Current Status of First Nations Environmental Health Research

Scoping Paper

Assembly of First Nations
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Section I: Introduction

This paper provides a broad overview of existing environmental health research and literature for First Nation communities in Canada. It examines this research and identifies key gaps in information and practice. The material presented in this scoping paper responds to the need identified by the First Nations Environmental Health Innovation Network to assess existing literature on First Nations and environmental health in order to support ongoing work by the network and by environmental health professionals in First Nation communities. In order to complete this work, the Assembly of First Nations Environmental Stewardship Unit (AFN-ESU) undertook a comprehensive review of existing research on First Nations’ environmental health issues from First Nations, researchers, government departments and agencies. This review focused on First Nations-specific literature – environmental health literature not specific to First Nations that could still potentially be applied to First Nations’ needs was not reviewed. In addition, it should be noted that this literature review is an ongoing process and that there is always additional research to be added to this discussion. This paper provides a snapshot of the current environmental health research field for First Nations in Canada, identifying key research successes and needs in order to begin to lay a path forward for more comprehensive environmental health research that will effectively serve First Nations in Canada in the years to come.

~ Environmental Health ~

The field of environmental health is relatively new and its parameters are still being defined by researchers and health professionals. Broadly defined, environmental health is the branch of health care that is concerned with all aspects of how the natural, built and cultural environments affect human health. The World Health Organization (WHO) provides the following definition of environmental health:

*Environmental Health* comprises of those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social, and psychosocial factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling, and preventing those factors in the environment that can potentially affect adversely the health of present and future generations.¹

The concept of environmental protection adds depth to the above definition of environmental health. Environmental protection is crucial to ensuring environmental health and can be defined as follows:

*Environmental Protection* pertains to protecting (keeping from harm, attack, or injury) the combination of external conditions which affect the life, growth, development, and survival of an organism or group of organisms. Subject areas include: air and water quality; biodiversity; ecological dynamics; environmental effects; environmental monitoring;

¹ World Health Organization (WHO) draft definition developed at a WHO consultation in Sofia, Bulgaria, 1993.
hazardous substances and exposures; land use; pollution; resource management; and waste treatments.  

The remainder of this paper assesses what literature and research on environmental health exist for First Nation communities in Canada. Section I of this paper starts by considering the overall status of environmental health research in Canada. Building on that background, it then describes the status of environmental health research for First Nations in Canada. Section II provides a more detailed look at the status of literature for some of the key topic areas in environmental health. Section III highlights a few examples of community initiatives (but is by no means a comprehensive list of all exemplary First Nations environmental health-related community initiatives) and briefly describes some key policy concerns by way of conclusion.

~ Status of Environmental Health Research ~

The literature reviewed for this paper identifies extensive gaps in the state of knowledge on environmental health for First Nation communities in Canada. This is not surprising, as the literature also identifies significant gaps in research and professional development in the environmental health field for Canada as a whole.

Background information on things like contaminants of concern, their pathways of movement, and basic mitigation steps to avoid contamination does exist. For example, Health Canada provides information backgrounders on topics such as arsenic in drinking water, lead impacts to human health, drinking water chlorination, and moulds. The wide range of environmental health topics covered by these backgrounders and other similar resources is indicated by the list of Health Canada documents included in the reference section of this report. This is not an exhaustive list but merely a sample of the range of topics covered by Health Canada.

While background information does exist for many topics, the National Collaborating Centre for Environmental Health (NCCEH) finds that there is a lack of surveillance on environmental exposures and risk factors of concern (2007: online). Baseline monitoring data and a holistic understanding of the movement of toxins and contaminants through the environment is often absent. In addition, recommended levels for ‘safe’ consumption of these toxins and contaminants are frequently lowered as additional studies are completed on the physical health impacts of their presence. This ongoing adoption of more stringent standards reinforces the NCCEH’s finding that more comprehensive surveys of environmental exposures are required.

In addition to the need for more studies assessing environmental exposures, the NCCEH also identifies the need for a more extensive research knowledge base to support current services and programs. Better knowledge synthesis, translation and sharing among professionals is required, as well as professional development through evaluation of current

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2 From a WHO sponsored “Workshop for Nurses and Environmental Health Assistants” Funafuti, Tuvalu; 17-18 July 2003
services and programs that respond to environmental health concerns (NCCEH, 2007: online).

~ First Nations Environmental Health Research ~

First Nations environmental health research is embedded in this patchy information base. The major challenge for First Nations is to develop their own definitions of what environmental health encompasses, to collect and access adequate quantities of baseline environmental monitoring and health data, to develop First Nation-specific research methods, to implement community-based environmental health projects, to effectively share research findings and to create networks of environmental health experts on First Nations. This scoping paper responds to a need articulated by the First Nations Environmental Health Innovation Network to conduct a comprehensive review of existing First Nations-related environmental health literature in order to create a clear picture of what research and knowledge already exists and which topic areas require the most attention in order to fill knowledge gaps. Research projects developed and carried out by First Nations are required to ensure that information is collected and presented in a culturally-sensitive and contextual manner that is meaningful to the communities who the research is intended to serve.

Numerous sources identify a gap in data and indicators for Aboriginal peoples’ health and children’s health (for example: Canadian Institute of Child Health, 2000; Commission for Environmental Cooperation of North America, 2004, 2006a, 2006b; Ostroff, 2006). One major goal of First Nations’ research initiatives will be to generate more comprehensive collections of baseline health and environmental monitoring data and to enable better access to and comprehension of this data by community leaders, policy makers, technicians, and health professionals. Orol (2007) identifies the need for capacity support to enable community residents to access and understand information held in existing environmental contaminant databases like the National Pollutant Release Inventory (NPRI) housed at Environment Canada. Analytical tools for understanding collections of numbers are also required. Health indicators are one example of a useful tool that First Nations communities might choose to use. Indicators are well understood by mainstream western science for analyzing data, expressing connections and for measuring changes in individual health related to environmental factors over time.

The remainder of this section highlights the current research terrain for First Nations environmental health and then discusses some First Nations-specific considerations that must be accounted for in planning additional research to fill existing gaps.

Current Projects

There are many organizations currently engaged in conducting research on First Nations’ health and trying to fill gaps in data, information and research practice. These initiatives include (but are not limited to) the First Nations Regional Longitudinal Health Survey (RHS) and the National First Nations Environmental Contaminants Program (FNECP), both in collaboration with Health Canada’s First Nations and Inuit Health Branch (FNHIB). The RHS “is the only First Nations governed, national health survey in Canada. It is longitudinal in nature and collects information based on both Western and traditional
understandings of health and wellbeing” (RHS, 2008: online). Some of this information is on environmental health-related topics. This longitudinal survey will help to fill existing gaps in baseline health data that exist for First Nations in Canada.

The FNECP, launched in 1999, provides funding to individual communities to conduct their own research projects on environmental contaminants-related issues. More detail on specific projects is included in Section II. The FNECP provides a model for conducting community-based environmental health-related research and has helped to pave the way for additional First Nations’ community-based research initiatives. It provides methods for supporting project development and administering funding. FNIHB is currently starting implementation of an additional program, Climate Change and Health Adaptation in Northern First Nation and Inuit Communities. This program will build on FNECP experiences in successfully soliciting project proposals, providing support to communities and funding community-based research projects. Research projects like these provide a base for developing solid research on First Nations’ environmental health issues.

Other successful examples of community-based research include Bertell, 1994; Coumans, 2005; CCSG Associates, 2004a; Labrador West Status of Women Council, 2004; and Karafowski, 2003 (see References list). In many cases, community-based research will require novel application of traditional research methods to make it work within the community context. For example, Haley (2005) discusses the pros and cons of a ‘popular epidemiology’ approach used by some communities to advocate for remediation and compensation for impacts suffered by community members as a result of industry activities, toxic dumping and other such challenges.

Data collection initiatives such as the ones described above must be implemented according to the OCAP principles of ownership, control, access and possession (for elaboration on these principles and procedures see Assembly of First Nations, 2007). With ownership of, control over, access to and possession of data, First Nations decision-makers will be able to access the information required to plan for and minimize the risks posed by potential environmental health hazards. In the case of research, community-based research methods and holistic approaches are required in order to gather data and information that will be useful to community members. Finally, this information must be presented with a First Nations-specific lens to render it meaningful to community needs.

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First Nations’ environmental health research will push the boundaries of existing definitions of environmental health by insisting on holistic, community-based research approaches that reflect and address the complex relationships among health determinants unique to First Nations. For example, relationships with specific places are a health determinant for First Nations that might be overlooked by Western research (see sidebar entitled The Power of Place). The importance of unique relationships with places is just one example of the need for holistic research approaches that reflect First Nations’ unique relationships with the environment.

Holistic research will require First Nations to develop their own approaches to conducting research. Community-based development of indicators provides a good example of how First Nations are developing their own research processes. Anderson et al (2006: online, 5) point out that indicators of Aboriginal health in Canada exist, but that existing health information is of limited utility at the community level because of inadequate consultation, national level sampling, and local level data reporting.

The First Nations Health Reporting Framework shows one way of overcoming this limited utility of some indicators. The Framework describes a policy and planning model that places “community” at the core of the process for identifying indicators of health (see AFN, 2006: 3 for a visual rendition of this model). The experiences of the Yellowknives Dene First Nation illustrate the importance of integrating community knowledge into research practice in the way the Framework suggests. This First Nation used a community-based research process to research and choose indicators to measure the social and cultural changes that they experienced as a result of the opening of two diamond mines in their region. This research process helped to develop community understanding of the nuances of the mining impacts and was essential to making the chosen indicators useful to community members (Tsetta et al., 2005). Ratima et al (2006) also describe the importance of community-driven research in their discussion of Māori participation in selecting and developing a set of health indicators that reflects their concepts of health and that will be used according to community-determined parameters.

In addition to the need for more comprehensive data collections and to develop First Nations-specific research methods, professional development support is also required for health care providers, water treatment facility operators and other key technicians already working in communities. In terms of health care, Marshall et al (2002) identify a lack of...
training in and knowledge of environmental contaminant exposure among primary care physicians in all of Canada. To help overcome this lack of training, Marshall (nd) provides a simple worksheet that health care practitioners can use to assess a patient’s environmental health exposure history. Straightforward tools like this one, designed specifically with First Nations’ unique situations in mind, can help to overcome existing shortfalls in training and knowledge about the importance of environmental health.

In addition to resource support, information and knowledge-sharing among practitioners in all environment-related fields is essential. First Nations require their own “communities of practice” where best practice strategies and new tools for responding to environmental health challenges can be shared and improved upon through ongoing use and development. The Advanced Aboriginal Water Treatment Team (AAWTT) is an excellent example of such an information and research initiative aimed at developing a network of community experts on water treatment. Development of such expert networks for other topics, like air quality and dealing with the impacts of industrial land uses will often require support for new professional positions within community employ. AAWTT has built on the presence of water technicians who are already employed in communities and has created space for an expansion of their range of responsibilities and technical expertise. A network of experts able to respond to indoor and outdoor air quality challenges, for example, would require support for employing a full-time Environmental Health expert in each First Nation community.

The proactive environmental health approaches described throughout this section will be applied to a community reality that is currently often only able to take a reactive stance to environmental health challenges. This state of affairs is well captured by the Chiefs of Ontario Housing Department webpage (2005). This page provides information and considerations for basic safe building requirements. These are the pressing issues for which communities need information. The need to respond to the more subtle challenges posed by a range of environmental hazards may go unnoticed in the face of more urgent concerns requiring immediate response. The current research programs being implemented through FNIBH at Health Canada respond to this gap in capacity and funding for responding to environmental health challenges. More national and regional programs and funds will be required to successfully respond to gaps in information, to develop a more complete research base and to ensure ongoing professional development.

As the environmental health field develops and receives more attention from researchers and funders, it will be essential for First Nations to develop their own research, professional development and information dissemination programs that are nested in culturally-specific environmental health frameworks. First Nations’ special relationships with the environments in which they live, traditional practices, and ways of knowing their homelands will be central to all environmental health research work.

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4The shortfall in national-level environmental health research for First Nations is illustrated by the Canadian Institutes of Health Research (CIHR) project funding: from 1999 to 2006 the CIHR funded 243 projects on Aboriginal health (NCCAH, 2006: 11). Of these projects, the least funded research topic area was Environment, Toxicology and Food Security. There were only 11 projects underway for these three topic areas, accounting for 4.5% of the CIHR’s research (NCCAH, 2006: 11). Taken together, these projects receive only 1.8% of CIHR’s total funding (NCCAH, 2006: 12).
Environmental health topics discussed in Section II of this paper include: Air Quality; Water Quality; Soil Quality; Traditional Food Quality; Noise; Industry Impacts; Environmental Contaminants & Contaminated Sites (including radiation, waste disposal and consumer products); Children’s Health and Environment; and Climate Change. Key concerns and priorities for First Nations are outlined for each of these topics.
Section II: Topics in Environmental Health

~ Air Quality ~

Environmental health concerns exist for both indoor and outdoor air. Indoor air quality can be negatively impacted by presence of asbestos insulation, leaded paint on walls, moulds growing in damp parts of a building, inadequate air exchange in sealed energy efficient homes and radiation from basements. Health Canada provides informative backgrounders for many of these topics, including sources of poor air quality and how to avoid them. First Nations require additional community outreach and engagement programs to tackle problems like mould in housing that may exist undetected for years, causing subtle health problems (malaise, environmental allergies).

First Nations’ outdoor air quality issues may arise from nearby or distant industry emissions or improper waste disposal, activities within the community like barrel-burning or climate change impacts to air. For example, uranium mining can result in the presence of radon, which is an odourless and tasteless gas that is the by-product of uranium breakdown (CanNorth, 2003: 4). Mining activities may also result in release of dust, diesel emissions and contaminants in mine stack effluent (Coumans, 2005: 16). In addition to mining and industry activities, particulate matter or dust may also be released through barrel burning or garbage dump burning in or near a community, as well as by forest fires. Climate change may exacerbate some of the above activities. For example, climate change is predicted to increase the incidence of forest fires. In addition, while studies on the effects of higher ambient air temperatures remain inconclusive, warmer temperatures may result in higher mortality rates resulting from accompanying elevated ozone levels (Haines and Patz, 2004: 100).

Approaches to studying and mitigating impacts of poor outdoor air quality are discussed in greater detail in the Contaminants and Contaminated Sites and Industry Impacts sections. In order to effectively respond, First Nations communities require the capacity and research-training support to determine which contaminants pose threats to community health and well-being and how best to respond to these potential and realized threats. Health Canada’s Environmental Health Program (EHP) provides support for improving indoor air quality within individual homes on First Nations (see Health Canada, 2007b: online). The National First Nations Environmental Contaminants Program (FNECP) funds community-based research on contaminants. One community focused part of their research on outdoor air quality concerns associated with two landfills within their traditional territory. Their study looked at the impacts of burning landfill gas without pollution controls. Additional studies and remediation projects are required to address indoor and outdoor air quality concerns facing First Nations.

~ Water Quality ~

Water quality issues stem from contamination of waterways, climate change impacts, water-use pressure from industry and settlements and degradation of water ecosystems. Contaminants may enter waterways from a range of sources, including polluted run-off from
human settlements, improperly processed wastewater from septic systems, industry discharge and agricultural run-off. Climate changes and warmer ambient air temperatures are predicted to result in lower quantities of water, poorer water quality and general higher levels of stress on watersheds and their ecosystem communities. Rivers in some parts of Canada are already over-allocated, meaning that the quantity of water withdrawals of all licensed water-users adds up to more than the total quantity of water in the source from which they are taking. Finally, wetland ecosystems are an essential part of a watershed’s ability to maintain the integrity of its water quality. These ecosystems have been devastated by development and disregard for their importance and require extensive remediation to support overall vitality of ground and surface water in Canada.

At a regional level, the above stresses on water will be experienced by communities as poor quality source water for drinking, degraded waterways for participating in traditional hunting and fishing activities and loss of water ecosystems like the shallow lakes that create vital wild rice habitat. In the short-term, First Nations communities require research, technology development, capacity and infrastructure support to create and maintain robust, resilient water and wastewater treatment facilities that will ensure high quality drinking water for all community members and adequate levels of wastewater treatment prior to its release into surrounding environments.

In some cases it will be obvious that drinking and wastewater treatment systems require remediation, but in others, the symptoms will be more subtle. For example, disease-causing microbes in water can remain undetected in the general population because they result in only mild clinical symptoms, such as difficulty with digestion. Hans Peterson notes that subpopulations, such as fetuses and infants, are more susceptible to these same waterborne diseases and would suffer more acute symptoms than the general population. He suggests that it is worth investigating possible connections between poor rural water quality and the fact that rural Canada has a 40% higher infant mortality rate than urban Canada (nd, p162 online).

Programs and research are required to address the above challenges. Indian and Northern Affairs Canada’s First Nations Water Management Strategy (FNWMS) and Health Canada’s Environmental Research (ER) program are two initiatives that work in tandem to ensure that communities can access safe drinking water. Health Canada’s ER program conducts research and collects data to support the FNWMS. Research focuses on monitoring drinking water to establish a baseline collection of data, identify knowledge gaps and establish research priorities (Health Canada, 2007b: online). Health Canada’s Environmental Health Program (EHP), also helps to ensure that monitoring programs to assess potential water health risks are in place. This program also offers protection by reviewing sewage system design plans from a public health perspective (Health Canada, 2007b: online).

In addition to safe drinking water provision, research and programs are required to clean up and better care for contaminated waters by identifying and eliminated ongoing sources of contamination. Projects initiated through the National First Nations Environmental Contaminants Program (FNECP) are helping to expand the existing knowledge base. Numerous communities within this program are studying water contamination originating from various sources including nearby landfills, abandoned Radar Lines sites and various industrial activities.
In the long-term, First Nations communities require the water monitoring information described above, as well as capacity support, to participate in community-level, watershed-level, regional, national and international watershed governance initiatives and water management decision-making. Federal water policy is currently coming under criticism from many non-governmental organizations and will likely receive major attention at the Federal level in the coming years. For examples of current advocacy projects, see the Gordon Water Group’s *Blueprint for Federal Action on Freshwater* (Morris et al., 2007). First Nations’ water rights must be accounted for to ensure that vital watersheds exist to support and enhance individual, family and community health. Further discussion of methods for identifying water quality issues and developing remediation strategies is included in the *Contaminants and Contaminated Sites* and *Industry Impacts* sections.

~ Soil Quality ~

Soil quality and contamination is an issue for First Nations communities that are in proximity to existing or closed industry operations that have contaminated areas with by-products, tailings or aerial fallout from their activities. Soil contamination may also result from improper garbage dump facilities within communities or from existing / past land uses on contained sites like gas stations and certain agricultural operations.

Being aware of possible contaminants in soil is particularly important for children’s health and for food that is grown in or harvested from potentially contaminated soil. While an entire community’s health is at risk when soil contamination occurs, children often exhibit effects first, because they tend to play quite intimately with soil and the plants growing in it and have lower thresholds of resilience than adults to toxic and chemical exposure. The experience of the community in Love Canal, New York, illustrates children’s vulnerabilities. In that community, a chemical company dumped chemical waste into a canal, filled and capped it. This land then had a school built on it. Parents noticed that their children’s feet became irritated when they played barefoot in the schoolyard (Levine, 1982 in Haley, 2005: 36) and residents close to the school noticed chemicals leaching through cracks in basement foundations (Haley, 2005: 36). Proper disposal of chemicals and other toxins is essential to avoiding situations like this one.

Health Canada’s First Nations and Inuit Health Branch (FNIHB) has a Fuel Tanks and Contaminated Sites Remediation Program (FT&CSR) through which staff work with Health Canada Facility Managers to prioritize fuel oil contamination remediation across Canada. Initiatives include training First Nations on fuel tank systems and upgrading or replacing fuel storage tank systems (Health Canada, 2007b: online). Some National First Nations Environmental Contaminants Program (FNECP) research also looks at soil contamination. Most of the research that includes soil investigation focuses on sampling for contaminants in locations that are close to known contaminated sites, landfills or industrial activities.

More detail is provided on environmental contamination as a whole (of soil, air, water and ecosystems) and of the specific impacts of industry in subsequent sections in the *Industry Impacts* and *Contaminants and Contaminated Sites* sections.
There is a growing body of research and literature on contaminants in First Nations’ traditional food sources. Some of this research measures concentrations of certain contaminants and outlines possible health impacts of exposure to these contaminants while other research considers the broader health impacts of changing diets that place less emphasis on traditional foods. To date, research findings provide community-level results and have not been coordinated to provide a national-level picture of human tissue contamination resulting from consumption of traditional (or ‘country’) foods.

The EAGLE (Effects on Aboriginals of Great Lakes Environment) project was a 10 year study (started in 1990) that examined impacts of traditional ways of life on physical and socio-cultural well-being among First Nations people (Health Canada, 2005d: online). Part of this program was a study of contaminant levels in human tissue among First Nations populations living in the Great Lakes area. Other regional studies on contaminants that were carried out in partnership with Health Canada in the late 1990’s include the Lesser Slave Lake Health Study, the Northern River Basins Study and the Sioux Lookout Zone Environmental Contaminants Study. These studies all included eating surveys and human tissue sampling to determine contaminant levels (Health Canada, 2005d: online).

The National First Nations Environmental Contaminants Program (FNECP) was launched in 1999 to replace regionally-based studies like the EAGLE project. This program is both national and regional in scope, with the national component aiming to address contamination issues that are common to First Nations across the country and the regional component aiming to address those issues that are specific to smaller regions within the country. Studies conducted through the FNECP look at contaminants in foods, medicines, water, air and soil (Health Canada, 2005d: online). Research findings from projects like EAGLE and FNECP create the basis for a body of literature concerned with how environmental contaminants impact First Nations’ health and lifestyle.

In addition to considering the physical health repercussions of consuming food with high levels of contaminants, many studies consider the broader social context of the discussion, noting that consuming contaminated food may be no worse than the combined socio-cultural and health impacts of consuming imported store-bought foods. Of note is an article by Furgall (2005) which discusses the challenges associated with much of the research on contaminants in traditional foods. Furgall identifies a communication challenge that can render entire studies meaningless to the communities they target when concepts such as ‘risk’ are discussed entirely according to Eurocentric understandings of environmental risk. Furgall points out that these studies often fail to orient themselves within communities’ ways of knowing and interacting with their environments. Lack of acknowledgement and respect for methods already used by communities to assess and avoid environmental risk factors like unsafe food must be incorporated if studies are to be meaningful and add to the body of literature on contaminants that is relevant to the First Nations communities who require it. The best way to overcome challenges associated with culturally inappropriate research is for research to be conducted by community members, with community ownership over research findings. Programs like the FNECP provide useful research opportunities by funding such community-based research.
~ Research Gaps and Needs ~
First Nations’ issues related to contamination of traditional food have received a relatively large level of research attention compared to other environmental health topics. Despite this attention, consistent national-level baseline data on First Nations’ food consumption patterns, nutritional composition, presence of contaminants in food and temporal changes to diet have not been collected. In addition, the literature lacks approaches for developing contaminated food advisories. Furthermore, research is required to begin developing remediation measures and alternative food practice solutions for communities whose traditional food sources do contain unsafe levels of contaminants. This is especially important for communities where extreme environmental degradation or contamination has occurred. In these cases the community may identify certain foods that are no longer safe to eat or that are no longer present in adequate quantities for harvesting as a result of the impacts of climate change or other environmental degradation. A ten-year study that will collect consistent baseline data on contaminants in traditional foods is currently being launched through a partnership with representatives from Health Canada, University of Northern British Columbia, the Public Health Agency of Canada, AFN and University of Montreal. This study will help to fill existing knowledge gaps and guide future research.

~ Noise ~

The two major sources of noise that may cause problems from an environmental health perspective are community and recreational noise and aircraft noise. Sources that fall into the first category include machinery and power tools (including chainsaws and snowblowers), vehicular noise (trucks, cars, boats, planes, snowmobiles, atvs), noise from other dwellings, and machinery or industry noise. Aircraft noise is the other major type of noise posing an environmental health concern – particularly noise from low-flying military.

Health Canada concludes that the main adverse health effects of noise disturbance are annoyance, sleep disturbance, interruption to communication and hearing damage (2006a: online). A more in-depth review by Health Canada of the potential health impacts of low-level military flights in Happy Valley Goose Bay Labrador found that there are no adverse physical health impacts that result from these flights and that any hearing loss or irritation suffered will only be temporary (Health Canada, 2007a: online).

Examples of community and recreational noise that might pose particular health concerns for First Nations communities are noise from generators running constantly as a power source for the community or continuous noise from an industry operating in close proximity to the settlement. The environmental impacts of low-level military flights are of particular concern for aboriginal people living in the Happy Valley Goose Bay area where these flights are conducted in Canada. The 100 000 km2 of land in question has traditionally only been used by aboriginal people in the area. While the low-level flight industry supports the community economically, health impacts suffered by people and animals in the area bring the practice into question. Impacts of the project were reviewed in 1994 by an Environmental Assessment Panel for National Defense. The report states:
“Despite more than 14 years of military low-level flying, there are few sound data on the effects of low-level flying on human health, on wildlife or on the environment in general. That state of ignorance should not be allowed to continue.” (Canadian Environmental Assessment Agency, 1995: online)

A study by R. Ian Goudie on impacts of military jet flights in Labrador on harlequin duck behaviour found:

“Behavioural responses of harlequin ducks to military jets were 23 times stronger than their responses to floatplanes, helicopters and military cargo planes, and the significant interaction of aircraft type and noise indicated that noise may be the primary stressor affecting behaviour”. (2006: online).

No additional studies on impacts to human health were located or reviewed for this report. The findings reviewed thus far indicate that low-level aircraft have a significant effect on the health and well-being of First Nations in the Happy Valley Goose Bay area and that efforts must be made to offset negative impacts even though there may be significant economic benefits for some community members from having this industry located in their region.

~Industry Impacts~

As indicated by discussion throughout this paper, industries like mining, oil extraction, pulp and paper operations, hydro-electric plants and agricultural developments have impacts on their surrounding environments and generally alter the composition of air, water, soil and ecosystems, often introducing contaminants that would not otherwise be present. Much of the current environmental health literature relevant to Canadian First Nations is community-level analyses that focus on developing ways of understanding the impacts of industry on individual, family and community health.

In addition to introducing contaminants into the physical environment, extractive industries alter ecosystem integrity and vitality by collecting certain plants or animals from a given region. Harvesting activities (like fishing, hunting, gathering medicinal and food plants) are often important parts of First Nations’ spiritual and cultural traditions and in many cases have been compromised by conflicts over land use and allocation with incoming prospectors and settler populations.

Some research projects focus on monitoring levels of contaminants released into the environment and present in soil, air, water and vegetation. Toxins of concern include, but are not limited to, uranium, mercury, methyl mercury and pesticides. For examples of research methods and some findings of this monitoring-type research, see: Bertell, 1994; CCSG Associates, 2004b; The Labrador West Status of Women Council, 2004; and CanNorth, 2003 & 2005.

Other research focuses on gathering information from community members on the physical, mental and emotional health impacts they experience in relation to activities of a nearby industry. Examples of these types of study include: CCSG Associates, 2004a, Coumans, 2005; Ginger & Klinck, 2005; The Labrador West Status of Women Council, 2004; and
Mergler, 2003. who notes that mining activities shape the social fabric of mining communities, and that impacts on happiness and sense of well-being are sometimes more significant in community members’ lives than the physical impacts of contamination, though these also play a role.

Research that considers what sustainable industry looks like from a community perspective can respond to the above finding, by suggesting remediation efforts to enhance physical, mental and emotional wellbeing. Such research is essential, as industries are often the livelihood for communities and their impacts may be taken as a necessary repercussion of having a viable livelihood. Research that considers ways for industry-dependent communities to understand and reconcile the realities of living with that industry include: Kuyek and Coumans, 2003; Spiegel and Veiga, 2005; Paci and Villebrun, 2005; Offshore Oil and Gas Research Group, 2004; and Tsetta et al, 2005. Turner (2001) discusses sustainable harvesting of non-timber forest products, considering how First Peoples can control harvest and use of their traditional resources and whether communities should pursue such harvest as a form of sustainable economic development. Approaches to making industry more sustainable usually focus on community-level articulation of indicators of environmental health impacts and community-generated solutions that respond to the unique challenges identified that face the community.

~ Environmental Contaminants & Contaminated Sites ~

As discussed throughout the Air Quality, Water Quality, and Soil Quality sections, contamination of the physical environment is a major concern for the entire Canadian population, especially First Nations. Sources of contamination include industry by-products, improper waste disposal by industry and individuals, chemical spills, electrical equipment (containing lead or PCBs), environmental radiation, some drugs and personal care products, and certain consumer products (including building materials and children’s toys). Contamination of indoor environments is also a concern, as indicated in the Air Quality section. Consumer products are a particular cause for concern with regards to contaminants in indoor environments. Identification and discussion of all possible contaminants is well beyond the scope of this report. Health Canada reported in 2006 that the New Chemical Substances Sections of the New Substances Assessment and Control Bureau are responsible for assessing health risks associated with approximately 1000 new chemicals and polymers (2006b: online). This list is in addition to existing substances already in common use.

Topics covered in the reviewed sources include basic information on the chemical structure of contaminants and pathways of contamination (see Health Canada). Health Canada also provides a series of fact sheets on specific contaminants (topics include PBDE flame retardants, fluorides, pesticides, lead and consumer products). These highlight contaminants of concern and ways of minimizing risk. Such fact sheets may be useful for introducing issues of concern, but may also be disempowering for people living in isolated communities with little access to choice over which products to purchase and use. Searchable databases with records of pollutants being transferred or released into the environment are also available (see Environment Canada’s National Pollutant Release Inventory and Environmental Defence).
In addition to this non-First Nation-specific environmental contaminant information, First Nations-specific research on contaminants is being conducted in communities across the country through the National First Nations Environmental Contaminants Program (FNECP). The specific content of this research is discussed in the preceding sections Air Quality, Water Quality, Soil Quality and Traditional Food Quality. In general, projects aim to determine how much contamination of fish, meat, medicine, plants, water, air, and soil occurs as a result of activities and land use including (but not limited to): petrochemical extraction, landfills, hydro-electric generation, abandoned Radar Line sites, mining, incineration, and sewage lagoons. Individual projects look to determine the persistence of certain pollutants in the environment, establish acceptable concentrations of contaminants, assess the impacts of behavioural changes toward non-traditional diets, identify links between contaminant exposure and disease, and map contaminated sites at a regional level. These single and multi-year projects are helping to create a First Nations-specific knowledge-base and discourse on environmental contaminants and environmental health. As time goes on, new projects will emerge that build on studies that have been conducted thus far and explore new concepts and approaches to understanding and solving environmental contamination facing so many First Nations communities in Canada.

~ Research Gaps and Needs ~

While FNECP research projects have begun to establish regional knowledge bases, the literature reviewed thus far indicates the need for more studies on the impacts of environmental contaminants and specific industries on human health. In many cases, the long-term health impacts of exposure to particular environmental contaminants are not yet known. For example, the community of Fort Chipewyan (located downstream of a major tar sands extraction project) is experiencing abnormally high rates of cancers, auto-immune diseases and a condition called cholangiocarcinoma (Petersen, 2007: online). Specific research linking these illnesses with the tar sands activities has not been completed. Additional studies linking the specific impacts of industry activities to environmental and human health outcomes are required so that communities have leverage for inclusion of health impact mitigation measures in environmental assessments of proposed future developments.

Further research is also required on contaminant clean-up and remediation for communities that have already been impacted by contamination of their environments and bodies. Research that links the impacts of specific contaminants with industry activities and human health (cancers) is also lacking. Finally, successful litigation on environmental health rights in First Nations communities is lacking. A legal analysis of a path forward is required to support community initiatives to assert the right to a clean and safe environment.

Contextual research methods are required to gather evidence that will be useful to communities. For example, assessment of contaminant impacts must be conducted over the long-term and should be studied intensively prior to creation of new industry developments. This period of study will often be at odds with the economic benefits of a given project but is essential to a proper environmental assessment. In many cases a First Nation community might benefit from the economic opportunities offered by an incoming industry and conflicting interests within communities will impact the breadth, depth and direction taken with research initiatives.
Finally, existing backgrounder fact sheets on sources of environmental contaminant exposures and risk-posing contaminants require hands-on support to be helpful to First Nations communities. Dissemination of information could be conducted through information workshops that provide realistic solutions to avoiding contaminants that community members can implement in their own lives. In addition, as more community-level studies are completed it will be important for First Nations Environmental Health Workers to begin to establish their own networks and knowledge sharing pathways so that research completed in one community that may be relevant to another community can be shared in a way that is acceptable to members and research participants in both of those communities. An example of this is the “Best Practices Gatherings” being coordinated by Turtle Island Environmental Resources (TIER) and the Indigenous Cooperative on the Environment (ICE) in fall 2007 – winter 2008 to develop community strategies on pollution and the environment.

~ Children’s Health and Environment ~

Children represent a specifically vulnerable subpopulation to the effects of environmental health threats because they breathe, eat and drink more per kilogram of bodyweight than adults, their organs are still developing and they tend to interact more closely with their environments by eating, smelling and touching things that most adults leave alone (Ostroff, 2006: online). The field of children’s environmental health is just developing, with a range of reports being released on possible health indicators to measure environmental impacts on health. Most of these reports frame their discussion by stating that inadequate research on linking environmental factors to children’s health exists to date. For examples, see: the Canadian Institute of Child Health, 2000; Ostroff, 2006; Committee on Health and the Environment – Children’s Task Group, 2006; and Commission for Environmental Cooperation of North America (CEC), 2004, 2006.

Emerging issues include high incidences of respiratory illness, childhood cancers, and effects of exposure to lead and other toxic substances (Commission for Environmental Cooperation of North America, 2006a; Canadian Institute of Child Health, 2000). Baseline health data and other research specifically focused on First Nations children is required to make these emerging research projects relevant to First Nations communities. Existing assessments of environmental health issues unique to First Nations communities should be extrapolated for how those same health issues might more drastically impact children.

~ Climate Change ~

Climate change impacts are likely to exacerbate many of the environmental health issues identified throughout this report. Changes to climate are likely to result in warmer temperatures and thermal stress; poorer quality air and water; more floods, droughts and extreme weather; greater incidence of vector-borne and zoonotic diseases; more water and food borne contamination; increased exposure to UV radiation; increased vulnerability of subpopulations (including children, elderly, disabled and poor communities) (Haines and Patz, 2004; Health Canada, 2005a & b).
The international academic community is shifting its focus to developing viable adaptation strategies for coping with the above stressors to environments and human health. The Government of Canada is supporting adaptation through programs to be administered by Indian and Northern Affairs Canada (INAC), Natural Resources Canada (NRCan), Health Canada and Environment Canada. In many cases these programs will support community-based research project development to support eventual implementation of adaptation initiatives. The issue of climate change is complex, and First Nations communities will require much support to maintain access to sufficient infrastructure and health care facilities to ensure ongoing health and well-being.
Section III: Research & Development

~ Community Initiatives & Tools ~

Much of the existing research on the environmental health issues discussed throughout this paper focused on the issue (e.g. impacts of forestry practices on the forest ecosystem) and does not consider how it affects First Nations (CIER, 2005: 1). The Canadian Environmental Assessment Agency identifies this shortcoming and articulates the need to improve environmental assessment practices to better account for First Nation communities and the impact of projects on First Nations people in addition to the animals, plants and ecosystems that current environmental assessments supposedly consider (2001, online). A key challenge is finding ways to assess environmental health while accounting for socio-economic prosperity and sustainable environmental projects. First Nations communities require novel tools and approaches to assessing and evaluating environmental impacts and building socially and economically resilient communities.

An essential step within communities will be the integration of traditional knowledge into land and water management strategies. Moller et al (2004) point out that such knowledge integration can better equip First Nations people to respond to western scientists and their arguments and viewpoints by building First Nations’ capacity to critically evaluate scientific predictions in light of traditional ways of knowing and managing ‘resources’ and to respond with culturally appropriate strategies for collaboration or First Nations-led management. Research conducted through the FNECP program helps to facilitate this knowledge integration by supporting community-based projects conducted in accordance with western scientific research approaches.

Appropriate management tools and assessment methods will be required to support initiatives aimed at developing capacity for First Nations to manage their own lands and waters and to impact management strategies for surrounding lands and waters. For First Nations who harvest from the land as part of their economic livelihood, development of fair-trade movements to support their activities in the marketplace may be an appropriate path forward to ensuring the ongoing integrity of the particular product in question and the harvesting practices employed to collect it. Laduke (2007: online) compares the advocacy work of Ojibwe tribes in the Northwest US to the fair-trade coffee movement. Ojibwe rice gatherers have been working to protect both the genetic integrity and presence of suitable habitat for indigenous wild rice strains. Part of this work has lain in raising awareness among wild rice consumers about the differences in types of wild rice and the importance of supporting indigenous wild varieties of wild rice (Laduke, 2007: online).

Other approaches to sustainable integration of higher impact industries like mining or hydro-electric developments will be required on a case-by-case basis. The experience of the Yellowknives Dene First Nation in developing their own set of community-defined indicators for measuring the impacts of mining on their community is one approach to accounting for health impacts of such a development.
The experience of the Taku River Tlingit First Nation in Northern BC provides a final positive example of a new way forward for impact assessments. In this community, the industry group Redfern engaged in the provincial government’s consultation process in speculating on some of the Tlingit Nation’s land. The Tlingit people were not consulted during this process and did not accept the road that Redfern planned to build. The community requested that an independent panel of researchers conduct a study on the impacts of Redfern’s proposed mining road through Tlingit traditional territory before construction could go ahead. The report found that Redfern’s adaptive management plan was inadequate and did not account for the significant cultural, environmental, and economic impacts that the road would have on the community (Botkin et al, 2004: online). This highlights the inadequacy of existing environmental assessment consultation processes and illustrates how one community was able to overcome these shortcomings.

~ Policy Support ~

The need for more comprehensive environmental assessment approaches identifies a final gap in environmental health research and capacity of any community to respond to the issues discussed throughout this paper – policy support. A recent report by the David Suzuki Foundation (2007), Prescription for a Healthy Canada: Summary for Policy-makers, calls on the Canadian government to adopt more stringent national laws and policies governing air and water quality drinking standards, use of pesticides and regulation of toxic substances. The report summarizes five priority areas to which a national health strategy should respond: improved research and monitoring of toxic substances in human bodies; stronger laws, regulations and policies that ban potentially dangerous substances, building professional capacity and public awareness of environmental health risks, responding to unjust distribution of environmental harms and prioritizing environmental health at the international level. The policies recommended in this report would begin to respond to many of the environmental health issues that currently have a disproportionate impact on First Nations communities by taking dangerous consumer products out of circulation and reducing output of toxic contaminants into water, air and soil. New policies must create space for First Nations to continue to participate in traditional activities, to generate novel sources of economic prosperity and to exercise their treaty rights.

As the literature body currently stands, additional First Nations-oriented research is required for all topics in environmental health discussed in this report. This research needs to provide baseline environmental monitoring and health data, link health complaints and environmental impacts, support professional development within the environmental health field and promote communities of practice among professionals. First Nations require research methods that support community-led research, grassroots response to environmental impacts and that nurture culturally-appropriate analyses that have a voice within the current literature that is dominated by the western scientific voice. Environmental health research responds to difficult questions that do not have clear-cut answers, especially in the face of widespread contamination and environmental abuse that is creating ongoing degradation to First Nations’ health and well-being. First Nations communities require ongoing support and capacity development to be able to respond effectively to this complex array of issues.
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