings for health: a valuable investment for strategic partnerships? *Critical Public Health*, 14(1), 37-49.
- lxix Maller, C. J., Henderson-Wilson, C., & Townsend, M. (2009). Rediscovering nature in everyday settings: or how to create healthy environments and healthy people. *Ecohealth*, 6(4), 553-556.
- lxx Townsend, M., & Weerasuriya, R. (2010). *Beyond blue to green: The benefits of contact with nature for mental health and well-being*. Burwood, Australia: Beyond Blue Ltd.
- lxxi Moore, M., M. Townsend and J. Oldroyd. (2006). "Linking Human and Ecosystem Health: The Benefits of Community Involvement in Conservation Groups." *EcoHealth* 3(4): 255-261.
- lxxii Townsend, M., & Weerasuriya, R. (2010). *Beyond blue to green: The benefits of contact with nature for mental health and well-being*. Burwood, Australia: Beyond Blue Ltd.
- lxxiii Kuo, F. E. M. (2009). Parks and Other Green Environments: Essential Components of a Healthy Human Habitat, National Recreation and Park Association..
- lxxiv Parkes, MW. (2011). *Ecohealth & Aboriginal health: A review of common ground*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- lxxv Greenwood, M. and S. de Leeuw . (2009). "Teachings From the Land: Indigenous People, Our Health, Our Land, and Our Children." *Canadian Journal of Native Education*. 30:: 48-53.
- lxxvi Berry, H. L., Butler, J. R. A., Burgess, C. P., King, U. G., Tsey, K., Cadet-James, Y. L., ... Raphael, B. (2010). Mind, body, spirit: co-benefits for mental health from climate change adaptation and caring for country in remote Aboriginal Australian communities. *New South Wales Public Health Bulletin*, 21, 139-145.
- lxxvii Burgess, P., Johnston, F. H., & Bowman, D. M. J. S. (2005). Healthy country: healthy people? Exploring the health benefits of Indigenous natural resource management. *Australian and New Zealand Journal of Public Health*, 29, 117-122.
- lxxviii Parkes, M. W., & Horwitz, P. (2009). Water, ecology and health: ecosystems as settings for promoting health and sustainability. *Health Promotion International*, 24(1), 94-102.
- lxxix Poland, B., Dooris, M. (2010). A green and healthy future: the settings approach to building health, equity and sustainability. *Critical Public Health*, 20(3), 281-298.
- lxxx Barten, F., V. Sousa Santanab, L. Rongoc, W. Varillasd and T. A. Pakasie. (2008). "Contextualising workers' health and safety in urban settings:The need for a global perspective and an integrated approach." *Habitat International* 32: 223–236.
- lxxxi Parkes, M. W., & Horwitz, P. (2009). Water, ecology and health: ecosystems as settings for promoting health and sustainability. *Health Promotion International*, 24(1), 94-102.
- lxxxii Forget, G., & Lebel, J. (2001). An ecosystem approach to human health. *International Journal of Occupational and Environmental Health: Supplement*, 7(2), S3-S38.
- lxxxiii Davis, J. M., & Cooke, S. M. (2007). Educating for a healthy, sustainable world: an argument for integrating health promoting schools and sustainable schools. *Health Promotion International*, 22(4), 346-353.
- lxxxiv Ibid.

- lxxxv Townsend, M., & Weerasuriya, R. (2010). *Beyond blue to green: The benefits of contact with nature for mental health and well-being*. Burwood, Australia: Beyond Blue Ltd.
- lxxxvi Louv, R. (2005). *Last Child in the Woods: Saving our Children from Nature Deficit Disorder*. Chapel Hill, Algonquin Books
- lxxxvii Chu, C., & Forrester, C. (1992). *Workplace health promotion in Queensland*. Brisbane, AUS: Queensland Health.
- lxxxviii Ibid.
- lxxxix World Health Organization. (1986). *The Ottawa charter for health promotion*. Ottawa, ON: World Health Organization.
- xc Barten, F., V. Sousa Santanab, L. Rongoc, W. Varillasd and T. A. Pakasie. (2008). "Contextualising workers' health and safety in urban settings: The need for a global perspective and an integrated approach." *Habitat International* 32: 223–236.
- xcii Burton, J. (2006). *Creating healthy workplaces*. Mississauga, ON: Industrial Accident Prevention Association.
- xciii Canadian Association for Physicians for the Environment . (2000). Greening Healthcare Retrieved from <http://www.cape.ca/greening.shtml>
- xciv Susan, G. (2001). The Ecological Footprint of Lions Gate Hospital. *Healthcare Quarterly*, 5(2), 61-66.
- xcv OraTaiao: New Zealand Climate & Health Council . (2011). *Toolkit for Greening General Practice*. <http://www.orataiao.org.nz/file/detail/Greening+Your+Practice+toolkit.pdf>
- xcvi Haubenhofer, D.K., Elings, M., Hassink, J., & Hine, R. (2010). The development of green care in western-European countries. *Journal of Science and Healing*, 6(2), 106-111.
- xcvii Hine R., Peacock J., Pretty J. (2008). Care farming in the UK: contexts, benefits and links with therapeutic communities. *International Journal of Therapeutic Communities*, 29(3), 245-260.
- xcviii Burls A. 2004. Ecotherapy in Practice and Education. Open space People space conference proceedings. Retrieved from: <http://www.openspace.eca.ac.uk/conference/proceedings/PDF/Burls.pdf>
- xcix Mundel, E., & Chapman, G. E. (2010). A decolonizing approach to health promotion in Canada: the case of the Urban Aboriginal Community Kitchen Garden Project. *Health Promotion International*, 25(2), 166-173.
- c Yukon Hospital Corporation. (2011). *Traditional Diet Program*. Retrieved from <http://yukonhospitals.ca/firstnationhealthprogram/traditionaldietprogram/>
- ci Ashton, J. (2002). Healthy cities and healthy settings. *International Journal of Health Promotion and Education, supplement 1*, 12-14.
- cii Poland, B., Green, L., & Rootman, I. (2000). *Settings for Health Promotion: Linking Theory and Practice*. London, UK: Sage.
- ciii BC Healthy Communities . (2012). Accessible online at: <http://www.bchealthycommunities.ca/Content/About%20BCHC/Index.asp>
- civ McMichael, A. J., Powles, J. W., Butler, C. D., & Uauy, R. (2007). Food, livestock production, energy, climate change, and health. *The Lancet*, 370(9594), 1253-1263.
- cv Story, M., Kaphingst, K. M., Robinson-O'Brien, R., & Glanz, K. (2008). Creating healthy food and eating environments: policy and environmental approaches. *Annual Review of Public Health*, 29, 253-272.
- cvi Capon, A. (2007). Creating healthy, just and eco-sensitive cities. *New South Wales Health*, 18(3-4), 37-40.
- cvi City of Prince George. (2011). *myPG social development: Health and wellness*. Retrieved from <http://mypg.ca/about/Pages/HealthandWellness.aspx>
- cvii Pickett, K. E. and M. Pearl . (2001). "Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review." *Journal of Epidemiology and Community Health* 55(2): 111-122.
- cviii Sellstrom, E. and S. Bremberg . (2006). "Review Article: The significance of neighbourhood context to child and adolescent health and well-being: A systematic review of multilevel studies." *Scandinavian Journal of Public Health* 34(5): 544-554.
- cix Pearce, J., K. Witten and P. Bartie . (2006). "Neighbourhoods and health: a GIS approach to measuring community resource accessibility." *J Epidemiol Community Health* 60(5): 389-395.
- cx Witten, K., T. Blakely, N. Bagheri, H. Badland, V. Ivory, J. Pearce, et al. (2012). "Neighbourhood Built Environment and Transport and Leisure Physical Activity: New Zealand Findings Using Objective Exposure and Outcome Measures" *Environmental Health Perspectives*, Online 28 March, <http://dx.doi.org/10.1289/ehp.1104584>.
- cxii Greenwood, M., & Place, J. (2009). The health of First Nations, Inuit and Metis Children in Canada. *Aboriginal children's health: Leaving no child behind. Canadian Supplement to The State of the World's Children*. NCCA. Toronto, ON: UNICEF Canada.
- cxiii Greenwood, M., & de Leeuw, S. (2009). Teachings from the Land: Indigenous People, Our Health, Our Land, and Our Children. *Canadian Journal of Native Education*, 30, 48-53.
- cxiiii Parkes, M. W. (2011). *Ecohealth & Aboriginal health: A review of common ground*. Prince George, BC: National Collaborating Centre for Aboriginal Health
- cxv Cameron, E. (2011). *State of the knowledge: Inuit public health, 2011*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- cxvi Townsend, M., & Weerasuriya, R. (2010). *Beyond blue to green: The benefits of contact with nature for mental health and well-being*. Burwood, Australia: Beyond Blue Ltd.
- cxvii Gies, E. (2006). *The Health Benefits of Parks: How Parks Help Keep Americans and Their Communities Fit and Healthy*. The Trust for Public Land. San Francisco, CA.
- cxviii Canadian Parks Council. (2007). Healthy by nature. <http://www.parks-parcs.ca/english/cpc/about.php>
- cxviii Kuo, F. E. M. (2009). *Parks and Other Green Environments: Essential Components of a Healthy Human Habitat*, National Recreation and Park Association.

- cxix Maller, C. J., Henderson-Wilson, C., & Townsend, M. (2009). Rediscovering nature in everyday settings: or how to create healthy environments and healthy people. *Ecohealth*, 6(4), 553-556.
- cxx Bedimo-Rung, A. L., Mowen, A. J., & Cohen, D. A. (2005). The significance of parks to physical activity and public health: a conceptual model. *American Journal of Preventative Medicine*, 28(2), 159-168.
- cxixi Kuo, F. E. M. (2009). Parks and Other Green Environments: Essential Components of a Healthy Human Habitat, National Recreation and Park Association.
- cxixii Townsend, M., & Weerasuriya, R. (2010). *Beyond blue to green: The benefits of contact with nature for mental health and well-being*. Burwood, Australia: Beyond Blue Ltd.
- cxixiii Healthy Parks Healthy People. (2012) Extensive online resources available at: <http://www.hphpcentral.com/>
- cxixiv Morrison, K. E., Parkes, M. W., Hallstrom, L. H., Neudoerffer, R. C., Bunch, M. J., & Venema, H. D. (2012). *Ecohealth and watersheds: Watersheds as settings for health and well-being in Canada*. Winnipeg, MB: International Institute for Sustainable Development.
- cxixv Parkes, M. W., & Horwitz, P. (2009). Water, ecology and health: ecosystems as settings for promoting health and sustainability. *Health Promotion International*, 24(1), 94-102
- cxixvi Brandes, O. M., & Curran, D. (2009). Setting a new course in British Columbia - water governance reform options and opportunities POLIS Discussion Papers. Victoria, BC: Polis Project on Ecological Governance
- cxixvii Nowlan, L., & Bakker, K. (2007). Delegating water governance: issues and challenges in the BC context BC Water Governance Project: UBC Program on Water Governance.
- cxixviii Morrison, K. E., Parkes, M. W., Hallstrom, L. H., Neudoerffer, R. C., Bunch, M. J., & Venema, H. D. (2012). *Ecohealth and watersheds: Watersheds as settings for health and well-being in Canada*. Winnipeg, MB: International Institute for Sustainable Development.
- cxixix Parkes, M. W., Morrison, K. E., Bunch, M. J., Hallström, L. K., Neudoerffer, R. C., Venema, H. D., Waltner-Toews, D. (2010). Towards integrated governance for water, health and social-ecological systems: the watershed governance prism. *Global Environmental Change*, 20(4), 693-704.
- cxixxx Parkes, M. W., Panelli, R., & Weinstein, P. (2003). Converging paradigms for environmental health theory and practice. *Environmental Health Perspectives*, 111(5), 669-675.
- cxixxxi Williams, R. J., & Bhattacharyya, K. K. (2004). *Guide to airshed planning in British Columbia*. Victoria, BC: Ministry of Water, Land and Air Protection (Water, Air and Climate Change Branch).
- cxixxxii Ibid.
- cxixxxiii Jacobs, P., Moffatt, J., Jonsson, E., Ohinmaa, A., & Gladwin, C. (2011). *Everybody's business: The cost of multidepartment involvement in public health in Alberta*. Edmonton, AB: Institute of Health Economics.
- cxixxxiv British Columbia Ministry of Environment. (2007). *Provincial framework for airshed planning*. Victoria, BC: Ministry of Environment. Available from http://www.bcairquality.ca/reports/airshedplan_provframework.html
- cxixxxv Fraser Basin Council. (2012). Community Action on Energy & Emissions: 2005-2010 Projects. Accessed at: <http://www.fraserbasin.bc.ca/programs/caee.html>
- cxixxxvi Peters, C.J., Bills, N.L., Wilkins, J.L., & Fick, G.W. (2008). Foodshed analysis and its relevance to sustainability. *Renewable Agriculture and Food Systems*, 24, 1-7.
- cxixxxvii Loring, P. A., & Gerlach, S. C. (2009). Food, culture, and human health in Alaska: an integrative health approach to food security. *Environmental Science & Policy*, 12(4), 466-478
- cxixxxviii Neff, R.A., Parker, C.L., Kirschenmann, F.L., Tinch, J., & Lawrence, R.S. (2011). Peak oil, food systems, and public health. *American Journal of Public Health*, 101(9), 1587-1597.
- cxixxxix Loring, P. A., & Gerlach, S. C. (2009). Food, culture, and human health in Alaska: an integrative health approach to food security. *Environmental Science & Policy*, 12(4), 466-478
- cxli Pilgrim, S., Samson, C. & Pretty, J. (2010). Ecocultural revitalization: Replenishing community connections to the land. In S. Pilgrim & J. Pretty (Eds.), *Nature and culture: rebuilding lost connections*, (pp. 235-265). London, UK: Earthscan.



northern health
the northern way of caring

UNBC UNIVERSITY OF
NORTHERN BRITISH COLUMBIA