



Crisis on Tap: Seeking Solutions for Safe Water for Indigenous Peoples



**University
of Victoria**

Centre for Aboriginal
Health Research

Crisis on Tap: Seeking Solutions for Safe Water for Indigenous Peoples

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CAHR dedicates this book to the Indigenous peoples who are working to protect their water from development impacts, and to the disturbingly high number of communities that remain, at time of publication, without access to safe water. CAHR, through its health research programs, supports the integral involvement of Indigenous peoples in seeking solutions to their health and water safety issues.

The University of Victoria Centre for Aboriginal Health Research (CAHR) is a research centre of the University of Victoria that aims to promote the health and well being of First Nations, Inuit and Métis Peoples whose health disparities require urgent attention.

The Centre provides a physical and interdisciplinary intellectual environment for research, student training and for the generation and dissemination of basic and applied knowledge. It focuses on the strengths, challenges, opportunities and problems of Aboriginal Peoples and the societal structures and institutions that affect them. The Centre fosters Aboriginal contributions to society through research that values First Nations, Inuit and Métis culture, community collaboration, experience and knowledge and world views.

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Preface

Water which is safe to drink straight from the tap is taken for granted by many Canadians, despite the fact that access to safe drinking water is far from universal. Across the country, many communities endure conditions unimaginable to most Canadians: water accessed through pipe systems causes gastrointestinal illness, must be boiled prior to consumption or not used at all, and these drinking water advisories can last anywhere from a few days to several years. First Nations are over-represented in both the number and severity of drinking water advisories, and face considerable barriers in (re-)establishing clean drinking water in their communities. These challenges have been increasingly recognized by all levels of government – this recognition led to the development of the First Nations Drinking Water Safety Programme and to new legislation creating enforceable drinking water standards on First Nations reserves.

Last year's World Water Day also marked the midpoint of the United Nations Decade for Indigenous Peoples, and honouring the importance of water to the health of Indigenous communities, the Centre for Aboriginal Health Research and partners held the Consensus Conference on Small Water Systems Management for the Promotion of Indigenous Health, March 21-23, 2010. This three day event brought together community members, researchers, policy makers, and health and water services professionals to discuss pathways to achieving universal safe drinking water in Canada and abroad. Two themes emerged from the discussions as important to addressing safe drinking water in Canada: collaboration across disciplinary boundaries and greater self-determination among First Nations.

In the months following the conference, the Centre for Aboriginal Health Research initiated a workshop series exploring economic and social barriers to safe drinking water experienced by First Nations in British Columbia. Working in partnership with six communities, CAHR delivered workshops on topics specific to local needs.

The book that follows shares the proceedings of the conference and a report summarizing the process and findings of the workshop series. On the Centre's website (www.cahr.uvic.ca) you can also access the video recordings of the conference presentations, as well as a trailer video and a full documentary produced as a result of the conference. It is my hope that these materials open a door to interdisciplinary exploration of the issue and support 'two-eyed seeing' where water is concerned¹.

¹ Marshall, A. (2008). Two-eyed seeing. Retrieved October 14, 2011, from Collaborative environmental planning initiative Website: <http://www.brasdorcepi.ca/two-eyed-seeing>.

Historically and to the present day, expanding settler economies rely on water for use in agriculture and industry as well as for household consumption. The process of colonization denied the water rights of Indigenous peoples in many countries around the globe. For example, here in British Columbia, the right to withdraw water from fresh water sources was assigned through licenses issued to settlers making withdrawals for domestic, agricultural, and industrial uses. In a time of scarcity, the oldest licenses have access to available water first. As a result of colonial processes and exclusion of First Nations from decision-making and information-sharing, and allegedly also from deliberate action on the part of the provincial government, First Nations are seldom the senior license holders.

Water, both as a public health and rights issue, is difficult to manage fairly for the benefit of all. It is simply too valuable to too many people. Its course often crosses political boundaries, making it difficult to govern in a coordinated manner. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) brings the issue of water rights to the fore, asserting that:

Article 25

Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.

Article 32

- 1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.*
- 2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.*
- 3. States shall provide effective mechanisms for just and fair redress for any such activities, and appropriate measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact."*

At a recent “*Healthy Land, Healthy People*” meeting hosted by the National Collaborating Centre for Aboriginal Health, Indigenous community members and academics from New Zealand and Canada gathered on the traditional territory of the Coast Salish People² to discuss the role of Indigenous knowledge in addressing links between the health of the land and the health of people. Participants offered the following comments:

1. *New and existing networks are an opportunity to share success stories and lessons learned from Indigenous research partnerships that re-connect community, environment and health.*
2. *It is important to identify and overcome obstacles to research that recognizes and acknowledges the critical roles of Indigenous Knowledge and ‘ways of being/knowing’.*
3. *There is a growing need to communicate the notion of respectful relationships that promote sustainable environmental stewardship linked to health advocacy and social change that respects traditional indigenous knowledge and world views.*

I hope that in reading this book, in viewing the companion videos online, and in hearing the voices of those impassioned by this public health and health equity issue, that you will come to find, as I have, a rationale for increased cooperation and partnerships, particularly across disciplinary boundaries and in support of communities as agents of change.



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² <http://www.squamish.net/aboutus/>

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Part I

Introduction: Indigenous Peoples' Health and Access to Safe Water

Water and Indigenous Peoples' Health:
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Introduction: Indigenous Peoples' Health and Access to Safe Water

A Global Issue: Impacts on Aboriginal Peoples

Human beings are dependent on clean, healthy water for all elements of our well-being. In the absence of this gift, we are prone to hunger, thirst, and illness. World- wide, lack of access to clean water for domestic use is responsible for reduced life span, increased child mortality, and increased burden of illness. Some 1.1 billion people struggle against these challenges around the globe¹, and each year 1.5 million children die from dehydration caused by diarrhea which is in turn most commonly caused by waterborne pathogens carried in unsafe drinking water². In response to these chilling facts, the United Nations (UN) made drinking water and sanitation targets and programs integral to the Millennium Development Goals (MDGs). The World Health Organization (WHO) has also initiated programs improving access to safe drinking water, including household level interventions focused on improving water storage techniques³. Internationally, issues of drinking water and sanitation have received much attention from such organizations as the World Health Organization (WHO 1997; 2003; 2006) and the United Nations (UN 2006; 2010). Modest success has been recorded. However, these efforts have not targeted assistance towards Indigenous communities which are over-represented among the world's poorest⁴.

Access to safe drinking water has also long been a concern in rural and First Nations communities in Canada. A doctor working in northern Manitoba reported that drinking water quality was the greatest public health threat in reserve communities – in the 1950s⁵. Fifty years later, an INAC assessment of on-reserve water systems found that over a third posed health risks⁶, and 118 of some 630 First Nations across Canada were on a drinking water advisory at the end of June, 2011⁷. The 2005 Regional Longitudinal Health Survey – Results for Adults, Children, and

¹ WHO & UNICEF (2006).

² UNICEF & WHO (2009).

³ WHO (2007).

⁴ CAHR (2010); Stephens, C., Porter, J., Nettleton, C., & Willis, R. (2006); Anderson, I., Crengle, S., Kamaka, M., Chen, T., Palafox, N., & Jackson-Pulver, I. (2006); Montenegro, R. & Stephens, C. (2006); Ohenjo, N., Willis, R., Jackson, D., Nettleton, C., Good, K., & Mugarura, B. (2006).

⁵ Bureau of Health and Welfare Education (1961).

⁶ INAC (2003).

⁷ Health Canada. (2011)

Youth reported that 32.2% of First Nations people living on-reserve were concerned about the quality of their drinking water. These findings belie a serious threat to public health in Canada, as “poverty in the form of material deprivation, *lack of clean water*, poor nutrition, allied to lack of quality medical care can account for the tragically foreshortened lives of people” in vulnerable populations⁸.

Factors contributing to poor access to safe drinking water in First Nations communities are numerous and complex. “[M]ost First Nations water systems share the problems facing all small, remote systems.”⁹ Small water systems are more prone to contamination from logging, mining, agricultural, and other land use activities which lead to contaminants entering hydrologic systems, simply because these activities take place nearer to small communities than large urban centres. These water systems often rely on small bodies of source water with variable flow rates, resulting in reduced capacity of the water source to dilute contaminants and high variation in concentration levels of contaminants. This makes the water more challenging to treat. The financial limitations of smaller communities also make it difficult to retain well-trained water systems operators, as once they are qualified they can often earn higher wages by relocating to larger centres. The BC Auditor General reports that small water systems generally are at risk from several threats, resulting in a highly complex environment in which to assure drinking water that is safe for consumption.

At the time of writing this publication, there are no enforceable standards for water quality provided by on-reserve treatment and distribution systems. Moreover, conflicting incentives arise from the division of responsibility for safe drinking water between Indian and Northern Affairs Canada (INAC), Health Canada, Environment Canada, and communities themselves, which are responsible for approving water-related infrastructure, monitoring water quality, and protecting source water; and the operation and maintenance of treatment and distribution systems serving residents of First Nations communities, respectively.

Thus far, actions taken to improve First Nations access to safe drinking water have been technical in nature. For example, in 2006 Indian and Northern Affairs Canada launched the First Nations Water and Wastewater Action Plan to improve infrastructure and water systems operator capacity in First Nations communities. As it stands, as of 2012, \$903 million will have been spent in the pursuit of technical

⁸ Marmot, M. (2005). p.1101.

⁹ Swain, H., Louttit, S., & Hrudey, S. (2006). p.19

(infrastructure) solutions since 2006. Despite this the 2010 progress report states that in that year, the number of high-risk water treatment systems actually increased (INAC, 2010). This apparent discrepancy between investment and improved water supply is a significant gap that warrants further examination.

In 2010, the federal government introduced new legislation through the Senate for the application of provincial drinking water standards to on-reserve systems - titled Bill S-11 - though serious concerns have been raised about the bill's actual impacts on First Nations communities (Four Arrows, 2010). These concerns range from financial solvency of bands to First Nations' right to self-determination¹⁰ to the likelihood of the legislation resulting in real improvements in drinking water quality. There is a pressing need to synthesize the complex array of perspectives regarding barriers and opportunities for provision of clean potable water for First Nations. For example, a major shortcoming of the impact analysis process associated with the creation of Bill S-11 was that the studies did not include any social (non-technical) impacts of the devolution of responsibility for providing safe drinking water to the band councils (Institute on Governance, 2009), including legal, economic, cultural, and self-governance impacts. The process determined by the federal government simply did not allow enough time for these kinds of discussions. Perhaps, in light of the hundreds of millions of dollars invested by government, the question of supporting safe drinking water in First Nations communities also merits significant investments into consultation and cooperation to ensure the effectiveness of its implementation.

The Centre for Aboriginal Health Research Water and Aboriginal Health Program

The Centre for Aboriginal Health Research (CAHR) at the University of Victoria is concerned about the health and related social circumstances, in which Indigenous peoples worldwide, including the First Nations, Métis, and Inuit of Canada, find themselves. Our past work has focused on the various pathways by which Aboriginal people can find their way to good

¹⁰ Bill S-11 is 'enabling' legislation, meaning that it is legislating the power to regulate water quality standards to the Minister of Indian and Northern Affairs. If passed, the final say on water quality standards on reserve will rest with a federal ministry and not with the hundreds of independently-run reserves in Canada. Furthermore, there will be no more room for democratic discussion on water standards; it will have been bureaucratized. Another concern with the wording of the Bill is that it doesn't include anywhere a non-derogation clause assuring that it cannot derogate from existing Aboriginal Right and Title. Rather, the wording says that decisions made under the Bill shall "prevail over any laws and by-laws made by a First Nation" (Senate of Canada, 2010). For further reading see Evans, R., 2010; Mitchell, G., 2010; and Dyck, L., 2010.

health, by acting as a catalyst to bring together Aboriginal communities, researchers, governments and non-governmental organizations to address issues critical to improvement of health. CAHR produces publications that are freely available and increase access to knowledge on Aboriginal health based on scientific evidence and using holistic approaches such as a life course approach to epidemiology, and the study of the social determinants of health as they relate to the crisis of chronic disease among Aboriginal peoples¹¹.

It has become increasingly apparent that safe drinking water is an important health resource which is continuously or sporadically unavailable in many First Nations communities. Moreover, increasing attention to this matter means that the time is right for action on this issue from many fronts. Within the research community, networks and institutes are devoting more resources and attention to water-related challenges in First Nations communities. For example, the Canada-wide Res'eau-Waternet has a working group on First Nations water systems that develops methods for linking source water quality with the water quality delivered by treatment systems and investigates innovative treatment methods which are cost effective and appropriate to small water system settings. Also at the national level, the Public Health Agency of Canada-funded National Collaborating Centres, and in particular the National Collaborating Centre on Aboriginal Health, have recently run projects on small drinking water systems in Canada.

CAHR's contribution in the area of Aboriginal and Indigenous health has been to elevate the concerns and goals of communities in research and policy agendas. As a result, CAHR is actively engaged with experts from various disciplines, a broad range of stakeholders in Aboriginal health and water quality, policy-makers and Aboriginal communities in addressing the knowledge-to-action gaps through the creation of new knowledge and identifying new opportunities for knowledge-to-action and knowledge synthesis projects to improve First Nations health through increased access to safe and clean water supply. To this end, the CAHR has been successful in obtaining funding for meetings, planning and dissemination, and public outreach and workshops, from the Canadian Institutes of Health Research (CIHR), the International Development Research Centre (IDRC), the BC Environmental and Occupational Health Research Network (BCEOHRN), and Social Sciences and Humanities Research Council (SSHRC) for the following initiatives:

¹¹ See for example Reading, J., 2009.

1. The Consensus Conference on Small Water Systems Management for the Promotion of Indigenous Health, March 21-23, 2010, University of Victoria, British Columbia (“Consensus Conference”): Timed to coincide with UN World Water Day, this three day international event addressed science and technology; government policy; traditional knowledge and spirituality; and indigenous politics and advocacy.
2. Mobile Aboriginal Water Workshop Series, July 2010 (“Mobile Workshops”): Workshops were delivered in partnership with six First Nations communities and other stakeholders on the socio-cultural context of small water systems. The purpose of these workshops was to connect communities to academic experts in topics pertinent to their locale, to provide open fora for discussion of issues affecting the community and working toward a shared community vision, and to generate commitment for community-level action plans developed over the course of some workshops.

CAHR has developed a video documentary based on the presentations and interviews with community members, water system operators, policy-makers, leaders, researchers from natural and social science backgrounds, and students. It is called “Crisis on Tap: First Nations Water for Life”. This documentary, produced in 2010-2011 and narrated by Cree television personality and musical artist Art Napoleon, is currently available from CAHR and examines the issue of lack of access to safe water from the points of knowledge connection between the often opposed bodies of knowledge of Western science and Indigenous traditional knowledge.

In this publication you will find the proceedings of Consensus Conference (see Part II) as well as a report on the workshop series (see Part III), and we hope that you will find the knowledge useful in your work and for your communities to develop and advance solutions this important public health issue. We are most grateful to our Aboriginal community partners for inviting us to their communities to hold the workshops and for reviewing the report; we support their perseverance in working to provide and maintain access to clean water for their members.

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Water and Indigenous Peoples' Health: An Integrated Knowledge Translation Approach

The Ethics of Knowledge Translation and Aboriginal Health

Knowledge translation (KT) is one of many terms commonly used to describe efforts made to close the know-do gap – by using research to fuel positive change. This challenge is partly a feature of an historical separation of knowledge and action, and this can be seen in health where the specialized functions of knowledge creation and health service delivery are often separate. In contrast, in Aboriginal knowledge traditions, knowledge is often inherently practical, developed for a specific use and easily applied to everyday tasks¹. Aboriginal communities also have diverse traditions of knowledge that are created and refined over long periods of time and shaped by living closely with the natural world; these include rich oral traditions, experiential knowledge, and cross-cultural knowledge sharing. Therefore, although the term knowledge translation may not be familiar to some Aboriginal communities, the concept of acting upon knowledge to improve conditions of life is one that is readily understood as necessary.

The decision to put research to use by affecting positive change in the world is often primarily an ethical choice, though it will have practical, economic and other considerations in its implementation. Motivated by a moral calling to improve the circumstances of fellow human beings, putting research to use raises ethically-charged questions of who, what, why and how to affect positive change. In the case of Aboriginal health research, KT is often motivated in part by the urgency of the challenges many communities face, the disparities in health and socio-economic indicators relative to the general population², and a desire to eliminate them. Examining the 'what' question and defining knowledge translation as it relates to diverse Aboriginal communities requires us to reflect on how to define *knowledge* and what could be considered in its *translation*³. In defining these terms, it is imperative to identify how the research process will be informed by Aboriginal, culturally-rooted approaches to knowledge, as this will impact both the nature of information shared

¹ CIHR (2009); Kaplan-Myrth, N. & Smylie, J.(2006).

² Reading, J. (2009).

³ CIHR (2009).

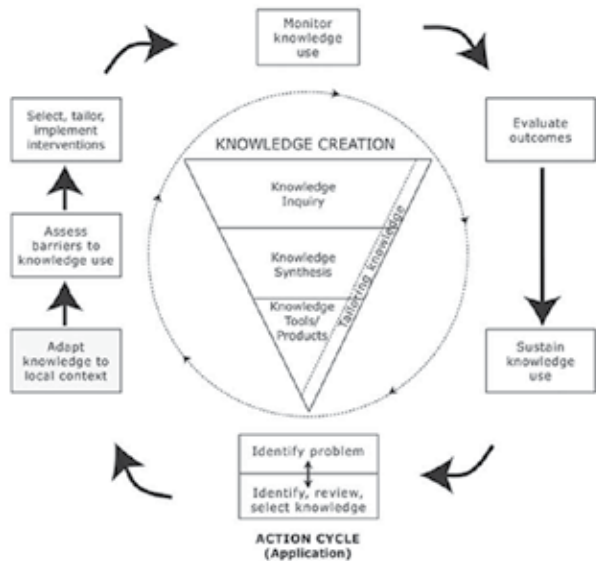
and the means through which it is translated. From a practical point of view, successful KT requires community input and support from the onset of the research project, in order for knowledge generated by the research activity to be relevant to the prospective knowledge users. Further, the involvement of Aboriginal people in both research and KT is a requirement for conducting ethical research⁴. In terms of research methods, this ethical imperative has contributed to the development of community-based and participatory-action research methods, which share many principles with integrated knowledge translation – the form of KT which is often most consistent with and responsive to the needs of Aboriginal communities. The codification of Aboriginal community interests and the clarified definition of their role as an equal partner with academic institutions in the research process, from its inception, through to publication and other forms of knowledge translation, has required significant and concerted efforts spanning two decades⁵. This significant achievement in defining national ethical guidelines, which has brought together the aims of government and funding agencies, research intensive institutions and Aboriginal communities, is very recent and has only just begun to change the landscape of research involving Aboriginal peoples in Canada. The future may look quite different in terms of how formal mechanisms support Aboriginal peoples' involvement in research that concerns their community.

⁴ For guidelines on conducting ethical research involving Aboriginal peoples, please see CIHR (2008) and CIHR, NSERC, & SSHRC (2010).

⁵ Brant-Castellano, B. & Reading, J. (2010).

An Integrated Approach to Research and Knowledge Translation to Improve Indigenous Health

Figure 1: Knowledge to Action Cycle



Graham, Logan, Harrison, Straus, Tetroe et al. (2006). p.19

The knowledge to action cycle (see Figure 1) was first described by Graham, Logan, Harrison, Straus, Tetroe et al (2006) and has been adopted by CIHR as part of its explanation of knowledge translation and the role of research in affecting change. CIHR identifies two types of KT: end of grant KT and integrated KT. Conventional knowledge translation focuses on the bottom two segments of the central triangle – knowledge synthesis and knowledge products – often called “end-of-grant KT” which disseminate research findings to other researchers and large knowledge users such as ministries and public health authorities. CAHR’s program of past and planned activities on the topic of Indigenous health and water encompass many stages along the knowledge to action cycle, but are concentrated particularly in the steps for “knowledge creation” and “adaptation of knowledge to local context”. Aligned with its mandate to conduct collaborative research with active roles for communities, CAHR uses an integrated KT approach that also incorporates end-of-grant KT products such as reports and videos. As part of its mandate to increase the accessibility of information, all of CAHR’s KT products are freely available.

An integrated KT approach involves the participation of the knowledge user⁶ from the beginning of the project⁷ and contributes to community capacity building throughout the project. Therefore, integrated knowledge translation creates opportunities to increase the role of Indigenous perspectives and research methods in health research. Integrated KT also facilitates direct participation by Indigenous people, through which research can lead to other benefits for the community. Ismael (2002) describes “process as the integral link between research and action” (p. 42), indicating the manner in which research and KT are undertaken impacts how effectively the knowledge generated can achieve change in a society. Further, the research approach CAHR embraces leads to processes through which knowledge users can engage with the research team and participate in a way that is consistent with Aboriginal knowledge translation⁸. For example, in CAHR’s Indigenous Water Ways workshop series, knowledge users were involved in and contributed heavily to determining the workshop themes, developing content, and setting goals for workshop outcomes. As a result, communities directly involved in addressing topics related to their specific concerns may have been more motivated to pursue additional community-development initiatives related to the workshop content after the workshop objectives were met.

In locating the workshop series and some of its outcomes within the knowledge-to-action cycle, the workshop series included activities at two early phases of knowledge application: identifying the problem and selecting relevant knowledge, and, in some cases, adapting knowledge to a local context. At many of the workshops, much of the agenda was devoted to building a shared understanding within the community of the water challenges they face. This was accomplished through open discussion, emphasizing the words of Elders and community leaders, but allowing everyone the opportunity to share their views. During such discussions, participants also identified the information which would help them to move forward in addressing the community’s water challenges. For example, one community decided it needed baseline water quality data for water bodies in their traditional territories to support decision-making. At another workshop, recognizing that projected water scarcity could lead to deteriorating relationships with other water users, community members developed a plan for strengthening relationships

⁶ This term is broad and can refer singularly or simultaneously to policy or decision-makers, and the target-group or ‘beneficiary’, to the result of improved practice as a result of knowledge translation.

⁷ CIHR. (2009).

⁸ Ibid.

with neighbouring ranchers in preparation for water-scarce seasons which lead to an increased need for cooperation. These are two of several examples of community action that emerged from this project of adapting knowledge to a local context.

At the time of this publication, CAHR is seeking further resources to expand its water program by deepening the level of engagement with Aboriginal communities and working from a participatory-action approach to assist in the development of plans and activities that will improve access to safe water and, in turn, better health. It is anticipated that, as this program expands, the integrated KT approach currently employed by CAHR will be both modified and enriched by Indigenous knowledge and emerging Indigenous approaches to knowledge translation.

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Part II

2010 Consensus Conference on Small Water Systems Management
for the Promotion of Indigenous Health: Abstracts,
Papers and Biographies



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Inequality and Access to Water in the City of Cochabamba

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Abstract

Rapid urban population growth in the city of Cochabamba, Bolivia has generated an increased demand for basic services, especially that of water. Due to its limited capacity, the Public Water Company, or “the Municipal Water Supply Company (SEMAPA)” has been unable to provide sufficient water for home consumption within the city itself, and less so in the marginalized districts of the city. Three basic types of water suppliers service the needs of the urban population. The Public Water Company (SEMAPA) attends to the needs of 60% of the population of the northeastern zone. This is the largest number of households that can be considered as not living in poverty. On the other hand, the population on the outskirts of the city does not have running water; therefore, they have to buy water from tankers, dig wells, or obtain water from a community-administered private source of water supply. Alternative social systems of water supply, such as water co-operatives, associations, and committees, are mainly located in the South and North Western zones of the city and supply water to about 20% of poor households. The third source, the private water supply system, attends to the remaining 20% of households in the southern zone. Informal vendors (“aguateros”) and wells are the other source of water supply. However, water from these sources is unsafe for home consumption because of the risk of contamination and the resulting infections that cause high infant mortality in poor neighbourhoods.

Keywords: Health, poverty, urban population, water supply

Introduction

Serious water shortage affects the city of Cochabamba, Bolivia, which has undergone increased urban expansion in recent years. The city's location in a valley predisposes it to destructive hydrologic effects, a problem that has been compounded by the construction of homes and other buildings on land that was originally used for growing crops using irrigation to supplement scanty rainfall. The floods and natural disasters that are

common in these districts endanger the lives of the inhabitants, who are mostly low-income populations. The configuration of the city depicts a trend towards an increase in internal economic and social heterogeneity. The clustering of populations according to social status evidences the elements of inequality and discrimination that exist in the inter-urban spaces. This is an indicator of the differentiation processes that are operative within the social systems. Differences as expressed in terms of poverty and unfulfilled basic needs clearly indicate the existence of the segregation processes that are evidenced by how space and property are used. Inequities in water distribution indicate the State's failure to meet the demand for basic services that are the result of accelerated urban expansion. Channeling services to the urban wealthy merely exacerbates the pre-existing social inequalities that widen the gap between north and south. The terms "municipality" and "city" will be used interchangeably as both refer to the same geographical area.

The purpose of this study is to evaluate access to water for human consumption in households within the city of Cochabamba, examining the issue from the perspectives of gender and access to water services, considering both its quality and quantity. For practical reasons, the study is divided into two sections. Section One sets the conceptual elements, the analytic framework and methodological aspects. Section Two synthesizes the historic changes in the process of urbanization in the city of Cochabamba, providing material for an interesting case study that can be explored further considering the accelerated rate of urban growth in relation to acute inequality and discrimination with regard to water supply issues. It then describes and makes a detailed analysis of urban infrastructure through a large number of indicators related to water consumption in homes that are connected to public or private water supply systems. An analysis of homes with no running water, the means of obtaining water, and the strategies used by women and men to obtain water follows. Finally, the study will end with the submission of the general conclusions of this piece of work.

Methods

The present study will encompass the entire population living in private homes. First, the households are classified according to their basic characteristics; then, the classification is applied to the people that live in these homes using selected indicators to refer to household characteristics. The statistical analysis uses the variable of "sex of the head of the household" for private households. Household is defined as "a person

or group of people, who may or may not be related but occupy a private home, sharing main meals and/or expenses that cover the common basic needs”. The Census and national household surveys distinguish men from women according to the sex of the person whom the household considers as its “head”. This does not necessarily refer to the home’s main breadwinner. In order to achieve this goal, a varied range of primary and secondary information was carefully re-processed and then used because the actual data was not able to reveal the gaps that exist between men and women.

First, a broad range of variables from the National Population and Housing Censuses provided lists that were sorted according to sex. Within the context of a joint project between CEPLAG (Centro de Planificación y Gestión) and UNIFEM (a UN entity supporting gender equality), valuable primary information was gathered from a representative sampling of households in Cochabamba. This was done by using the survey on “Household Uses of Domestic Water Supply, with a Gender Dimension – Women’s Rights to Water,” which were then applied to approximately 2100 households in Cochabamba. These surveys were prepared focusing on gender. Based on these findings, diverse economic and social indicators have been designed from a gender perspective based on the analysis that was done in this research as an effort to assess domestic water consumption during November and December 2004.

The CEPLAG-UNIFEM questionnaire was specifically designed to gather data for this study, and examines water issues exhaustively. It disaggregates households with male or female heads according to the types of connection and payment, investigating the use of alternative sources for daily supply, strategies that they must resort to when basic services are not supplied, and men’s and women’s aspirations in terms of future prospects. It is important to highlight the painstaking data processing work done in constructing indicators to visualize and characterize female heads of households, because conventional statistics are not suitable for the examination of this issue. It is recommended that the statistics office gather data that reflects the gender perspective for analysis and processing.

Results and Discussion

The growth of Cochabamba, both physical and demographic, has been differential, exhibiting high demographic concentrations in some areas and very low concentrations in others. The highest concentrations occur in the old part of the city and around the central marketplace. This

happens in stark contrast to the high population growth rate in the poorest districts that have the rates of over 9% annually. The accelerated growth of the neighbourhoods is attributable to mass immigration from the poorest regions of western Bolivia to the cities.

Since water is essential for the preparation of food, personal hygiene and the washing of clothes, its lack is directly related to incidence of high infant and child mortality. Water is a basic commodity, the lack of which ought to be considered a social problem. Access to water is a principal human right that merits State protection at all levels. A public asset should not be considered merchandise. There ought to be an international treaty that ensures the observance of these basic principles. Supporting data will separate households according to water supply systems - the public system (SEMAPA), the private system (small enterprises) and those with no domestic supply.

Households with water supply connection

The Municipality of Cochabamba is responsible for providing drinking water and sanitary services to the population. The company through which the municipality provides these services, SEMAPA, was created through the DS (Supreme Decree) 08048 on June 12th, 1967, and then re-organized by the DS 10597 of November 24th, 1972 that conceded its administrative and financial autonomy. On August 25th of 1997, according to the DS 24828, SEMAPA was recognized as a decentralized company of the Honorable Municipal Government of the City. The services extend throughout the entire metropolitan area. During the brief and convulsive period from 1999 to 2000, a private company administered SEMAPA. The so-called “water war” of the year 2000 put an end to the concessional agreement with the private company, and SEMAPA returned to the status of a public service entity.

Table 1. Service rate distributed by sex and districts of residence, 2004

SEMAPA	Service Rate (%)		
Public System	Men	Women	Total
District 9	0.6	0.0	0.5
District 7, 8 and 14	1.0	0.0	0.8
District 13	12.5	16.7	13.0
District 2 and 6	87.0	87.0	87.0
District 1, 3, 4 and 5	76.2	77.7	76.5
District 10, 11 and 12	96.9	98.1	97.3
Total	57.2	68.9	60.1

Source: Prepared by the author with data from the Survey “Household uses of drinking water with a gender dimension – women’s water rights”, 2004, CEPLAG-UNIFEM, Cochabamba - Bolivia.

The provision of piped clean water into homes is an important indicator for the living conditions of a population. Not having piped water requires that extra effort be put into obtaining it from a distant source - a community tap or well – or that of buying it from a water truck. Lack of piped water in toilets and kitchens goes against good health habits and is also associated with high levels of infant and child mortality. Since water is a basic requirement for human life, the lack of access to clean water must be considered a problem that is social in nature. The measure of the amount of water used for sanitation divides Cochabamba into two cities: the legal city, which enjoys all the amenities, equipment, infrastructure and services; and the illegal city that is excluded from all those services, a practice that violates the basic rights of a citizen. The illegal is comprised of populations living at the southern edge and in the extreme north of the city (District 13).

Since the presence of SEMAPA is practically non-existent at the outskirts of the city, the areas without services have been excluded from the analysis for practical purposes. Even with this exclusion, notable differences still exist within the districts included in the study. It is obvious that the volumes of sanitary consumption remain superior to the actual consumption levels reported by the poorest groups, an aspect that will be treated in the section where households without public water supply connections will be studied.

Table 2. Households by service rate from public system (SEMAPA), per capita consumption (m^3 / year), percentage of volume consumed by sex of head of household, Districts of residence, 2004

Cochabamba Public system = SEMAPA	Consumption M^3 / Mo.	Consumption Liters / Day	Cost Bs./ Mo.	Cost Bs. / Day	Family size	Family income Bs./Mo.	Per capita income USD/ Day	Years of Education
District 2 and 6	13.64	449.01	35.29	1.13	5.38	1914.69	1.60	10.24
District 1, 3, 4 and 5	13.34	446.52	38.88	1.35	5.26	2136.23	1.90	11.46
District 10, 11 and 12	20.93	695.35	75.80	2.65	4.40	3334.06	3.37	13.25
Male head of household	13.77	457.72	40.26	1.37	5.20	2023.41	1.84	10.32
District 2 and 6	15.39	477.28	40.73	1.34	4.66	1471.81	1.52	9.04
District 1, 3, 4 and 5	13.69	456.08	40.83	1.39	4.63	2008.65	2.07	10.38
District 10, 11 and 12	20.24	669.44	81.14	2.73	3.57	2806.89	3.95	11.63
Female head of household	15.34	498.82	49.18	1.65	4.37	1809.14	2.16	9.39

Source: Prepared by the author with data from the Survey "Household uses of drinking water with a gender dimension – women's water rights", 2004, CEPLAG-UNIFEM, Cochabamba - Bolivia.

The study on the volumes consumed according to the sex of the head of the household and place of residence reveal that less water is used along the outer belt that surrounds the wealthier districts, which is where the poor live. Unlike the wealthy, the poor households have more members and therefore, require more water for domestic consumption, but because they have less income, they cannot afford to pay for the services. However, when women are the heads of households, they tend to invest more in the acquisition of safe water for their families than their male counterparts who might have a higher income.

All the indicators used reveal that segregation and the absence of ethical principles in providing basic water supply services are a danger to public health and social welfare. According to this data, the northeastern and central areas (Districts 10, 11 and 12) have the highest service rates, a high concentration of domestic connections as well as a high volume of water consumption. In the northeastern zone, the volume consumed is almost half of SEMAPA's total production (48%), although only 27% of the total population of Cochabamba lives there.

Water consumption volumes differ for men and for women due to the roles each one of them plays in relation to the use of water. The Andean worldview considers water to be the origin of life. Therefore, its use is associated with territorial, space and time concepts, with a cyclical vision that is highly mystical and religious in content. Since women are in direct contact with water during performance of different functions within the home, the right to clean water for all these needs should be viewed from an integrated perspective. Isolating water from its cultural context is a violation and a failure to understand the cultural codes, the rationality and cosmology within which it acquires meaning. This aspect is of great importance when preparing projects that will be implemented as a specific action.

Data from middle-class residential areas show that, in Districts 10, 11, and 12 of the city of Cochabamba, the per capita consumption of water is higher, while that of the neighborhoods around the southwestern edge of the city is lower, under 50 litres /day per person, regardless of whether the public or private system is involved. In Cochabamba, it is illustrative to analyze the water consumption rate in terms of private / public systems, as an indirect way to show that private systems (which the people are forced to use because there is no public service) are very precarious, and urgently require administrative and management mechanisms that will make them more socially, economically and financially sustainable.

Table 3. Area of study: Per capita usage rate for water consumption and sex of head of household, by city and stratum of residence, 2004

Stratum/ City	CONSUMPTION PER PERSON, IN LITRES/DAY				
	Men		Women		Total
	SEMAPA	Private system	SEMAPA	Private system	
District 9	*	60.9	*	80.8	64.9
District 7, 8 and 14	*	37.6	*	32.8	36.7
District 13	*	51.5	*	23.4	66.7
District 2 and 6	81.6	53.3	95.1	82.2	84.2
District 1, 3, 4 and 5	85.6	93.3	124.0	67.9	93.4
District 10, 11 and 12	151.4	.	171.4	.	158.5
Cochabamba	102.7	64.9	131.8	74.4	99.0

Source: Prepared by the author with data from the Survey “Household uses of drinking water with a gender dimension – women’s water rights”, 2004, CEPLAG-UNIFEM, Cochabamba - Bolivia.

Despite SEMAPA’s efforts to increase the supply and coverage over the last 15 years, the results show a pronounced situation of deficiency. To make things worse, water supply to certain neighbourhoods is shut off two or three times a week during the dry season leaving the people with little or no water and at the same time creating a high risk to public health. These findings ought to motivate better decision-making and the designing of specific projects for immediate action.

Households with no water supply connection

The survey asked what prevented people from having a water connection. Answers by the majority of women living in the poor districts of Cochabamba mentioned that the system does not extend to where they live, meaning that, there is absolutely no possibility of solving their problems by having a connection to public and/or private systems. The second limiting factor on access to water supply in Cochabamba is the status of being a tenant. The rent for a house ought to cover all the basic requirements, but twenty percent of women living in rented houses stated that their property owners were not willing to install water, which means that the home does not meet the minimum habitability standards. The reasons for not having a water supply connection can be divided into two groups: structural (no system, over 40% of households, regardless of their sex or city) and management services (which could be solved with the presence of political will). This leaves us with the interrogative: “who is responsible for initiating the process and how should this be done?” In order to find out more about this, the section that will explore what happens when people apply for a connection.

In Cochabamba, tankers that distribute water to four fifths of the households provide the main source of water supply. Water is scarce in Cochabamba but digging wells is not an option because ground water is generally salty. People are obliged to buy water from vendors who profit from water of doubtful quality. Since there is no regulatory body to oversee their activities, their prices and the hours of service are structured to their convenience.

Table 4. Households with no water connection by sex of head of household and city of residence, according to reasons for no connection, 2004

Reason	Men	Women	Cochabamba
No system near the house	56.6	46.9	54.9
It is difficult to get a connection	11.0	10.2	10.8
Connection is expensive	7.3	12.2	8.2
The landlord won't allow it	16.0	20.4	16.8
Others	9.1	10.2	9.3
Total	100.0	100.0	100.0

Source: Prepared by the author with data from the Survey "Household uses of drinking water with a gender dimension – women's water rights", 2004, CEPLAG-UNIFEM, Cochabamba - Bolivia.

Evidently, this situation causes high health risks for the public, because of the unsanitary handling of water by the tankers as well as by the consumers handling and storing it. The quality of this water is doubtful especially in urban settings where aquifers are highly contaminated from underground sewage.

Table 5. Area of study: Households without water connections, by water supply sources, by sex of head of household and city of residence, 2004

Source	Men	Women
1 Public tap	0.90	0.00
2 Own well	7.60	3.90
3 Tanker lorries	83.40	82.40
4 Springs	0.90	2.00
5 Neighbours	5.40	5.90
6 Others (specify)	1.80	5.90
Total	100.00	100.00

Source: Prepared by the author with data from the Survey "Household uses of drinking water with a gender dimension – women's water rights", 2004, CEPLAG-UNIFEM, Cochabamba - Bolivia.

A second source of water supply is the wells that are sometimes dug without following any technical standards and are often placed near latrines. The main problem is that sewage is deposited in oxidation chambers and septic tanks, often owner built and technically deficient.

This contaminates the underground water in the aquifers, which supply wells. Empirical evidence has shown that poorly located latrines or badly made septic tanks contaminate both the plots they stand on as well as the surrounding areas, polluting the aquifers that provide drinking water.

Differences in amounts spent by households not connected to a water supply system and those who pay tankers for their water are dramatic, especially in the southwestern peripheral districts. Here the total volume consumed by a family is equivalent to that consumed by a single person using the public water system connection, that is, they consume about four times less per person than those who are connected to the system. In this unfair situation, the poor pay 52 Bs. a month (6.5 dollars) for a supply that is four times smaller, whereas those who are connected to the public SEMAPA system pay just 44 Bs. a month (5.5 dollars) for 111 litres per person.

The unconnected households' total income is not sufficient to cover basic consumption needs; in addition to that, members of these households are often also undernourished. The duty of the State is to ensure the health of its citizens, a need that it fails to provide. Palpable evidence shows that public investments in these areas have been substantially lower and the people's essential requirements, much higher. This has led to widespread contamination that creates health risks for all the members of the family, especially malnourished children. Nutritional deficiencies in children reduce their immunity and expose them to bacterial invasions and high risks of illness and death, as shown by child morbidity and mortality rates.

Table 6. Households without water connection, by total per capital volume consumed, amount paid for water and total family income, by sex of head of household, districts of residence, 2004

Districts	Family size	Total income	Bs. Mo. Paid	% Income to pay water bill	Volume in litres per month	Litres/Day per capita
Men	5	1288	53	6	2710	19
Women	4	960	43	9	2412	34
District 9	5	1235	52	6	2658	21
Men	5	670	49	6	2858	20
Women	5	573	47	8	2641	20
District 7, 8 and 14	5	653	49	7	2817	20
Men	5	1389	46	5	4300	34
Women	4	1001	53	8	4730	65
District 13	5	1322	47	6	4341	37
Men	5	2234	61	3	4399	48
Women	4	800	62	12	4157	49

District 2 and 6	4	1737	61	6	4300	48
Men	5	1803	63	4	4185	28
Women	4	1910	69	5	8600	73
District 1, 3, 4 and 5	5	1829	64	4	4921	35
Cochabamba	5	1198	52	7	3639	33

Source: Prepared by the author with data from the Survey "Household uses of drinking water with a gender dimension – women's water rights", 2004, CEPLAG-UNIFEM, Cochabamba - Bolivia.

Given the characteristics of the populations inhabiting these areas, the study findings represent the real situation of households whose material living conditions fall below the minimum requirements for life, shelter and health. Water usage rates are unquestionably alarming. Although households in these districts have improvised strategies to overcome these problems, urgent action to extend water networks to these populations is required. Another mechanism that these families have been shown to use is water recycling, a practice that significantly increases the risks of morbidity and mortality. Outlying neighborhoods have the highest deficits in consumption, an undeniably severe problem because of the irreversible consequences in terms of damage to public health and life, particularly for children who fall ill and/or die from water-related problems. The costs of this extremely low water consumption shows how precariously these people are forced to live. They are obliged to spend 5 to 12% of their total family income for a miserable service, a heavy blow to their fragile economy.

The poorest must pay a high price for services of inferior quality, such as for the water that is provided by the tankers. A high incidence of infant mortality can be traced to such diseases as diarrhea and gastroenteritis that originate from insufficient or poor quality water and a high degree of malnutrition. The statistics are clear: 35 infant deaths in the north compared to 112 infant deaths in the neighborhoods of the south, for every 1000 children born alive. Access to water in Cochabamba has become an expression of segregation, physical marginality, and an indicator of poverty and inequity. Unequal distribution of water and other goods is a major feature of Cochabamba's urban structure: the public water supply system is concentrated in those areas with more economic power and not where there is a greater need for public services (i.e.: where residents cannot afford to pay the high rates for private services).

Conclusions

One of the most significant research findings is the proof that lack of access to water supply does indeed affect women more than men. Women respond to the lack of household water by going several times a day to fetch it from a distance and using alternative access mechanisms. Therefore, their participation in neighborhood organizations and water committees is increasingly important and aimed at guaranteeing the stability of their households.

In Cochabamba, households of high-income families are connected to public or private networks. A select group of households, in general the highest income-earning segment, has access to public system connections. Female-headed households predominate among households not connected to the network, with lower income than those who are connected.

As a mechanism to overcome unmet demands, women who live on the outskirts of southern Cochabamba have played a key role in seeking alternative water supply sources. Some are organized in precarious private systems, water committees, cooperatives, or they purchase water from a tanker lorry and administer it themselves. Water usage is alarmingly low at the southwestern edge of Cochabamba. Deficits become undeniable among women. Whether they get water from a public or private system, their consumption levels are extremely low and a contributing factor to poor health. The lack of access to a water supply connection is the result of the non-existence of public systems near people's homes. This makes it impossible to solve their problems through public and/or private services. Therefore, the construction of systems that extend to zones that have no water supply is extremely urgent. This analysis shows that the lack in basic services mostly affect the southern outskirts of Cochabamba as shown by: acute shortages of indoor running water, too little consumption and a terrifying deterioration in the quality of life. These households deserve special attention from authorities who design social policies focused on making the living and dying conditions less precarious while generating actions that will attenuate precariousness in living conditions and income disparity.

Consensus building is imperative among central and local authorities, as well as among different social stakeholders for extending basic sanitation to the poorest sectors. The construction and coordination of a strategy geared at reducing the time of suffering that poor people must endure, because the public water network currently ends where the poorest neighborhoods begin, is imperative. Therefore, the search for strategic,

consensus-based, long-term solutions is a prerequisite to the construction of humanely just and sustainable cities that promote gender equity.

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The Advanced Aboriginal Water Treatment Team

Bob Pratt

Water Keeper, George Gordon First Nation and Founding Member of the Advanced Aboriginal Water Treatment Team

The Advanced Aboriginal Water Treatment Team (AAWTT) is an initiative of the Safe Drinking Water Foundation (SDWF) and the AAWTT members were trained by the founder and previous Executive Director (1997-2009) of the SDWF, Dr. Hans Peterson. AAWTT members were trained by the SDWF in the chemistry and biology of water treatment and how to troubleshoot and assess water treatment challenges.

The SDWF was founded in 1997 by five scientists from Russia, Scotland, Japan and Canada. Originally, the goal of the SDWF was to help developing countries with their water problems, but the scientists soon realized that we should first improve the drinking water situation in rural and First Nation communities in Canada. The mission of the SDWF is to encourage the universality of safe drinking water by supporting innovative research and development, to increase awareness of health concerns from consumption of poor quality water, and to act as a policy advocate to ensure appropriate action is taken to provide safe drinking water to all people. The vision of the SDWF is to reaffirm and promote all peoples' rights to safe drinking water. With a focus on developing partnerships with rural communities throughout Canada and around the world, the SDWF intends to effect change at the municipal, provincial, and federal levels as well as within civil society and industries involved in the protection and production of public water supplies. The SDWF works with one community at a time to empower community leaders and citizens through the sharing of knowledge, education programs, community outreach programs, and scientific research/development. The goals of the SDWF are for national drinking water regulations to be implemented and enforced, resulting in all communities in Canada having access to truly safe drinking water and for the Federal Government of Canada to recognize at the United Nations that water is a basic human right.

The purpose of the AAWTT is to share the unique body of knowledge that it has developed with other Water Keepers in Canada and internationally. Members of the AAWTT visit communities in order to

make recommendations and give presentations. The AAWTT is focused on empowering communities to deal with challenging water quality issues in a sustainable manner. AAWTT members volunteer their time and are able to participate via webinar in order to contribute to project meetings of other First Nation communities.

Bob Pratt is one of the founding members of the AAWTT and he is also the Water Keeper for George Gordon First Nation as well as a Circuit Rider for Touchwood Tribal Council. Bob was instrumental in changing the quality of drinking water produced in George Gordon First Nation. George Gordon First Nation drinking water had many problems prior to Bob finding a treatment system that could greatly improve the community’s drinking water. Previously, the pre-treatment system consisted of greensand filters which caused membrane fouling and did little to provide the membranes with a stable water supply to be treated. This water had abnormally high arsenic, manganese and sulphate levels for decades but Health Canada had never shared that data with the community. The following is a table of George Gordon First Nation water data derived from water taken from wells that are approximately 275 metres deep and where the temperature is approximately 9.5°C year-round:

Table 1. George Gordon First Nation Water Data 1989 & 2000

Analysis of	Well #1 1989	Well #2 2000
Ammonia	1.5 mg/L	1.5 mg/L
Arsenic	91 ug/L	43 ug/L
Sulfate	1230 mg/L	1350 mg/L
Iron	1.3 mg/L	3.8 mg/L
Manganese	1.4 mg/L	1.8 mg/L
Total Dissolved Solids (TDS)	2390 mg/L	2490 mg/L

Please note that the Maximum Acceptable Concentration (MAC) for arsenic based on the Guidelines for Canadian Drinking Water Quality is 0.01 mg/L (10 µg/L), the Aesthetic Objective (AO) (or Operational Guidance Value) for sulfate based on the Guidelines for Canadian Drinking Water is ≤ 500 mg/L, the AO for iron based on the Guidelines for Canadian Drinking Water Quality is ≤ 0.3 mg/L, the AO for manganese based on the Guidelines for Canadian Drinking Water is ≤ 0.05 mg/L, and the AO for TDS based on the Guidelines for Canadian Drinking Water Quality is ≤ 500 mg/L. Also note that the Guidelines for Canadian Drinking Water Quality tend to be more lax than the National Primary Drinking Water Regulations (USA), the

WHO Guidelines for Drinking Water Quality and the Drinking Water Directives (EU). A chart that compares these guidelines can be found on the Safe Drinking Water Foundation's website: <http://www.safewater.org/PDFS/resourceswaterqualityinfo/RegulationsGuidelinesComparisons.pdf>. The Parametric Value for ammonia in the Drinking Water Directives (EU) is 0.5 mg/L, whereas there is no recommended value for ammonia in the Guidelines for Canadian Drinking Water Quality. Also, both in the National Primary Drinking Water Regulations (USA) the Secondary Maximum Contaminant Level (regulation is based on aesthetic considerations) and in the Drinking Water Directives (EU) the Parametric Value for sulphate is 250 mg/L.

Reverse osmosis was discovered to be the appropriate solution to decrease the amount of arsenic and ammonia in the drinking water at George Gordon First Nation because this water had too many impurities (salt, organic carbon, arsenic, ammonium, iron, manganese, sulphate, hardness, calcium, magnesium and alkalinity). In the reverse osmosis process water is forced through the smallest possible filtration membrane at high pressure. The resulting water supply is called permeate and is highly purified as only pure water (H₂O) and some small compounds, such as sodium, can pass through the membrane. George Gordon First Nation now has a fully operational Integrated Biological Reverse Osmosis Membrane (IBROM) treatment system and this method supplies the membranes with a stable water supply. The biological treatment system reduces or removes most nutrients and changes the composition of troublesome compounds such as arsenic so that they can be removed by reverse osmosis. The IBROM treatment system was developed by Dr. Hans Peterson and the system is redefining the future of water treatment, not only in Canada but around the world.

High quality drinking water is so important because of the damage that can be caused when it is not available. Unsafe drinking water has been known to lead to many costly and tragic consequences to both infrastructure and human health. It is important to honour all those who have suffered health problems from unsafe drinking water by practicing due diligence for future generations. What we do today has an effect (either positive or negative) on tomorrow's resources. More information about the SDWF and the AAWTT can be found by visiting the SDWF's website at www.safewater.org

Implementation of the Drinking Water Safety Program in First Nation Communities in British Columbia Health Canada, First Nations Environmental Health Services

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The Drinking Water Safety Program (DWSP) is a community based program launched in 2001 by Health Canada (HC) to work with First Nations in the essential task of monitoring and ensuring safe drinking water. Through the program, First Nations are actively involved in the monitoring and analysis of their public water supplies, and raising awareness of water issues in their community. The program seeks to develop First Nations capacity to prevent and manage the risks of drinking water contamination.

Within the 203 First Nations in British Columbia, there are approximately 292 community water systems. Community water systems are defined by Indian and Northern Affairs Canada (INAC) as being distribution systems with greater than 5 connections, or that serves as a public facility. The majority of community water systems are very small systems consisting of 300 connections or less (98%) and only 2% being larger systems with greater than 300 connections. Sources of water are primarily groundwater (73%).

In 2003, the First Nations Water Management Strategy was developed by HC and INAC to address existing gaps in water management, and provided additional support to existing drinking water monitoring programs. The management of water supplies in First Nation communities is a partnership between the First Nation Chief and Council, HC, INAC, and community residents, and requires the commitment of each in order to be effective and sustainable.

First Nations have overall responsibility for the daily management and operation of services, as well as the design and construction of facilities. Funding assistance for the design, construction, operation and

maintenance of facilities, and training for water treatment plant operators is provided by INAC.

Health Canada's role in First Nations drinking water is both at the community level and at the national policy level. In collaboration with the provinces and territories, the *Guidelines for Canadian Drinking Water Quality* is developed as the overarching standard for which water quality should meet. Maximum acceptable concentrations are set for parameters of health concern and aesthetic objectives for parameters which do not impact health. At the community level, HC works in partnership with communities to ensure that drinking water quality monitoring is in place, facilitating sampling and testing through support and training of community based water monitors, and providing advice on drinking water quality. The success of community programs requires the collaboration and commitment of a number of key players: Environmental Health Officers, Medical Officers, Community Health Nurses, Community Health Representatives, Chief and Councils, Water Treatment Plant Operators, Community Based Drinking Water Quality Monitors, Circuit Riders, INAC, and community residents.

How do we achieve success?

Drinking Water Safety Program

The goals of the Health Canada Drinking Water Safety Program are to ensure water is regularly monitored, results are interpreted, advice, guidance and training are provided, and suspected problems with community water supplies are investigated. The program assists in reducing the possibilities of waterborne disease outbreaks and in promoting the importance of safe drinking water through public education and awareness.

- The Drinking Water Safety Program provides:
- Training on water sampling;
- Community microbiological lab equipment for water testing; and
- Recommendations and ongoing assistance by Environmental Health Officers (EHOs) on drinking water issues.

To assist in the effective delivery of the program, a number of initiatives have been developed to ensure procedures are in place to assist communities and HC, and to ensure that roles and responsibilities are established. Standards, policies and procedures are reflective of the multi-

barrier approach, a model that Health Canada strives to implement in all communities. Public education and awareness have been expanded by the development of: Individual Wells for First Nations – inspection and maintenance guides, Water Advisory Tool Kit (communication materials), Procedure for Addressing Drinking Water Advisories in First Nations Communities, Guidelines for the Design, Installation, Maintenance and Decommissioning of Drinking Water Cisterns, and Guidelines for Trucked Drinking Water Systems. Surveys of drinking water perceptions are conducted yearly to determine how water quality on reserve is perceived as compared to those off reserve. This information assists in gaining an understanding of the level of awareness and confidence of community water supplies, and gauges any improvement or decline of these perceptions.

Environmental Health Officers

Environmental Health Officers work directly with communities to build capacity of First Nations to prevent and manage the risks of drinking water contamination, primarily through the development of community water quality monitoring programs. Ongoing training and assistance is provided to community based water monitors to ensure that consistent water quality data is obtained, and data is reliable through effective QA/QC (quality assurance/ quality control) programs. Where data indicates a potential or confirmed risk, EHOs provide recommendation to First Nations on the need for advisories, and the necessary measures needed to protect public health and to correct water quality issues.

In addition to supporting community based water monitors, EHOs conduct chemical sampling of community water supplies, as per the *Guidelines for Canadian Drinking Water Quality*. In 2009, a total of 859 chemical sampling events were carried out, including general water chemistry and trihalomethane analysis. On a 5 year cycle, a comprehensive water quality survey is conducted and includes a full spectrum of drinking water analysis, including radiological, protozoal, and case specific analytes. During the most recent 2007 survey, the study also included generating a register of the water system profile, infrastructure, treatment, and distribution information. This data would allow for a more comprehensive source to tap assessment. Additional evaluation of water infrastructure is provided during the project proposal stage and provides technical comments on plans from a public health perspective.

On average, there are approximately 25 drinking water advisories in First Nations communities in BC Region, representing approximately 8% of total community water systems. This encompasses Boil Water Advisories, Do Not Consume Advisories, and Do Not Use Advisories. Because water quality is not static, this number fluctuates throughout the year, depending on factors such as equipment failures, lack of trained water system operators, seasonal changes to source water quality, and poor microbiological quality. Improved community capacity has enabled communities to resolve advisories more quickly by having trained water operators, and expertise such as Circuit Riders available to them. In partnership with Indian and Northern Affairs Canada (INAC), the Circuit Rider Training Program (CRTTP) is designed to raise the competency level of operators of water and wastewater systems. It is a site-based, one-on-one and hands-on program tailored to the needs and aptitude of each trainee. Although many of the advisories still have been in place for up to 5 years, overall there has been a reduction in the number of long term advisories. Majority of the long term advisories required significant upgrades or repairs.

It is important to note that the Drinking Water Safety Program is only one of several public health programs delivered to communities by the EHO. Environmental public health core programs include food safety, wastewater, health and housing, facilities inspection, solid waste disposal, communicable disease control, and emergency preparedness and response.

Community Based Water Monitors

The success of the Drinking Water Safety Program depends on the participation and commitment of First Nations. The dedication and professionalism of the community-based water monitors and water treatment plant operators who are in the field testing and monitoring the water is vital in ensuring safe drinking water in their communities. They play a key role as they are responsible for microbiological sampling, testing, recording, and communicating the quality of community water supplies. Communities are equipped to sample drinking water using provincially approved laboratories, or in-community Colilert® microbiological testing equipment. In-community labs allow communities which are remote and are not able to deliver samples to approved laboratories in required time frames, and as well allows for more rapid response by having results available in as little as 24 hours. Approximately 250 communities have access to community based water monitors and in-community test equipment.

For the year of 2009, a total of 34,846 bacteriological samples were analysed, the majority (76%) through in-community Colilert® testing equipment, and 33% in approved laboratories.

Water Quality Data Management

Early warning data tracking and communication is essential to both identify and respond to water contamination. Water quality data gathered by community based water monitors or EHOs is entered into WaterTrax™, a secure web-based data management tool that provides for generation of alerts of unacceptable water quality results, historical data management, and allows communities to generate regular water quality reports. Current and past drinking water advisories are tracked for duration, status, reasons for issuing, and remedial actions. Additional analysis of data and advisories can be completed through data exports.

Drinking Water Awareness

Public awareness and education is an integral component of drinking water safety in that by understanding how water can become contaminated and what we should do to prevent and treat contamination, we will be able to provide a safe water supply to our communities. BC Region has initiated the Water Awareness Initiative in 2008 to provide additional funding to communities for community events which will bring residents together to raise awareness of their community water supplies, and encourage more involvement in drinking water safety. Since the start of this initiative, 33 community events have been funded. The Water is a Treasure school activity book developed in conjunction with INAC has been well utilized and provides educational activities to school-aged children.

Research

Starting in April 2010, Health Canada will be providing funds under the national Drinking Water Quality Program to assist communities in conducting research related to drinking water and health. [www.environmentalcontaminants.ca]

Common Challenges

First Nations communities share a number of common challenges experienced by non-First Nation small water systems. These include: the limited capacities of small systems, remote and isolated locations affect

access to trained operators, supplies, accredited laboratories, and weather influences. Demands and multiple priorities for operators and water monitors result in high turnover rates; and, although financial funding is accessible, the funding process and multiple funding mechanisms are complex and often burdensome on First Nations.

In addition to those challenges of First Nations, a number of factors continue to challenge the Drinking Water Safety Program. Information obtained from focus groups and workshops continues to identify the need for additional communication and awareness of communities, primarily to obtain the necessary importance and support for community drinking water programs. Although improving year to year, First Nations residents are less positive about the quality of their drinking water and that it can be improved through awareness of existing safe water supplies. Community support, primarily at Chief and Council levels is necessary. Sustaining and accelerating current training, as well as enhancing training for experienced water monitors is necessary to maintain interest and reduce turnover. Training should have long term value by providing for continuing education credits.

Despite the large quantity of water quality data generated, there is little ability to link this with disease surveillance and the prediction of outbreaks. The Community Health Nurse is often the only source of information related to potential waterborne illness. An appropriate indicator of public health impact is also necessary as solely the number of water samples collected is not sufficient to indicate water system protection and improvement. Compliance with the frequency standards for bacteriological parameters (weekly) outlined in the *Guidelines for Canadian Drinking Water Quality (GCDWQ)* is often unattainable by many communities with limited human resources, and the public health importance of weekly sampling needs to be examined as it relates to very small systems. A sustainable monitoring program based on public health risk is needed.

Currently, there is no legislation or regulations governing water systems and water quality reserves, and achievements to-date are resulting from the efforts and education of all key players.

Effective community control, particularly during a potential water quality problem, can be more rapidly and effectively managed through the establishment of a community based water team that comprises all responsible parties and represents the community. Chief and Council involvement is essential to manage, communicate, and respond to

water quality incidents. Monitoring of water supplies can provide early identification of issues, and maintaining good records can assist in determining the source of contamination. In the event of a problem, rapid response and resolution can significantly reduce the potential of illness within the community. A collaborative response with experts to assess, plan, respond and inform during a problem is best.

In summary, there have been a number of successes that have been achieved since the Drinking Water Program was initiated, and throughout the ongoing implementation of the First Nations Water Management Strategy. Health Canada has increased its own capacity and the capacity of First Nations communities to sample and test drinking water, and in responding to possible water quality incidents. Drinking water is a public health issue and requires an integrated approach to ensure appropriate infrastructure and treatment is in place, operators are fully trained and qualified, adequate and reliable monitoring of drinking water quality, and coordinated response when potential contamination is identified. Source protection is critical to for the long term availability of water supplies, and considering the lack of treatment of many systems, microbiological contamination remains a key risk in BC.

Water Supply on Indigenous Territories: Policies and Politics in Brazil

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Introduction

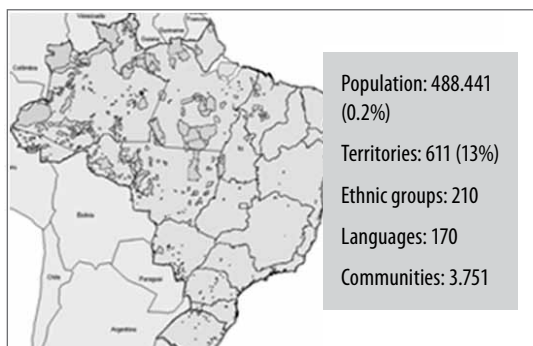
This presentation is part of a research project that compares the meanings, courses of action and institutional possibilities resulting from the exercise of autonomy by Indigenous peoples involved in the development of public health policies in the Brazilian and Canadian contexts. Although Brazilian Indigenous peoples are my priority in this presentation, all the time I will keep in mind this comparative perspective with Canada, having as a parameter the institutional and political role that is self-attributed and attributed to Indigenes in their distinct forms of insertion, both as members of Indigenous political organizations, as well as individual citizens.

Thus, by focusing on water supply on Indigenous territories I seek, on the one hand, to give an idea of the empirical reality in which Brazilian Indigenous people live and, on the other hand, shed some light on the complex connections among technical aspects, institutional dimension, and political field of Indigenous health policy in Brazil.

Keeping these objectives in mind, I first present some national data on the Indigenous population, their housing conditions, and the public investment made to improve the collective sanitation in their communities. Then I compare this data with insights gained through fieldwork in an Indigenous community in the Northern region of Brazil. Finally, I highlight disparities between the macro reality of national data and the micro reality of fieldwork and analyze technical, institutional and political factors related to this situation.

Indigenous Peoples in Brazil: Who are they? Where do they live?

According to the National Foundation of Health (Funasa in Portuguese), the organization responsible for Indigenous health and sanitation in Brazil, there were approximately 500,000 Indigenous people living on 611 territories in 2007. Indigenous peoples and their territories represent respectively 0.2 per cent of the Brazilian population and 13 per cent of the national territory.



However, it is important to see the relation between Indigenous territories and population. If we consider the region of Legal Amazon¹, for example, it represents 98% of the all Indigenous territories where less than 50% of the Indigenous population lives.

Consequently, we observe an unbalanced reality in which almost 300,000 Indigenous people live in only 2% of Indigenous territories in the other Brazilian regions.

Indigenous peoples in Brazil consist of 210 ethnic groups in 3,751 communities, speaking more than 170 different languages. Recent data show that only one in three Indigenous communities has more than 100 inhabitants (Funasa 2009). Thus the huge majority of Indigenes live in rural or isolated communities which, because of their remoteness and small size, frequently have poor housing conditions. When they live in larger communities, it tends to be in smaller overcrowded territories, such as the Guarani-Kaiowá, the Nadeva and the Terena, in the centre-west region, where a population of 12 thousand Indigenous individuals share 3.539 hectares, without any means for subsistence agriculture and insufficient sanitary sewage and treated water.

In response, the Brazilian government has increased its investment in collective sanitation on Indigenous territories over the last decade. While in 1999 the government applied less than 10 million Reais (approximately 6 million Canadian Dollars), in 2008 its investment was almost 50 million Reais (approximately 29.5 million Canadian Dollars). The majority of funds were allocated for water supply: in 2008, for instance, almost 39 of the 50 million Reais invested in Indigenous sanitation were used in water supply.

The government's increasing investment obscures broader inequities between Indigenes and non-Indigenous Brazilians. Despite the priority given to water, the coverage of water supply on Indigenous territories was only 63% of the population in 2009, while amidst the national population the coverage was already 83% two years before, in 2007.

¹ The so-called Legal Amazon region lies entirely in the Amazon Basin and comprises 9 states in the Centre-North region that should be considered integrated in terms of economic planning by Brazilian government.

Moreover, it is worth emphasizing that the majority of small Indigenous communities have not had any kind of water supply up to the last year.

Water supply on the ground: fieldwork in a Kanela Community

What does the coverage of water supply on Indigenous communities mean on the ground? The national data system doesn't say anything about this kind of qualified information. Thus, we need to look at localized research to have a better idea if the national water supply data actually express an improvement in terms of life quality in the Indigenous communities.

Although there was no anthropological fieldwork on Indigenous sanitation in Brazil, in 2004 the civil engineer Rosana Viana² conducted detailed research on sanitation conditions in a Kanela³ community in the state of Maranhão at North region. This community was not small by Brazilian Indigenous community standards in that it had approximately 1,600 inhabitants distributed in 162 residences; and 65% of its population had water supply in 2004, which was slightly better than the 2009 national rate of 63% for Indigenous people. Nonetheless, the research on the ground revealed a not so positive reality.

Despite the fact that the water system in the Kanela community was a simple one, the research revealed many material shortcomings:

1. Mistakes in the system design and its construction were responsible for the water supply not working in almost 20% of the residences (20 among 106 residences with water service);
2. Because of problems of maintenance, the community water tank has been leaking for 2 years; and
3. Fuel shortages have permitted pumping water up to the tank for only one hour a day.

In these conditions, when the pump stopped working the water leaked and people had to stock water for future use and rely on other water sources. The main alternative source was a nearby river where the water was contaminated with fecal coliforms. Even knowing the water was contaminated, people continued to use the river to wash clothes and bathe because they did not have enough treated water. Furthermore, frequently the water stock became polluted by the bad conditions of containers.

² Viana, Rosana. "Condições de Saneamento em Área Indígena". Dissertação de Mestrado, Escola de Saúde Pública, Fundação Oswaldo Cruz, Rio de Janeiro, 2005.

³ The Kanela peoples are part of the Timbira ethnical group and their language belongs to the Macro-Jê linguistic branch.

Unfortunately, considering Indigenous claims for better water supply in different political events, this is not an isolated situation. So it is necessary to reflect on its possible origins beyond circumstantial factors of the Kanela community.

Understanding the sanitation on indigenous territories

Considering the gap between national figures and information from community investigations and Indigenous claims, I argue it is essential to address three dimensions to understand this gap and approach the structural dimensions of sanitation problems on Indigenous territories.

The first is technical, among which I view the use of conventional constructive technology as the most important. Ignoring local material conditions and neglecting Indigenous traditions may have serious consequences in terms of sustainability because construction technologies are foreign technologies. As such, they are rarely appropriated by communities and in remote areas, as in the majority of Indigenous territories, because these technologies have high financial costs to implement and maintain. Transporting equipment to remote areas is expensive and it is unsustainable to maintain without local professionals and materials. Consequently, the financial resources applied do not achieve the expected results in regard to the Indigenous life quality in general and especially in relation to health conditions.

Technological choices are part of an institutional framework developed in a specific historical context. Until the early 1980's, management of Indigenous health services in Brazil was not the responsibility of the Ministry of Health, but rather part of the accountabilities of the National Foundation for Indians, the federal agency responsible for policy relating to Indigenous people in Brazil. The 1988 Constitution, or the so-called Citizen Constitution, established the right of every Brazilian citizen to health care. It then became a duty of the State to provide the necessary health care services through the country's Unified Health System (SUS in Portuguese). In 1990, a subsystem within this system was created to care specifically for the health of Indigenous people on reserves. This subsystem is composed of 34 districts, each with the structure necessary to provide primary health care services, under the coordination of the National Health Foundation (Funasa in Portuguese) of the Ministry of Health.

The Indigenous Health Especial Districts are the territorial units of the Subsystem of Indigenous Health, officially conceived as "a model organization of services – designed to a well-delimited population

and dynamic, geographical, and administrative ethno-cultural space, which encompasses a number of technical activities, aiming at rational and quality health care measures, promoting the reordering of the health care network and of sanitary practices and the development of administrative-managerial activities necessary for the provision of care with social control”(Funasa 2002, page 13). However, there is no institutional articulation between sanitation and health teams because until now the management of sanitation services is not integrated in the administrative and political structure of the Indigenous Health Especial District. Among many consequences that come from this institutional situation are: insufficient numbers of sanitation workers for Indigenous territories, inadequate or no training of sanitation workers to prepare them for culturally diversified contexts, and the separation between health and sanitation information systems. Although there are problems in the accuracy of Indigenous health statistics in general, these problems are compounded if you consider only Indigenous sanitation figures. Data about sanitation conditions on Indigenous territories are precarious in terms of the kind of data collected, their periodicity, and the statistical record method that has been used.

Political possibilities

Historically, Brazilian Indigenous peoples share strong bonds, recognize themselves as “peoples” and uphold their political autonomy. Yet what has been reserved for them in terms of political space and institutional processes is similar to what the so-called “new social movements” have made use of, with political demands for the inclusion of particularistic and differentiated citizenship rights – disregarding their claim to political and territorial self-determination.

Considering this political context, participation in the Indigenous subsystem and the mainstream health system is guaranteed to Indigenous peoples. This means that, as “users” of the system, they can and should take part in the design of the community health plans, participate in the development and implementation of health policies, supervise the achievement of their goals and the investment of resources made, as members of Health Councils and representatives in periodical Health Conferences. More important, they occupy 50% of the Indigenous health council’s places and there are at least three levels of Health Council where Indigenous people participate: on Indigenous communities, on especial Indigenous health districts, and on the national council. Finally, it is crucial to highlight that all levels of the health council have power to take

legal actions against the government, although this has happened only in the national council, the council concerning the Aboriginal subsystem and also the unified system.

Thus, the path to obtain Indigenous autonomy in Brazil, different from the Canadian process, has been the use of citizenship as an instrument for building this realm by reverting asymmetric power relations within different levels of the Brazilian national state.

But what are we talking about when we discuss Indigenous autonomy in health and sanitation in Brazil? Is this notion of autonomy similar to Indigenous self-government or self-administration in Canada?

From the perspective of Brazilian Indigenous peoples, to summarize, we can map a continuum that goes from self-determination (in recognition of their territories and traditional ways of life) to participation in and supervision of Indigenous health policies. The concept of participation aims at involving Indigenous peoples at all levels of the sector in planning, development and delivery of health and sanitation services. Moreover, Indigenous peoples affirm their capacity and disposition to work together with the federal government to develop strategies for appropriate health and sanitation services. Within this idea of partnership there is the premise that Indigenous peoples must be the protagonists of this relationship. The notion of Indigenous supervision of these processes, on the other hand, asserts the responsibility of federal government to carry out the Indigenous health system.

To date, Brazilian Indigenous peoples have not sought direct control over the health and sanitation administrative structure. Their position is much more to propose, plan, and act as a watchdog if their goals are implemented inadequately. To achieve it, Indigenous peoples struggle to become politically, administratively and financially decentralized in the Indigenous health subsystem. Last year, President Lula signed a decree declaring the autonomy of Indigenous Health Especial Districts in the terms demanded by Indigenous peoples. This decision can redefine Indigenous self-determination in health and sanitation because, it is the Indigenous leadership's expectation, the closer decision-making is to Indigenous communities the more powerful communities are. This seems to be their idea of self-determination: to strengthen the participation capacity of Indigenes in decision-making processes in health through a bottom-up political strategy.

Indigenous Boro People's Perspective on Water and Health

Jebra Ram Muchahary

President of the Indian Confederation of Indigenous and Tribal Peoples,
North East Zone

“Dwi” in Boro, my mother tongue, the language of 5.6 million suppressed, oppressed and marginalized Boro Indigenous people who are scattered in the present Nepal, Bhutan, Bangladesh and India, means ‘water’ in English. Dwi is sacred for us and therefore we worship it as a spirit. In olden days, Boro people worshipped rivers, rivulets, springs, ponds, lakes and oceans as the abode of the water spirit called Kwinasanti. ‘Kwina’ means ‘bride’ and ‘santi’ means ‘peace’, i.e. Bride of peace or Goddess of Peace. So, water itself is a symbol of peace and it is spiritually clean, pure and holy. Therefore Boro people used to invoke with prayers and offerings of a pair of Goi (Betel nut) and Patwi (Betel leaf) or a piece of cotton, coin, or any other locally available spiritual objects for offerings to Kwinasanti before they cross over any river, rivulet, springs, ponds or lakes for a special request for safe passage during their journey or travel. Traditionally there was a strong belief that there would be a harmful impact upon their family’s well-being if they cross, use or take bath in any river, rivulet, springs, ponds, lakes or ocean without seeking prior permission to the spirit of water. One might face sudden sickness, accident or unnatural death if one provokes or causes unhappiness or anger to Kwinasanti by intrusion. Every one used to gently touch the water with respect and offer prayer before their use and nobody ever dared to violate the golden rules of the spirituality and traditional belief, since people were strongly bounded by their traditional teaching, belief and strong bond of good practices with water. For Boro Indigenous people water was always clean, fresh, pure, uncontaminated, unpolluted and un-encroached, and therefore there was no question of today’s crisis of water or any related modern day adverse impact on their health and other water-related issues.

What made today’s modern water and water related crisis? Who are responsible for the fate of the deplorable situation with our climate leading to present-day health hazards to our human beings? Answers for these questions are with those who are responsible for the same fate. Further, disrespect to water as Holy Spirit Kwinasanti is the beginning to all these current water related problems. The strangers and their strange

teachings, and their attitude and unfriendly behaviour towards water have aggravated the current water issues.

For us water is an inalienable right for all people and all the creatures of nature. Yet the world's poorest and most vulnerable people are being denied access to clean water. Boro Indigenous People see protection of water as a collective responsibility. Polluted water is a problem for all people both in the developed and developing world for misconception about the water. Today children and elderly people are affected most by the state of water. Science and modern society has yet to deliver an effective remedy for this problem.

Thanks to the modern concepts of science and its behaviour, which has reduced water as a mere binary compound of Hydrogen and Oxygen, this is responsible for changing the attitude of the so-called modern civilized world towards water and the genesis of whole crisis of the Mother Earth. But one thing that we still firmly believe is that Dwi cannot be a mere product of two gases of Oxygen and Hydrogen since it has its own life and life cycle with lot of diversity of roles and functions for sustaining various life forms on the Mother Earth. Mere combination of two gases cannot be our spirit of peace. This is the wrong diagnosis of the sick mindset of the so-called modern scientist or the so-called advanced societies leading to wrong treatment, and its side effects in the whole crisis of water.

Truly, water is a life giver which is not merely a symbol of cleanliness, purity and holiness as we use it for ritual cleanings of our body, mind and soul; she is also a symbol of peace as she feeds and sustains us in peace despite indifference to her, who is full of tolerance, love and mercy and she will be the only one who will be able to cleanse the dirt of the Mother Earth by cleansing all wrong and evils of the entire human kind on earth.

Boro Indigenous people like any other Indigenous peoples on earth, always register our strong reservation against the commercialization our spirit "Kwinasanti" by the greedy multinational corporations (MNCs). They don't own Dwi and so also they have no right to sell or buy it. It is a free spirit and they must free it for the use and enjoyment for every one with respect and dignity. Let us strive to revive the past honour, respect of water and revive the godly image of Kwinasanti by sensitizing the ignorant as well as innocent people who are knowingly or unknowingly all bent to keep polluting it and greedy people who are over-exploiting and commercializing it as a mere resource. The time has come to reinvent ourselves to see water from the Indigenous perspective and to respect this

clarion call to join hands with a small handful of wise people who are striving hard with their endeavour to mitigate the water and water-related crisis on the Mother Earth for the best interest of our Mother Earth and all lives on it.

Options for Meeting First Nations Water Service Needs: Indian and Northern Affairs Canada, Public Private Partnerships (P-3s) or Shared Services?

John Calvert

Faculty of Health Sciences, Simon Fraser University

“Willingness to commit to common regional goals involves the recognition that we must work together to ensure that all communities benefit from available social and sustainable, environmentally responsible, economic opportunities. Sharing resources and information will benefit us all.”

-Grand Chief Stewart Phillip, Union of British Columbia Indian Chiefs

The purpose of my presentation is to discuss several of the options now facing First Nations who wish to build new water and wastewater infrastructure. As conference participants are aware, there is a pressing need both in BC and across Canada for facilities to provide safe, affordable drinking water for First Nations. Too many reserves are still faced with boil water advisories and too many First Nations' homes do not have access to safe tap water. While the federal and provincial governments have made some efforts in recent years to address this issue, progress has been painfully slow. As a consequence, many First Nations are looking for ways to fast track the construction of new water and wastewater facilities.

However, there are a number of different approaches for addressing this problem. These include: restructuring the current approach of Indian and Northern Affairs Canada (INAC) for financing new facilities; establishing financing partnerships with private water companies to develop Public Private Partnerships (P-3s); and, reaching shared service agreements with adjacent municipalities or, in some cases, provincial or territorial governments.

My presentation is structured as follows. I will begin by discussing the problems associated with INAC's approach to funding infrastructure – problems that flow from its budget allocation process, the lengthy approvals process and the challenges faced by some First Nations in meeting their share of operating expenses. I will then proceed to examine a relatively new approach being promoted by both Federal and provincial/territorial governments: Public Private Partnerships (P-3s).

Encouraged by the private sector, governments have put in place a variety of new programs over the past 15 years to facilitate the introduction of private capital into new infrastructure projects. I will examine some of the initiatives now being encouraged by governments and assess their strengths and weaknesses. Finally, I will outline another approach – shared services between First Nations and municipal governments. These can be broadly characterized as Public to Public Utilities (PUPs) using the framework recently developed by Boag and MacDonald.¹ Again I will note some of the advantages and disadvantages of this approach, using several existing agreements to illustrate my analysis.

The way in which First Nations choose to finance future water and wastewater projects will, in my view, have a major impact on the extent to which they maintain effective control over the resulting infrastructure and the options that they have for other related economic development initiatives.

Federal policy requires INAC to finance projects from current budget allocations. Unlike municipal or provincial/territorial governments, who can finance projects through loans that will be paid off over a period of time, INAC is constrained to build only the number of projects that can be fully financed from its yearly budget. This means that only a limited number of water service projects can be approved each year and these depend critically on INAC's budget allocation for the year. This, in turn, means that many First Nations will have to wait for many years before their reserve finally receives its funding allocation. Although the Federal government has allocated more funding towards water facilities over the past decade, the amount is still inadequate, given the pressing needs of so many First Nations.

One option to restructuring INAC's approach to financing would be to permit it to fund projects over a much longer period through debt financing. If it were able to borrow funds up front to be paid back over time from future budget allocations for First Nations infrastructure – or if it were to guarantee loans to First Nations - more projects could be financed. Of course, this would not address some of the other issues associated with INAC's process for approving projects. INAC would also need to address the issue of the lengthy period normally required to get approvals and the issue of how to assist First Nations with covering their share of operating costs. Regardless of what it does to reform the latter two matters, on the question of financing, I am not convinced that the

¹ Boag, G. and McDonald, D.A. "A critical review of public-public partnerships in water services." Water Alternatives. 3, 2010. www.water-alternatives.org. They define PUPs as follows: "A twinning arrangement with a stated non-profit motive that aims to improve water services in one or more of the partner regions and which includes only public partners."

Federal Government has an appetite to permit government guaranteed borrowing for water treatment and related facilities, particularly as it now seems to be moving towards P-3 models for new projects.

Because governments are now trying to introduce private capital into areas that were formerly funded by direct public borrowing, and because they have indicated it should be utilized for First Nations projects, the costs and benefits of this approach merit detailed scrutiny. As my presentation will show, there are a number of significant drawbacks to using this funding approach. Financing is more expensive because private firms do not enjoy the high credit rating of governments. Private proponents must also provide a profit to their shareholders, something that governments do not have to do. This adds to the costs of P-3 projects. The process of developing tenders and negotiating contracts is complex. If not done right, governments can find that even small changes to the scope of a project - or the services provided - can be extremely costly. Given the remote location of many potential projects, competition may be very limited, making it difficult to know if bids are really cost effective. And, finally, contracts can limit flexibility to expand operations into other areas that may be beneficial in terms of overall economic development for First Nations.

The third option – shared services – is one that I think has many advantages. True, in some locations partnering with adjacent municipalities may be problematic due to geography and low population density in remote areas. But in many cases there are opportunities for First Nations to develop ongoing relationships with adjacent municipalities in which the cost of infrastructure development can be shared. In some cases, the location of facilities can be arranged to take advantage of the most effective site, either on, or off, First Nations territory. Training and staffing issues can be rationalized to ensure effective management and operation of facilities. And, partnerships with municipalities can be expanded to include other economic development projects. But most importantly, public borrowing remains the most cost effective approach to financing projects. It has the added advantage for First Nations of ensuring that water facility assets end up being owned by governments, whether exclusively by First Nations or jointly in a partnership with municipal or provincial/territorial governments.

There are a number of examples of successful Public to Public (PUP) partnerships both in BC and in other jurisdictions which I will discuss in my presentation. I believe these provide useful examples of the kind

of relationship building that can result from this kind of co-operative approach to public infrastructure development.

In conclusion, my presentation will argue that government to government agreements (PUPs) have significant advantages over P-3s as a vehicle for developing water and wastewater infrastructure. However, for these advantages to be realized, it is essential that policy makers systematically catalog the experience of existing First Nations and local government partnerships so that best practices and successful models can be better known and the lessons shared among all the potential beneficiaries.

Collaborative Research Platform for Environmental Engineering Applications & Small Water Systems in Aboriginal Communities

Kerry Black

MA Candidate

University of British Columbia

Introduction

The global water crisis affects millions of people worldwide, every year. It is estimated that over 1.1 billion people do not have access to safe drinking water sources¹. The effect of poor water quality can have a major impact on human health. The most common disease related to inadequate water supply is diarrhoeal disease. An estimated 1.8 million deaths annually are the result of diarrhoeal disease². Small and rural communities within Canada, particularly Aboriginal communities are at the highest risk of disease caused by unsafe drinking water. While much research is ongoing across Canada into the development of technology in the hopes of improving drinking water quality in small and rural communities, access to education and the implementation of these technologies remains to be the key barriers facing these communities. Governance, policy and education are the key areas that need to be addressed at the community, provincial and federal level. More research is needed into the development of: Successful educational programs in small and remote communities; Access to water treatment technologies and monitoring strategies in remote communities; Availability of appropriate training and support for technical professionals within these communities.

The objectives of this research project are:

- Creation of highly-skilled technical professionals within Aboriginal communities;
- Increased access to on-site educational programs in small and remote communities;
- Improved access to resources and training within these communities; and

- Creation of remote real-time online monitoring facilities to facilitate on-site training and improve understanding of current operational efficiencies of water treatment systems in Aboriginal communities.

The collaborative research platform leads to the creation of shared networks from which members of small and remote Aboriginal communities can access engineering education tools and learning modules, on-site virtual educational centres providing access to water treatment operator technical education, training and support, and real-time water quality data collection and access to the network of virtual communities.

This research hopes to incorporate the WaterKeepers program, developed locally by BC First Nations, as a tool for water treatment Operator training. WaterKeepers is a system that is able to provide computer-based training programs for small water system certification and operational support for system operators. In addition, the WaterKeepers structure provides a framework for similar training programs and leads to education and training capacity development within First Nations communities.

This platform also investigates education tools and models and their application to Aboriginal communities (e.g. immersive learning techniques, Water is a Treasure! Learning Modules⁴) and the exploration of virtual remote learning centres in isolated communities as education and training tools (e.g. Virtual Learning Lodge, University of Victoria “UVic”). Finally, further work is needed to build on existing platforms (e.g. NEPTUNE, UVic) to lead to the creation of real-time monitoring systems that will provide insight into current efficiencies and deficiencies of water treatment systems and specific technologies; use of real-time monitoring stations to provide additional hands-on and problem-solving training for small water systems operators; and online data collection leading to increased knowledge into the current state of water systems in targeted communities.

¹ World Health Organization. (2004). Water, Sanitation and Hygiene Links To Health. Facts and Figures.

² World Health Organization. (2004). The Global Burden of Disease. Part 2: Causes of Death.

³ Government of Canada, 2007. Water is a Treasure! Published under the authority of the Minister of Indian Affairs and Northern Development and Federal Interlocutor for Métis and Non-Status Indians. Ottawa, 2007

Capacity enhancement for the implementation of source water protection plans in First Nations communities in Saskatchewan

Jessica E. Miller

MA Candidate

University of Saskatchewan

In Canada, uneven access to safe drinking water in First Nations communities continues to be problematic. Boil water advisories for First Nations communities are 2.5 times higher than non-First Nations communities (Advanced Aboriginal Water Treatment Team, 2008). Some of these boil water orders have been in effect for numerous years (Harden and Levalliant, 2008; Lebel, 2008). For example at Yellow Quill First Nation near Saskatoon, Saskatchewan a boil water order was in effect for 9 years – a condition that would have been intolerable for the residents of Saskatoon. In Saskatchewan, some First Nations have recently developed source water protection plans with the assistance of the North Saskatchewan River Basin Council. The purpose of these plans is to identify local threats to drinking water contamination, to identify specific action statements to overcome these threats and to enhance awareness in the community about threats to water. At the community level the expectation is that these action statements will be implemented in order to achieve positive improvements respecting local drinking water quality. The water resource literature has identified the importance of capacity enhancement for small communities to not only develop source water protection plans but also to implement these plans. Without sufficient financial, institutional, and technical capacity, the benefits of source water protection planning may never come to fruition. The goal of this research is to identify the necessary capacity enhancement requirements to support source water protection planning, and the implementation of those plans. This research will involve two First Nation case study communities in Saskatchewan under the Ownership, Control, Access and Possession methodology principles for building partnerships and conducting ethical research with Aboriginal peoples. Data will be gathered using key informant interviews combined with participatory research involving sharing circles, focus groups, interviews, and text document review. The knowledge gained from this research will be beneficial to other First Nation communities and organizations that are interested in source water protection planning. The results will also be useful to organizations

and government agencies that provide assistance in the planning and maintenance of water systems in First Nations communities.

Keywords: Source Water Protection Planning, First Nations, Implementation, Capacity Enhancement

References

- Advanced Aboriginal Water Treatment Team (AAWTT). (2008). *First Nations Drinking Water Position Paper* (5th ed.). Prepared for the Safe Drinking Water Foundation. Accessed 08/01/2009 <http://www.safewater.org/PDFS/PositionPaper.pdf>
- Harden, A. & Levalliant, H. (2008). *Boiling Point! Six community profiles of the water crisis facing First Nations within Canada*. Prepared in collaboration with the Assembly of First Nations. Ottawa, ON: Polaris Institute.
- Lebel, M.P. (2008). *The Capacity of Montreal Lake, SK to Provide Safe Drinking Water*. University of Saskatchewan: Saskatoon, SK.

Conference Agenda

Sunday, March 21, 2010 | Venue: First Peoples' House

5:00 to 5:30 pm: Conference Pre-Registration

5:30 to 6:00 pm: Welcoming and Opening Prayer

Dr. Jeffrey Reading – Director, Centre for Aboriginal Health Research

Honoured Elder Butch Dick – Opening Prayer

6:00 to 6:45 pm: Special Guest Presentation

Dr. Asit Mazumder, Water and Aquatic Science Research Program,
University of Victoria

NSERC Industrial Research Chair in Water

“Issues and challenges of sustaining clean and healthy water for the rural
and remote communities of Aboriginal peoples of Canada”

6:45 to 7:15 pm: Cultural Entertainment

Esquimalt Dancers

First Peoples' House-based drummers

7:15 to 8:15 pm: Reception with Refreshments

8:15 to 8:30 pm: Closing Prayer

Honoured Elder Butch Dick

Monday, March 22, 2010 | Venue: University Club

8:00 to 8:45 am: Registration and Continental Breakfast

9:00 to 9:15 am: Welcoming and Opening Prayer

Dr. Jeffrey Reading (Master of Ceremonies)

Opening Prayer - Honoured Elder Butch Dick

9:15 to 9:45 am: Opening Remarks and Keynote Speaker

Opening Remarks - Dr. Howard Brunt, VP Research,
University of Victoria

Keynote Speaker – Grand Chief Edward John, First Nations Summit

9:45 to 10:15 am: Presentation I

Dr. Margot Parkes, Health Sciences Programs, University of Northern British Columbia Canada Research Chair in Health, Ecosystems and Society “Watersheds as settings to link equity, ecosystems, and Indigenous health”

10:15 to 10:45 am: Presentation II

Dr. Carmen Ledo Garcia, Management and Planning Centre, Faculty of Economic Sciences, University of San Simon
“Inequality and Access to Water in the City of Cochabamba”

10:45 to 11:00 am: Coffee Break

11:00 to 11:30 am: Presentation III

Mr. Robert Pratt, Advanced Aboriginal Water Treatment Team, Safe Drinking Water Foundation “The Advanced Aboriginal Water Treatment Team: An Initiative of the Safe Drinking Water Foundation”

11:30 am to 12:00 pm: Presentation IV

Dr. Edward McBean, Professor of Water Resources, University of Guelph Canada Research Chair in Water Supply Security
“Challenges for Small Water Systems”

12:00 to 1:00 pm: Lunch

1:00 to 1:25 pm: Poster Presentations

1:30 to 2:00 pm: Presentation V

Mr. Richard Lawrence, Regional Manager, Environmental and Public Health Services, First Nations and Inuit Health Branch, Health Canada
“Implementation of the Drinking Water Safety Program in the First Nation Communities of British Columbia”

2:00 to 2:30pm: Presentation VI

Ms. Mona Shum, M.Sc. CIH, National Collaborating Centre for Environmental Health “Update on the National Collaborating Centres for Public Health Small Drinking Water Systems Project”

2:30 to 2:45 pm: Coffee Break

2:45 to 4:00 pm: Panel Session I – Science and Public Health

Panel discussion with the floor open for questions, chaired by Dr. Jeffrey Reading.

4:00 to 4:15 pm: Closing Remarks and Prayer
Honoured Elder Tom Sampson

Tuesday, March 23, 2010 | Venue: University Club

8:15 to 8:45 am: Continental Breakfast

9:00 to 9:30 am: Welcoming and Opening Prayer
Dr. Jeffrey Reading – Director, Centre for Aboriginal Health Research
Honoured Elder John Elliot

9:30 to 10:00 am: Presentation VII
Dr. Darlene Sanderson, University of Victoria
“The importance of Indigenous Elders’ teachings in our relationship with water – research guided by our past and strategies for the future”

10:00 to 10:30 am: Presentation VIII
Dr. Carla Teixeira, Professor - Universidade de Brasilia/CAPES, Visiting Professor - Simon Fraser University
“Water Supply on Indigenous Territories: Policies and Politics in Brazil”

10:30 to 10:45 am: Coffee Break

10:45 am to 12:00 pm: Panel Session II – Indigenous Perspectives on Water and Health
Panel discussion with the floor open for questions, chaired by Dr. Jeffrey Reading.

12:00 to 1:00 pm: Lunch

1:00 to 1:30 pm: Presentation IX
Mr. Jebra Ram Muchahary - President of the Indian Confederation of Indigenous and Tribal Peoples, North East Zone
“Indigenous Boro Peoples’ Perspective on Water and Health”

1:30 to 2:00 pm: Presentation X
Dr. John Calvert, Faculty of Health Sciences, Simon Fraser University
“Options for Meeting First Nations Water Service Needs: INAC, P-3s, or Shared Services?”

2:00 to 2:30 pm: Presentation XI
Ms. Kristin Stark, Assembly of First Nations
“First Nations Water Commission – Moving into a regulatory environment”

2:30 to 2:45 pm: Coffee Break

2:45 to 4:00 pm: Panel Session III – Policy and Governance

Panel discussion with floor open for questions, chaired by Dr. Jeffrey Reading

4:00 to 4:15 pm: Closing Remarks, Prayer

Honoured Elder John Elliot

Speaker Biographies and Presentation Abstracts

Dr. Asit Mazumder

Water and Aquatic Sciences Research Program, University of Victoria

Dr. Mazumder earned his PhD at the University of Waterloo and was a faculty member at Université de Montréal for 10 years. He joined University of Victoria in 1999 as an NSERC Senior Research Chair and Professor in water and aquatic sciences research. During the last decade, he developed extensive partnership with water utilities, communities, academics, government and industries for inter-disciplinary research for sustainable clean and healthy water for communities in Canada, New Zealand, Australia, Hong Kong, Cambodia, China, Bangladesh and Haiti, and during the last 5 years with a significant focus on water quality and health issues of Canada's Aboriginal and rural communities. In addition, he has served on numerous provincial, national and international committees on water and environment issues, many national and international grant selection panels, and as an editorial board member for several international scientific journals. He has published over 100 peer-reviewed papers in international journals, trained 100s of undergraduate students, and over 100 graduate and post-doctoral students in water and aquatic sciences. His passion is to help small, rural and slum communities with the science and knowledge needed for the protection of health and well being through sustainable clean and healthy water and food.

Abstract

As we entered the 21st century, our effort to sustain clean and healthy water for communities, like the rural and remote communities of Aboriginal and non-Aboriginal peoples, is being challenged by a variety of stressors, such as pathogens, toxins, pharmaceuticals associated with land- and resource-use and development, high water demands and depletion of groundwater, drought and heavy rainfall. These stressors are leading to chemical and fecal contamination of water used for drinking, and globally millions of people die a year from contaminated drinking water, and 35 out 1000 children in the rural and slums of developing countries die before the age of 5 from water-related illnesses. Unfortunately, the quality of the environment that provides us with precious drinking water are being compromised because it is assumed

that any water regardless of sources and quality could be treated to make them safe for drinking. The question is: does treatment produce healthy water? The small, rural and remote communities are at greater health risk from contaminated drinking water, because of lack of expertise and resources, and the lack of control over the protection and management of water sources used for drinking. The Aboriginal communities in Canada fall under the same category of small and rural systems, and this week, 109 out of 601 Aboriginal communities in Canada are under boil water advisories. In this presentation, in addition to providing a general overview of the issues and challenges with providing clean and healthy water to rural and remote communities, I will present results on some of the innovative tools we developed to track sources of chemical and fecal contamination of water that could be used to develop strategies to optimize and manage health risks of Aboriginal peoples related to water.

Dr. Margot Parkes

University of Northern British Columbia

Margot Parkes is a Canada Research Chair in Health, Ecosystems and Society, and Assistant Professor at the University of Northern British Columbia. Her move to UNBC in 2009 was fuelled by combined interests in community, environment and Indigenous health. Margot's orientation to the links between health, ecosystem and equity was founded during her medical training in New Zealand and subsequent work in public health, human ecology, and the emerging field of ecohealth, or ecosystem approaches to health. Her interests in the links between watershed management and the determinants of health began in New Zealand and were developed through work in Europe, Hawaii, Ecuador and Canada. Margot was founding Managing Editor of the international journal *EcoHealth* and since 2005 has worked at UBC with global health projects in Ecuador; as a CIHR 'Initiative in Global Health Research' Fellow; and Co-Principal Investigator of the Canadian Community of Practice in Ecosystem Approaches to Health. Her research focuses on impacts of ecosystem change on social determinants of health, and the design of education, research and practice that address the health, ecosystems and equity, especially in rural, remote and Aboriginal communities.

Abstract

When we think of waterways as the bloodstream of the planet, we are reminded of the myriad ways water connects our health, communities and economies with the natural world. These relationships are especially

relevant given the pressing concerns regarding sources, supplies and safety of water resources for Indigenous communities in Canada and beyond.

Watersheds provide a setting to focus on the links between ecosystems and equity as determinants of health. This thinking complements - and is informed by - many holistic models of Aboriginal health as well as emerging fields such as ecohealth and environmental justice. An integrative focus on livelihoods, living systems and life-scapes within watersheds helps to overcome the tendency for health conversations to be split between inequities and social determinants of health on one hand, or environmental health contaminants, hazards and risks on the other. Viewing watersheds as settings to promote social and ecological determinants of health helps to counter the view of the natural world as a source of exposures and illness, and shift attention to water as a fundamental resource for wellbeing.

This presentation will examine watersheds as the setting from which water sources, supplies and safety are derived, and present a framework that explores ecosystems, equity and health in the context of watershed governance. The presentation will draw on examples in New Zealand, Hawaii, Ecuador and Canada that highlight the importance of watersheds as settings for health and sustainability, and as the context for governance and management of small water systems.

Dr. Carmen Ledo Garcia

Management and Planning Centre, Faculty of Economic Sciences, University of San Simon, Cochabamba, Bolivia

Dr. Carmen Ledo (her full name is Maria Del Carmen Ledo Garcia) is a professor in the Department of Economic Sciences (FES) at the Universidad Mayor de San Simon- UMSS (or San Simon University) in Cochabamba, Bolivia. She also holds the position of Director of Planning and Management at this university, and serves on the academic committee for the FES doctorate program. She has worked both in public administration and in universities, with a particular interest in water systems requiring integration of a range of perspectives, from engineering to social science. In 2000, she was heavily involved, as both a scientist and a negotiator, in a controversial proposal to privatize water systems in Cochabamba, Bolivia. During this conflict, she demonstrated her skills in facilitating respectful dialogue and providing scientific evidence in clear and actionable terms that linked research to decision-making and mobilization of the public to protect public goods and social welfare. Her work in Bolivia has led to her participation as a researcher and project

coordinator in several international studies, mostly in collaboration with European universities. She has served as a consultant to several UN agencies, including UNDP, UNIFEM, and UNICEF. Carmen has been a strong supporter of the Canadian Coalition for Global Health Research role in facilitating the development of a national health research system in Bolivia. She participated in discussions of the Bolivia-Canada team during Canadian Conference on International Health, 2007. Following the December 2007 workshop in Cochabamba, she became a member of the working group that continues to promote the development of a National Council on Health Research (CONAIS). She also was a member of a 5-person team from Bolivia that participated in the Andean consultation of building research partnerships that was held in Quito Ecuador in May 2008.

Abstract

Rapid urban population growth in the city of Cochabamba, Bolivia has generated an increased demand for basic services, especially that of water. Due to its limited capacity, the Public Water Company, or the “Municipal Water Supply Company (SEMAPA)”, has been unable to provide sufficient water for home consumption within the city itself, and less so, in the marginal districts of the city. Three basic types of water supply attend to the needs of the urban population. The Public Water Company attends to the needs of 60% of the population of the northeastern zone. This is the largest number of households that can be considered as not living in poverty. On the other hand, the population on the outskirts of the city does not have running water, therefore, they have to buy water from tankers, dig wells, or obtain water from a community administered private source of water supply. Alternative social systems of water supply such as Water Co-operatives, Associations, and Committees, are mainly located in the South and North Western zones of the city and supply water to about 20% of poor households. The third source, the Private Water Supply System, attends to the remaining 20% of households in the southern zone. Informal vendors (“aguateros”) and wells are the other source of water supply. However, water from these sources is unsafe for home consumption because of the risk of contamination and the resulting infections that cause high infant mortality in poor neighborhoods.

Mr. Robert Pratt

Advanced Aboriginal Water Treatment Team

Robert (Bob) Pratt grew up in George Gordon First Nation and has worked off-reserve, but returned to help his home community treat a

challenging ground water source. In 1988 Bob began training as a water treatment plant operator. Bob has seen his plant progress from Version 1, 2 and 3 of various manganese greensand configurations, none of which worked. In 2000 the Gordon Water Treatment Plant got Reverse Osmosis (RO) Membranes, it was the first full-scale RO plant on reserves in Western Canada. At treatment flows of 5 L/s it remains one of the largest. The manganese greensand pre-treatment ahead of the RO continually presented problems, which were not resolved until the greensand was replaced by biological treatment in December 2005. Bob has helped other water plant operators in many reservations across western Canada. Bob is a founding member of the Advanced Aboriginal Water Treatment Team. Bob has attended many training courses including Advanced RO Treatment in Phoenix, Arizona. Bob is currently spearheading the establishment of the George Gordon Groundwater Research Centre, which is dedicated to finding solutions to groundwater problems.

Abstract

Bob will be presenting information about the Safe Drinking Water Foundation and the Advanced Aboriginal Water Treatment Team (AAWTT). Information regarding how the AAWTT was founded and trained will be included in the presentation. The purpose of the AAWTT will also be discussed as well as Bob's personal experiences in dealing with water treatment problems that they were faced with in his community of George Gordon First Nation and how these problems were solved.

Dr. Edward McBean

Professor of Water Resources, University of Guelph

Abstract

The causes of boil water advisories (BWAs) are many and varied, but also extensive in number and duration. Examples of the numbers of the BWAs are provided as evident across Canada. In addition, typical causes of the BWAs are reviewed, some of which are the result of non-operating conditions as opposed to actual failures. To a significant extent, the challenges to supply water are particularly difficult for small systems due to issues of affordability for multiple barriers, and more challenging with limited resources. Additional dimensions of concern also relate to source water type which greatly influences the treatment technologies that will be needed to ensure the safety of the supplied water. Insights into procedures to differentiate between 'secure' groundwater supplies that are not vulnerable to contamination, and ground water under the

direct influence (GUDI) of surface water (e.g. use of color and turbidity). Some of the issues of staffing, training and economics, associated with small water systems are reviewed and extensive reliance upon case study applications, to demonstrate how risks of system failure are provided.

Mr. Richard Lawrence,

Regional Manager, Environmental and Public Health Services, First Nations and Inuit Health Branch, Health Canada

Richard's career history spans more than 35 years working with Aboriginal communities in the promotion and development of Environmental and Public Health Services. Since his early days in the eastern Arctic, the Yukon Territories and throughout British Columbia, Richard's field experience is linked with many milestones and achievements in the promotion of community and public health services. Richard is a specialist in Environmental Health as the Regional Manager of Environmental Health Services, First Nations and Inuit Health, Health Canada, Pacific Region.

Abstract

Access to safe and reliable drinking water is essential as clean water supports our environment, our health and our well being. Environmental Health Officers work in partnership with First Nation communities throughout British Columbia to build capacity for community based Drinking Water Quality programs. The Drinking Water Safety Program was developed to ensure water is regularly monitored, results are interpreted, advice, guidance and training are provided and suspected problems with community water supplies are investigated. The program is effective in reducing the possibilities of waterborne disease outbreaks and in promoting the importance of safe drinking water through public education and awareness. Community-based Water Quality Monitors play a key role in the drinking water safety program as the designated community member responsible for sampling, testing, recording and communicating the microbiological quality of community water supplies. Environmental Public Health Services share responsibilities for the management of water supplies in First Nation communities. This presentation will explore a number of challenges and successes in the development of the Drinking Water Safety Program in First Nation communities of British Columbia.

Ms. Mona Shum

M.Sc. CIH, National Collaborating Centre for Environmental Health

Ms. Shum completed her undergraduate degree in Microbiology and Immunology at McGill University and went on to complete her graduate degree in Occupational Hygiene at the University of British Columbia. She started her career working as an industrial hygienist for Shell Canada in Alberta and then went on to spend the bulk of her career as a scientific consultant for an engineering and environmental consulting firm in California. In that consulting role, she managed several large scale environmental projects involving cellular telephones, mould in indoor environments, and antimicrobial resistance. She has also been involved in several projects involving chemical and microbial contamination of drinking water. On a regular basis, she synthesized and translated pertinent scientific information for her clients. She is now the manager for the National Collaborating Centre for Environmental Health and is excited to bring some of her project management and content expertise to this role.

Abstract

The National Collaborating Centres for Public Health (NCCPH) are working on a collaborative project on small drinking water systems in Canada. The purpose of the project is to improve these systems by identifying gaps and providing the necessary evidence to inform policy and practice. In 2009, the NCCPH held five different forums and workshops and posted an on-line survey to gather input from front-line practitioners, policy makers, local drinking water officials and other experts in water safety. Based on their input, the NCCs began focusing their efforts on projects that addressed priority areas. We will present an update on some of the projects being completed by the NCCPH:

- Production of a user guide to home water testing
- Review of effectiveness of treatment technologies
- Creation of a database of notifiable waterborne diseases across Canada and of provincial reporting requirements
- Review of effective strategies for communicating risk
- Description of responsibilities of agencies/organizations involved in delivery of safe drinking water
- Review of drinking water and its impact on pregnancy and children's health

- Inventory and summary of Canadian and international projects/ initiatives in small drinking water systems.

Dr. Darlene Sanderson

University of Victoria

Darlene Sanderson (Cree, Manitoba, living in Coast Salish territory, Victoria, BC) completed her PhD at Simon Fraser University in 2008. Her PhD focused on Indigenous elderly teachings of the spiritual dimensions of water and the connections between health, education, law and the environment. She learned teachings from *Cree*, the *NuuChahNulth*, and the *Maori* Elders. She has developed learning resources on water called, 'Traditional Perspectives on Water: How Can Elders' Teachings Be Applied Today for Future Generations?' Her current research looks at Indigenous solutions to climate change and water issues, and at the community level: community capacity-building for Indigenous water policy development, and education about water that is guided by Elders. Having participated at the UN Permanent Forum on Indigenous Issues for the last 3 years with Indigenous caucuses on water, she has been asked to serve as Secretariat for the planning for an Indigenous World Forum on Water and Peace, proposed to be held in Bolivia, on the shores of Lake Titicaca.

Abstract

Nipiy Wasekimiw/Clear water: The Meaning of Water from the Words of the Elders: the Interconnections of Health, Education, Law and the Environment is the title of my research thesis. This presentation will provide a summary of my doctoral work and some examples of how this research has shaped my work on water issues at both community and international levels.

Dr. Carla Teixeira

Universidade de Brasilia/CAPES, Visiting Professor – Simon Fraser University

Carla Costa Teixeira received her Ph.D. degree, with honors, in Social Anthropology at Universidade de Brasília in 1997. Since then she has been a Professor in the Department of Anthropology at Universidade de Brasília (UnB, Br). She has been working on Anthropology of Politics for about twenty years and in the last decade her focus has been public policies on Indigenous health and sanitation. Her works have been published in *Anuario Antropologico*, *Mana*, *Public Culture* and *Etnografica* and she has also several books published as author and editor. Currently, Carla Costa Teixeira heads the Laboratory of Anthropology, Health, and Sanitation Researches at UnB, is the leader of the research

group 'Political Anthropology of Health' (National Council for Scientific and Technological Development – CNPq/Br) and represents the Brazilian Association of Anthropology at the Intersectorial Commission for Indigenous Health (Ministry of Health, Br). Until April 2010, with support of Brazilian government, she is developing a comparative research between Indigenous health policy in Canada and Brazil as visiting professor at Simon Fraser University.

Abstract

This presentation is part of a research project compares the meanings, courses of action and institutional possibilities resulting from the exercise of autonomy by Indigenous peoples involved in the development of public health policies in Brazilian and the Canadian contexts.

By focusing water supply on Indigenous territories I seek, on the one hand, to give an idea of the empirical reality in which Brazilian Indigenous people live and, on the other hand, shed some light on the complex connections among technical aspects, institutional dimension, and political field of Indigenous health policy in Brazil.

Keeping these objectives in mind, I first present some national data on the Indigenous population, their housing conditions, and the public investment made to improve the collective sanitation in their communities. Then, I compare this data with insights gained through fieldwork in an Indigenous community in the Northern region of Brazil. Finally, I highlight disparities between the macro reality of national data and the micro reality of fieldwork and analyze technical, institutional and political factors related to this situation.

Mr. Jebra Ram Muchahary

President of the Indian Confederation of Indigenous Tribal Peoples, North East Zone

Mr. Jebra Ram Muchahary is President of the Indian Confederation of Indigenous and Tribal Peoples North East Zone (ICITP-NEZ), based in Guwahati, Assam, India. He is also advisor for Asia region for the Indigenous World Forum on Water and Peace based in Canada and President of United Peoples' Federation of Assam (UPFA). Professionally a teacher, and an International Boro Indigenous Human Rights & Environment Activist turned Peace worker, Mr. Muchahary is a serious United Nations Institute for Training and Research (UNITAR) Geneva trained activist for "Conflict Resolution and Peace Building Capacities". He is a Boro Indigenous leader having special intercultural

communications skills trained at Hague, the Netherlands and Excellent Award recipient of UNEP-Eco Peace Leadership Centre, Chuncheon, South Korea. “Best Citizen of India” as well as “Gem of India” awardee, Mr. Muchahary is also a gold medalist in “Organisation Management”. He has been actively working for protection of the fundamental rights of Indigenous and Tribal Peoples of India since 1996 and for protection of their basic human rights mainly focusing on their life sustaining resources of Water, Land and Forests (Jal, Jamin aur Jangal). He has also been actively involved in advocacy of Indigenous and Tribal Peoples’ various issues especially on Health, Socio-economic development, Culture, Intellectual Property Rights, Environment, Language, Democracy & Peace in all levels.

Abstract

He speaks on the concepts of water and spirituality and the impact of industrialization. He is concerned with the privatization of water and the expansion surrounding the big business of water with multinational companies entering the field. He talks about the unimaginable fact that today, despite being in a terrible economic situation, poor Indigenous and Tribal Peoples of his region of India are increasingly utilizing commercialized bottled water for drinking. The impact of industrialization resulting in pollution, disease, and commodification of water are new concepts to the Boro Indigenous and tribal peoples, although they have their own traditional beliefs that water is spirit, known as KHOINA SANTI. He shares that, although water is still respected and worshipped, today that respect has been diminished, due to external cultural influences and modern concepts of water introduced by culturally inappropriate education. His Indigenous and Tribal Peoples are concerned with the threat to the sustainability of fresh water, and the need for people of the world to recall the spiritual linkage and philosophical perspective as Indigenous Peoples’ vision to have sustainable use of water for future generations and for future wellbeing of the Mother Earth.

Dr. John Calvert

Simon Fraser University

John Calvert is an Associate Professor at Simon Fraser University in the Faculty of Health Sciences where he teaches public policy, the history of the Canadian health care system and international trade and health policy. Dr. Calvert has a PhD from the London School of Economics and a BA and MA from the University of Western Ontario.

Abstract

The purpose of my presentation is to discuss several of the options now facing First Nations who need, as a matter of urgency, to develop new water and wastewater infrastructure. These options include: restructuring the current approach of Indian and Northern Affairs Canada (INAC) for financing new facilities; developing public private partnerships (P-3s) with private water corporations; and, reaching shared service agreements with adjacent municipalities or, in some cases, provincial or territorial governments. I review each of these options, analyzing their respective strengths and weaknesses. The conclusion of my presentation is that the best option for many First Nations is to work with neighbouring local governments to develop co-operative, shared services infrastructure agreements. There are a number of examples of successful and innovative arrangements, both in British Columbia and across Canada which can provide important lessons both for local governments and First Nations. In addition partnerships with municipalities have the potential to be expanded to include other economic development projects, benefitting both First Nations and municipal residents.

Ms. Kristin Stark

Assembly of First Nations

Kristin Stark is a Policy Analyst at the Assembly of First Nations. In this capacity, she has worked on environmental issues facing First Nations, specifically those related to water and climate change. Previous to this, Kristin worked with environmental non-governmental organizations in Ottawa and Toronto on food security issues. Kristin grew up in Toronto and has a Masters in Environmental Studies from York University.

Abstract

This session will focus on the persistent challenges with accessibility to safe drinking water for First Nations on reserve. The session will describe the current policy context, including the trend towards an increasingly regulated environment. Options for establishing a First Nation-governed water management framework in order to assist First Nations with moving into a regulatory environment for drinking and waste water will be discussed. The session will identify gaps and opportunities for First Nations to effectively take the lead in implementing water governance solutions that address the root causes of current water-related challenges.

Part III

Indigenous Water Ways: A community-based workshop series
on the social context of First Nations drinking water
in British Columbia

Indigenous Water Ways: A community-based workshop series on the social context of First Nations safe drinking water in British Columbia

Roots of a Mobile Workshop Series on Water and Indigenous Health

Project Background

A significant body of literature establishes that Aboriginal people in Canada (First Nation, Métis and Inuit) experience poorer health status and a greater proportion of risk factors relative to the general population (Reading, 2009; RCAP, 1996; RHS 2005). Numerous studies have found that “poverty in the form of material deprivation, *lack of clean water*, poor nutrition, allied to lack of quality medical care can account for the tragically foreshortened lives of people” in the poor populations of the world (Marmot, 2005,p.1101). Lack of safe drinking water is a threat to public health affecting 117 of 630 First Nation reserves in Canada (Health Canada, 2010), and “is repeatedly identified as a major source of concern” (NAHO, 2003, p.3) by First Nations in Canada. In British Columbia, according to the Provincial Health Officer’s report, some First Nation communities have been on drinking water advisories continuously for over ten years (BC PHO, 2008). This presents serious threats to both individual community members and the community collective. It is well known that lack of safe drinking water “breeds sickness, blocks development, deepens inequalities of income and opportunity, and undermines the survival of entire societies” (Brooks, 2002). Hence, developing effective interventions and enabling policies to address this urgent issue is necessary to ensure the healthy development of First Nation communities in British Columbia and across Canada.

At the time of this project, there are currently no enforceable standards for water quality provided by on-reserve treatment and distribution systems. In addition, there is a lack of clarity around jurisdiction and the division of responsibility for safe drinking water between Indian and Northern Affairs Canada (INAC), Health Canada, Environment Canada, and communities themselves, which are responsible for approving water-related infrastructure, monitoring water quality, protecting source water, and the operation and maintenance of treatment and distribution systems serving residents of First Nations communities , respectively. Economic barriers make it difficult for communities to retain well-trained water systems operators, as once they are qualified they can often earn higher

wages by relocating to larger centers (BC Auditor General, 1999).

Drinking water is an important pathway through which the environment impacts human health, and in British Columbia, the extraction of natural resources is an activity affecting environmental and human health through its effects on the province's water ways (BC Provincial Health Officer, 2008). Challenges to safe drinking water for First Nations in British Columbia are therefore related to the province's economic reliance on natural resource extraction. These economic activities are often located near remote First Nations communities, increasing their exposure to contaminants (ibid). In British Columbia, the source waters of small water systems (which are the kind servicing First Nations communities) fall outside the Forest Practices Code of British Columbia Act and other provincial legislation to protect people from the environmental impacts of mining and logging activities such as the Water Act. These communities' water systems also often draw from smaller bodies of water, resulting in turbidity and contamination levels which are highly variable (BC Auditor General, 1999). Unlike many other Canadian provinces, most First Nations in British Columbia did not enter into treaties historically and maintain the position that their lands are un-ceded and they therefore retain jurisdiction over them¹. Frustration experienced by Aboriginal communities about the impacts of government decision-making on watersheds within their territories is particularly protracted as their title and rights are not accommodated and they view their role as stewards and users of BC's lands and waters as one that existed long before that of the province. The reality, however, is that a significant resource gap undermines the capacity of First Nations to take on responsibility for the construction, operation, maintenance, monitoring and monitoring of water systems as well as the enforcement of water quality standards (IOG, 2009). In addition, the province of British Columbia is 'up-dating' its 100 year old Water Act, causing great concern for the 203 First Nations who will be affected by new legislation. This legislation may threaten First Nations long-term access to safe drinking water through its disregard for Aboriginal title and rights, its 'flexible' policies regarding removal of water from rivers and streams, and through co-opting the authority to regulate ground water, which could affect communities relying on wells (Union of BC Indian Chiefs, 2010).

¹ Notable exceptions are the modern BC treaties, the Nisga'a Agreement and the Tsawwassen First Nation Final Agreement which set out formal relationships between each of those nations, the province of British Columbia, and the federal government. There are currently more than sixty BC First Nations at various stages of the treaty process.

In the fall of 2009 CAHR began planning a program of research pertaining to water and Indigenous peoples' health that began with a consensus conference held March 21-23, 2010 (See Part III). The ideas shared at that conference, and the knowledge gaps identified, emphasized the need for greater community involvement in decisions affecting water quality as well as stronger communication of ideas between practitioners and academics of different fields. Themes emerging from the conference, such as self-determination, knowledge synthesis, and traditional knowledge, validated our earlier conceptualization of a workshop series in First Nations communities across BC.

CAHR continued its inquiry into First Nations access to safe drinking water with a community-based workshop series taking place in six communities across British Columbia. Workshops were carried out in June and July, 2010, with partner communities identifying the topics they were interested in addressing. Community-level outcomes of individual workshops include water declarations, action plans for evidence-based decision-making, as well as plans to engage neighbouring water-users in shared governance discussions. The document that follows describes the process of implementing the workshop series and provides a thematic analysis of the discussions which took place.

Rationale and Objectives of a Mobile Workshop Series

The mobile workshop series was conceived in October, 2009 as a means of increasing the accessibility of knowledge in rural First Nation communities and gathering knowledge on local perspectives on water quality and health. The project was designed as a bridge between the high-level discussions then being planned for March, 2010 and future community-based research projects with partners seeking to improve water quality in their communities.

Much of the literature pertaining to developed countries treats water quality as a technical challenge², though calls for source water protection are also made, particularly in the multi-barrier approach to drinking water protection literature³. Research into water treatment technologies and relationships between source water and drinking water quality continues to be important⁴, however it is increasingly obvious that

² Ennis-McMillan, 2001

³ I.e: Davies & Mazumder, 2003; CCME, (2004)

⁴ For example, the work of Dr. Asit Mazumder and other researchers of Res'eau-Waternet represents high quality drinking water research which is cognizant of the unique social context in which First Nations water systems operate.

developing enabling social conditions will optimize the impact of water research in the natural sciences and engineering. At this time, few researchers are exploring the manner in which social context and relations between different actors impact First Nations access to safe water, though the findings of this workshop which are based on workshop responses point to many significant inter-connected and complex social, economic, political, environmental factors. Notable exceptions are the National Collaborating Centre for Aboriginal Health (NCCAH) and Dr. Margot Parkes of UNBC. Dr. Parkes is the Canada Research Chair on Health, Ecosystems, and Society, and her research investigates how waterways affect communities' health and livelihoods, interpreting water as a resource supporting economies, cultures, and food security. The NCCAH is also initiating a program of research in drinking water safety for First Nations and Inuit communities which will be based on a holistic approach to including Aboriginal people in public policy and respect for Indigenous knowledge and cultures.

Project Objectives - proposed to the Social Sciences and Humanities Research Council

- Increase the *reach* of knowledge on such topics as integrated water resource management, community economic development, and social networking and capacity-building tools currently available;
- Increase the *uptake* of knowledge by encouraging participants to consider it in the context of their community;
- Translate new knowledge into community visions of action or goals;
- Synthesize group discussions on community needs transcribed from recording and contrast these findings with what existing theories suggest communities need and with actions taken to improve First Nations water systems to date, with special attention paid to the socio-economic conditions which facilitate improvements in drinking water quality;
- Promote existing networks of tools and resources at communities' disposal, including initiatives by First Nations to improve access to drinking water;
- Build capacity of First Nations to engage in community-based research by facilitating community needs assessment and strengthening relationships between communities, researchers, and interest groups such as the British Columbia Water and Wastewater Association.

Strengthening Community Participation in Research Activities

Fairness, Respect, and Service

The Indigenous Water Ways mobile workshop series represents both an important relationship-building step towards the initiation of community-based research projects and a knowledge translation activity wherein community partners and the researchers involved benefit from each others' knowledge and experience. It was also an opportunity to emphasize the importance of Indigenous knowledge in addressing water issues, providing a forum for communities to share and express their own values, concerns, and solutions. When considering how to go about planning and implementing this project in an ethical way, the research team prioritized the protocols each participating First Nation had in place for activities involving university-based researchers. The project was also guided by: the ethical obligations as outlined in the CIHR Guidelines for Health Research Involving Aboriginal People (CIHR 2007), principles of integrated knowledge translation and community-based research, and culturally appropriate advice and guidance from an Aboriginal project advisory body. Because of the nature of the grant funded by the Social Sciences and Humanities Research Council (SSHRC) – i.e. as a public outreach workshop grant, obtaining ethics approval from a university ethics review board for this project was not required.

It was the project team's goal that fairness, service, and community control should characterize their interactions with partner communities. Other values which shaped the process and outcomes of this project were respect for the sacredness of water in Aboriginal cultures, as well as the people and places that water connects.

The key to the success of this project was that the research partners, project team, and community members come together in a right mind. Achieving this required the project team to honour the diversity of First Nation culture in British Columbia by allowing flexibility in implementation processes, and the creation of an ethical space where parties with different (but overlapping) objectives and intentions can come together in a shared dialogue. CAHR also sought to incorporate into the planning and workshop delivery space for sharing of the “rich history of KT in Aboriginal communities”⁵ which includes vibrant oral traditions, intercultural sharing of knowledge on how to live a good life, and a experiential knowledge, which is deeply contextual

⁵ CIHR. (2009). p. 3

and based on seasons, decades, and generations of observations. The understanding of knowledge translation and respect for community-held Indigenous knowledge on behalf of external researchers as ethical obligations in community-based Aboriginal health research^{6,7} creates a role for community partners as actors, holders of knowledge, and not only recipients of knowledge from researchers – a view which characterized much of knowledge translation in health research in the past, and still plays a role in the dissemination of knowledge⁸.

Elevating and respecting the wishes of community partners was the most important value throughout the workshop series. This series was planned on the basis that communities know their own needs, and we wanted to empower local community actors to pursue actions with community support. A natural extension of this desire is recognizing the importance of Indigenous knowledge in understanding and addressing water issues and supporting its role in the development of solutions. Indigenous knowledge is a distinct and frequently contrasting scientific paradigm on equal footing with western knowledge. Exploring the relationships between people, communities, and water from the First Nations perspective of knowledge sharing environments is consistent with Aboriginal knowledge translation and “does not need validation from any other knowledge institution”⁹.

Guiding Voices: Formation of an Advisory Body

In order to guide the planning and implementation process in an ethical way, Dr. Sanderson, a Cree scholar of Elders’ teachings about water, invited several leaders in Indigenous water policy and advocacy in British Columbia to form an advisory body for the project. Dr. Jeannette Armstrong of the En’owkin Centre is highly knowledgeable of environmental ethics rooted in Indigenous oral history. Mr. Marlowe Sam, also of the En’owkin Centre, researches the history of laws pertaining to water and Indigenous peoples, and how that impacts Aboriginal right and title. Ms. Andrea Glickman is a Policy Analyst with the Union of British Columbia Indian Chiefs (UBCIC) and provided technical support in drafting the UBCIC submission to the Water Act Modernization process currently underway in BC. This advisory body was extremely generous with their time and input. The project team met with the advisory in three teleconferences and one meeting at the UBCIC

⁶ Ibid. p.3

⁷ CIHR. (2008). p.17

⁸ See CIHR’s description of end-of-grant KT: <http://www.cihr-irsc.gc.ca/e/39033.html>

⁹ Ermine, W., Nilson, R., Sauchyn, D., Sauve, E., & Smith, R. Y. (2005). p.8

office in Vancouver, with Dr. Armstrong and Mr. Sam phoning in from Penticton. In Vancouver, Mr. Don Bain, Executive Director of the UBCIC, joined the meeting and contributed greatly into how to make the workshop series action oriented. The advisory body provided valuable insight into the ethics of community-based research in First Nations and into proper processes for engaging communities in this kind of work.

Engagement, Planning, and Implementation

In April and early May, an open call for project partners¹⁰ was sent to every First Nation in British Columbia and circulated through listservs where recipients were health directors or employees in First Nation communities. As a result of this announcement, CAHR began a dialogue with six communities and organizations where delivery of a workshop within the desired timeframe seemed feasible. Teleconferences and phone conversations were key to building relationships between communities and the project team and to understanding the goals and needs of community partners. Many communities have established protocols for engaging in research or related activities with academic institutions; where these were in place they were respected, including where research agreements were requested by the community¹¹.

Drawing on the vast experience of the members of the advisory body addressing First Nations water issues, as well as their network of contacts, the project team was able to develop a range of thematic areas and a pool of resource people to suggest to community partners during the workshop planning process. In order to meet project goals outlined earlier in this document, resource people included were either Indigenous people working on water issues, or non-Indigenous people who shared the project values described above.

The project team at CAHR collaborated with between 2 to 5 community-based partners per community to identify themes of interest to the participating communities; to identify and invite experts in relevant topics to the workshops; to format the workshop agenda; and to identify desired outcomes of the event. Sample agendas used at workshops A and D can be found in appendices B and C. Appendix D contains a sample of discussion questions used for group discussions at workshop E.

Workshops were often posited as open events community members could register to attend. Participants signed consent forms, including photo

¹⁰ Please see Appendix A for the project announcement sent to BC First Nations.

¹¹ In some cases, MOUs or research agreements were requested by the communities and drafted by CAHR. None were finalized prior to the workshops commencing and therefore in future activities, a longer timeframe will be allowed for the development of these documents.

and video release forms where needed – sometimes these were individual forms and sometimes these were sign-in sheets. Figure 1 below describes the workshops in terms of number of participants and basic demographics of the host community.

In one case rather than bringing in experts to speak to certain topics, our community partners requested the presence of a professional facilitator to engage participants in consensus-building activities and the development of a community action plan. These services were procured from a non-profit conflict resolution centre.

Figure 1: General Workshop Information

GENERAL WORKSHOP INFORMATION			
Workshop Code	Number of Participants	Community Population	Proximity to an Urban Centre
A	20	561	~ 350 km
B	30	407	~ 350 km
C	25	5330	~ 20 km
D	20	704	~ 225 km
E	70	870	~ 175 km
F	8	N/A	N/A

Prepared based on workshop records (e.g.: sign-in sheets) and population and geographic data on StatCan.

Workshop F took place at the BC Elders’ Conference in Salmon Arm and included participants from numerous communities across British Columbia. Thus, community population and geographic data are inappropriate. With a small number of Elders a meaningful discussion about cultural attitudes and practices toward water occurred, and these Elders expressed interest in the creation of an Elders’ statement on rights and responsibilities towards water.

As a result of the processes the project team put in place for planning and implementing the workshop series, these community-based workshops exemplify a non-hierarchical approach to knowledge translation. Reciprocity between academic and non-academic, and Indigenous and non-Indigenous people involved led to a more meaningful sharing of knowledge and experience and strengthened relationships between those involved. Each workshop became a forum where participants felt safe to express their thoughts about water issues, concerns, and potential solutions for their community. Because of the richness and depth of the workshop experience, a breadth of outcomes materialized in a relatively short amount time, further described below.

Outcomes

Overview

Outcomes of the workshop series can be examined in terms of the community outcomes for each individual workshop, as well as centre-based outcomes resulting from having engaged in the organization of the workshop series and qualitative analysis of the workshop notes. These workshops represent an excellent opportunity for the sharing and exchange of knowledge; workshop participants identified values, concerns, strengths, and actions about the quality and quantity of water near their communities as well as how they access these waters¹². Partner communities also accessed information on such topics as community mapping, climate change impacts on water near their community, and the significance of water in Indigenous language and spirituality. Some communities expressed interest in the development of declarations on asserting their right to water as established in the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) and similar to the Simpcw Declaration¹³ which was supported through resolution by the Union of BC Indian Chiefs. Other communities used the one-day workshop to create community action plans addressing local needs identified by participants. This undertaking has also led to and informed the development of two grant proposals submitted by CAHR earlier this fall.

Figure 2: Group Discussion Content

GROUP DISCUSSION THEMATIC ANALYSIS			
Values	Concerns	Strengths	Actions
Tradition & Language	Land Use	People	Policy & Governance
Good Usage of Water	Commodification of Water & Economic Factors	Cultural	Research & Knowledge Translation
Sacredness	Global Warming	Programs & Infrastructure	Infrastructure Development
Economic Values	Culture	Rights & Governance	Education
Respect	Pollution & Contaminants	Ecological Assets	Cultural Strengthening
Connectedness	Ecological Integrity		Finance
Social Values	Physical Qualities of Water		
Protecting Water	Health		
	Society & Policy		
	Infrastructure		

¹² These insights were either recorded by workshop participants themselves or by members of the research team observing the discussions.

¹³ See Appendix E for a copy of the Simpcw Declaration

Community Perspectives on Access to Safe Drinking Water

Each of the workshops (i.e.: A, B, C, D, E, & F) included several group discussion sessions from which detailed notes were kept. Some of the group discussions were guided by questions developed in advance by the project team and the community-based partners while others were guided by workshop facilitators. Workshop participants primarily identified and discussed barriers to safe drinking water, though their values, strengths, and desired actions were also discussed to varying degrees depending on the workshop. Figure 2 (above) demonstrates the breadth of topics discussed in reference to long term access to safe water, where thematic areas that are touched on by the most communities appear near the top.

In terms of how the transcript content maps into the template, roughly half of the transcript content dealt with the challenges partner communities face in improving their access to safe drinking water. Values and actions also make up substantial portions of the content, with assets accounting for 1/16th of the content. We included community strengths in the template nonetheless in the spirit of elevating community capacity for action and highlighting opportunities. While participants of only one workshop were explicitly asked about community assets which could be applied to the challenges, three made statements acknowledging their assets.

Only one workshop agenda include specific questions of assets the community possesses which can be applied to addressing the challenges named. Nonetheless, participants of three workshops identified strengths which could contribute to community-led solutions. Also, part of the rationale for this project was to empower communities to act in their own interests, and so assets is included as a category in the template despite relatively little attention given to community strengths relative to, say, the number of challenges identified. For a complete set of responses classified into thematic areas, please refer to Appendix F.

Values

The template takes its arrangement from the understanding that the values which an individual and a community hold will affect how challenges and asset are perceived, and which actions are ultimately pursued. The values brought up by workshop participants fell into 8 themes:

- Tradition and Language
- Good Usage of Water

- Sacredness
- Economic Values
- Respect
- Connectedness
- Social Values
- Protecting Water

The kinds of values referred to by the participants of the most workshops related to tradition and language. The individuals in participating communities have a long-established relationship with their traditional territories, developed over thousands of years of reliance on those lands. Other values frequently referred to concern what is “good usage” of water and the sacredness of water and the relationship First Nations share with water. ‘Economic values’ refers to discussion around both the importance of water to communities’ livelihoods and material well-being as well as many participants’ rejection of privatization and ownership of water.

Concerns

Not surprisingly, given the history of colonization in BC, the sharp socio-economic disparities faced by many First Nations and the urgency of threats to First Nations’ water resources, challenges to achieving sustained access to safe water made up the greatest portion of workshop notes content. These challenges have been categorized according to ten themes. Some, such as global warming, were easy to identify; other themes were more difficult to readily identify. In general, the themes represent either broad disciplines or topical areas which are the focus of professions and areas of study (i.e.: global warming, pollution & contaminants). The most difficult themes to differentiate were ‘Indigenous culture and education’ and ‘society and policy’. For example, colonialism is a social phenomenon which represents a serious threat to Indigenous cultures – should colonialism be viewed as a “society and policy” challenge or an “Indigenous culture and education” challenge? In the case of colonialism, which is a root factor of systemic barriers to clean drinking water and shapes the current relationships between municipal, provincial, and federal governments and First Nations governments, it was classified as a Society & Policy concern despite its obvious effects on Indigenous cultures in Canada. Where the author had some question as to where to classify, challenges that were highly relational were placed in the Society & Policy category. Items which are largely in the control of a particular

First Nations are included in the Indigenous culture and education. This was not to say that society's relationships do not affect Indigenous cultures – indeed the opposite is true – but the main question at hand is how we can think about the challenges First Nations face in overcoming barriers to safe drinking water, so their separation is appropriate. Most important to bear in mind, is that the differentiation of themes in this report is for illustrative and descriptive purposes – to highlight the diversity of concepts brought forward by workshop participants. This report does not attempt to make normative statements claiming that responses 'ought' to be grouped in such and such a way. The reader is also encouraged to view Appendix G, which contains a topical break down of statements.

Far and away the overall greatest concern of workshop participants was the effect of land use on BC's water ways. Specific concerns in this thematic group include: dams and hydro activities, industrial activities such as mining, logging, agriculture, ranching, etc, the spread of transportation infrastructure, and recreation activities. Naturally, there was a high correlation between the particular concerns mentioned at a workshop and the activities taking place near the communities. The next most common concern was the commoditization of water and other economic issues such as: consumerism, corporatism, and economic inequality between First Nations and other water users. Other concerns frequently referred to pertain to global warming, Indigenous culture, pollution and contaminants, and ecological integrity. Significant concerns for water related to Indigenous culture are cultural perpetuity and a lack of respect and gratitude for water on the part of First Nations as well as other water users.

Community Strengths

Five kinds of strengths were identified: people, ecological assets, cultural strengths, programs & infrastructure, and rights & governance. The only asset referred to by all three communities who spoke to their strengths was the people. In the words of one participant "our people are so brilliant and so talented and I believe that we have an enormous potential". With respect to assets that are required but missing, financial assets were identified as the main resource missing from First Nations' arsenal.

Only one workshop agenda included specific questions of strengths the community possesses which can be applied to addressing the challenges named. Nonetheless, participants of three workshops identified strengths

which could contribute to community-led solutions. Also, part of the rationale for this project was to empower communities to act in their own interests, and so strengths are included as a category in the template despite relatively little attention given to community strengths relative to, say, the number of challenges identified.

Actions

Participants of five of the six workshops identified specific actions their community could undertake to improve their long term access to safe, healthy drinking water. These actions comprise changes to water policy and governance, education, research and knowledge translation, cultural strengthening, securing funding, and infrastructure development. The most common actions identified related to water policy and governance (including development and enforcement of band by-laws to be applicable on reservation land), research and knowledge translation, and infrastructure development. Interestingly, though lack of financial resources was widely identified as a barrier to safe drinking water, only one group specifically identified seeking out funding as an action their community could undertake. Lack of financial resources was also identified at a workshop held last year by Res'eau-Waternet, despite considerable funding made available through Indian and Northern Affairs Canada's First Nations Water and Wastewater Action Plan. Specifically, the Ministry secured \$720M between 2006 and 2012 for building and upgrading infrastructure and improving availability of training to First Nations water operators. Despite this investment, roughly one sixth of First Nations communities are under a drinking water advisory and 49 water systems are classified as 'high risk' by INAC. Health Canada also reports that over one third of First Nations living on reserve believes their water to be unsafe for drinking¹⁴. Failure of increased investment to generate universal safe drinking water in First Nations communities is another topic of investigation.

Presentations by Guest Speakers

Partner communities invited expert speakers to the workshops based on the themes of interest identified by local people involved in water issues. Invited speakers were Indigenous people working actively on water issues or non-Indigenous researchers with a record of positive relations with First Nations. This process built on positive relationships between universities and First Nations. Presentation topics included:

¹⁴ Butler, (2008)

- Climate change impacts on water flows near community
- History of water laws and policies in British Columbia
- Community management of natural resources
- Spiritual and linguistic significance of water
- Community mapping
- Local fishery monitoring and management initiatives
- Successes of Indigenous water activists
- Effects of over-consumption of water on groundwater sources

Many of these presentations prompted group discussions during which a variety of opinions were aired out. Perhaps the most controversial presentation was of community mapping, as some participants expressed concern over sharing information and applying a Western technique (i.e.: mapping) to their sacred spaces, while others thought the spaces should be recorded for their own preservation as well as for cultural preservation.

Indigenous Declarations

Recently, the Simpcw First Nation developed its own declaration outlining the Nation's rights and responsibilities to water as rooted in their traditional knowledge and described in the UNDRIP. Many of our partner communities were interested in this medium of expressing their interests – at one workshop a draft declaration was even developed, though it is still before the Chief and Council of that nation. These declarations also provide a starting place for discussion of Aboriginal water policies, and when translated or written in the historic language of the First Nation, contribute to linguistic revitalization. Please see Appendix E for a copy of the Simpcw Water Declaration, which is also accessible on the Union of BC Indian Chief's website.

Community Action Plans

Identifying points of impact and feasible actions was an important task at many workshops as the community-based organizers had named the development of a community action plan as a key desired outcome from the meeting. Even communities where developing an action plan was not explicitly specified as a goal for the workshop, workshop participants and community leaders often identified community-level actions that could be undertaken.

Developing community action plans was the explicit goal of two workshops. In one case the community action plan is oriented to increasing community awareness, building relationships with neighbouring water users, establishing water conservation practices within the community. In another case, the plan is focused on training community members in water quality testing, establishing a baseline of water quality in local bodies of water, and improving local infrastructure – in particular the on-reserve treatment and distribution systems.

Grant Proposals

Two separate research questions became apparent throughout the course of this workshop series. The first was about the implementation of a knowledge-to-action cycle to the matter of water quality at the community level in community-driven initiatives. The second proposal was for funds to support a knowledge synthesis study to explore the interactions of complex factors influencing water quality in academic and grey literature.

Taking Stock

The Indigenous Water Ways workshop series met its objectives as follows:

Objective 1: Increase reach of knowledge: As demonstrated in Figure 1, roughly 150 people accessed expert information on topics deemed relevant to the community by community members. University-based researchers also received valuable knowledge and information from partner communities as a result of this activity. Finally, workshops contributed to knowledge sharing between Elders and youth in communities and between local researchers and knowledge holders, interested community members, and university-based researchers.

Objective 2: Increase the uptake of knowledge: the Indigenous Water Ways workshop series provided information to members of partner communities who were highly likely to put it to use. In many cases the knowledge was contextualized and incorporated into a community action plan or statement about the community members' rights and responsibilities towards the water. At least two communities have new by-laws protecting local water ways before their Chief and Council.

Objective 3: Translate new knowledge into shared visions or goals: This was achieved through outputs such as declarations and community action plans.

Objective 4: Synthesize group discussions with existing theories from the natural and social sciences for the identification of tractable solutions at local, regional, provincial, and national levels: Data from the group discussions has undergone thematic analysis and will be examined using further qualitative methodologies. CAHR is seeking further funding to support the synthesis of diverse theories – a task which requires more resources to achieve academic rigour, thoroughness, and to support the involvement of numerous knowledge users in the process.

Objective 5: Promote existing networks and tools available: Resources shared throughout the course of the series include the Advanced Aboriginal Water Treatment Team, Network Environments for Aboriginal Health Research – BC, the Community-Based Research Laboratory at Uvic which provides resources for community mapping, the Indigenous World Forum for Water and Peace, and FORREX, which is an organization that facilitates community management of natural resources.

Objective 6: Build capacity to engage in community-based research: Community-based organizers, the project team, guest speakers, and workshop participants all gained skills which improve capacity to undertake collaborative research. Community-based workshop organizers and academics established relationships built on mutual trust and learned to be effective in new institutional frameworks. Invited speakers often made important contacts for future studies, both in each other and in community partners.

Future Directions

The challenges identified by communities throughout the workshop series are immense, ranging from climate change to the exclusion of Indigenous voices from decisions impacting the quality of their water. In addition, there is a need to do further research with BC First Nation communities and other Aboriginal communities across Canada. These findings are limited in that they are based upon self-selected communities that identified the issue as a priority to them and so are not a representative sample. Further to that, there are 203 First Nation communities in British Columbia and this project worked with only five; therefore there is need to examine the extent to which the issues identified in this group of communities. Synthesizing the theoretical and empirical literatures of these diverse fields would assist greatly in the identification of tractable solutions for communities and policy makers at all levels of government.

Current efforts to improve First Nations access to safe drinking water would also benefit from this kind of study.

In 2010 the Senate tabled Bill S-11 to legislate enforceable drinking water standards for First Nations communities. If the bill passes without amendment, on-reserve treatment and distribution systems for drinking water will have to adhere to provincial standards, with liability resting with the band councils. Many concerns with this legislation have been discussed in the introduction of this book, and ultimately what is required is the meaningful inclusion of First Nations in the clarification of the roles and responsibilities of provision of drinking water of First Nations, provinces, territories, and federal ministries in legislation which does not abrogate Aboriginal Title and Rights. British Columbia is also undergoing the Water Act Modernization process which will make more room for environmental considerations in water use planning as well as regulation of ground water. Neither piece of legislation in current form addresses, or indeed leaves room for, greater self-governance or involvement in decision-making around environmental issues directly or indirectly impacting First Nations access to safe water.

Current and upcoming activities will occur in a context of changing legislation and policy. Presently there exists a policy vacuum wherein one Ministry is responsible for approving the construction of infrastructure, another for water quality monitoring, and yet another for source water protection. No one is directly responsible for ensuring First Nations access to safe drinking water, recently declared a human right by the United Nations. Many First Nations would like to govern their own water policies and infrastructure, but lack the financial, technical, or human resources to do so.

Acknowledgments

The Centre for Aboriginal Health Research would like to respectfully acknowledge the traditional territories in which the workshops took place, the capable community partners who volunteered to be a part of this project, and the workshop participants who were so generous with their knowledge, experience, and perspectives.

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CAHR was fortunate in putting together a dynamic team of researchers and students to plan and implement this workshop series. Dr. Darlene Sanderson provided invaluable insights into traditional models of culture and health as well as forming the advisory body and establishing contacts with community partners. Ms. Danielle Perron and Ms. Monique Auger also established contacts with other community partners and coordinated the series, making logistical arrangements and documents necessary for each workshop. In addition, Ms. Perron prepared this report with contributions from Dr. Sanderson, Ms. Namaste Marsden, Special Projects Manager at the Centre for Aboriginal Health Research and Ms. Robynne Edgar, Programs Manager at the Centre for Aboriginal Health Research.

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Appendix A

Opportunity for Collaboration in Community-Based Research Project

March 21-23, 2010, the Centre for Aboriginal Health Research (CAHR) at the University of Victoria, in collaboration with the Water and Aquatic Sciences Research Program and funding partners, hosted the Consensus Conference on Small Water Systems Management for the Promotion of Indigenous Health. We wish to thank everyone who participated in this event for making it the success that it was.

March 31, 2010, CAHR learned that its application for funding to coordinate a mobile workshop series on the socio-cultural context of small water systems was successful, and so the centre is seeking partner communities across British Columbia at which to host the six workshops.

Our goals for this project are:

Increase the availability of knowledge on such topics as integrated water management, traditional knowledge, community economic development, and social networking and capacity-building tools currently available;

Increase the uptake of knowledge by encouraging participants to consider new and existing knowledge in the context of their community;

Assist in the translation of knowledge into community visions of action or goals;

Synthesize group discussions on community needs transcribed from audio recording and contrast these findings with what existing theories suggest communities need and with actions taken to improve First Nations water systems, water rights, and legislation to date, with special attention paid to the socio-economic conditions which facilitate local improvements in water governance, rights, and access;

Promote existing networks of tools and resources at communities' disposal, including initiatives by First Nations to improve access to drinking water, water rights, and governance, and other environmental or local development initiatives;

Build capacity to engage in community-based research by facilitating community needs assessment and strengthening relationships between communities, researchers, and interest groups.

We are seeking community partners who share – and would benefit from – these goals. In our vision for the partnership, CAHR is responsible for organizing a one-day workshop in a partner community with the assistance of, and in close consultation with, the people of that community. Community partners hosting a workshop would contribute to the content planning of the workshop, arranging logistics by providing information on the local area, and inviting prospective participants to attend. Interested communities that would like to take on different roles than outlined here are invited to contact CAHR for further discussions.

Appendix B

INDIGENOUS WATER WAYS:
Draft Agenda – Workshop A

Confirmed Date:

Location:

The draft agenda is as follows:

Time	Agenda Item
9:00 am	Workshop Welcome & Opening Prayer by Local Elder
9:20 am	Presentation 1: thinking of a cultural foundation for our relationship with water; Darlene Sanderson – “water” in our languages
9:50 am	Group Discussions – What do our culture and our stories tell us about how we should think about, feel about, and interact with our waters?
10:30 am	Break
10:45 am	Presentation 2: community-mapping tools and their applications
11:15 am	Presentation 3: Community partner – possibilities for action
11:30 am	Group Discussions – What places in our territory are we concerned about? Why?
12:00 pm	Lunch
1:00 pm	Presentation 4: climate change impacts on the local waters
1:30 pm	Priority Setting – Summarizing concerns and values: which ones do we need to act on first?
2:15 pm	Break
2:30 pm	Group Discussions – development of work plans with deadlines and personnel committed to different tasks
3:30 pm	Round Table Summary & Discussion
4:00 pm	Workshop Wrap Up & Closing Prayer by Local Elder

The workshop will run from 9 am until 4:30 pm. If the participants agree, they will be divided into groups of approx. seven people each for the group discussions. For the Round Table, all workshop participants will share and discuss the focus group results in a circle of learning.

Appendix C

INDIGENOUS WATER WAYS:
Draft Agenda – Workshop D

Confirmed Date:

Location:

Participants: Band members, local water users, invited professionals, and four representatives from neighbouring bands.

The draft agenda is as follows:

Time	Agenda Item
9:00 am	Workshop Welcome & Opening Prayer by Local Elder
9:20 am	Presentation 1: Local history of water – Honoured Elder
9:45 am	Presentation 2: Local fisheries management and restoration projects – Natural Resources Department employee
	Group Discussions – Defining the scope of the challenge – discussion around positions and perspectives on water issues and values with local band members and ranchers
10:10 am	
10:40 am	Break
10:55 am	Round Table – Identifying shared values
	Round Table Summary & Discussion – Creation of an output document (statement of water user challenges)
11:25 am	
12:15 pm	Lunch
	Group Discussions – centered on the creation of a work plan with time-committed outcomes for creating a governance structure; establishing goals for this process
1:00 pm	
2:20 pm	Break
	Round Table – Creation of an output document addressing objectives and milestones of a work plan, with help from afternoon presenters
2:35 pm	
3:15 pm	Round Table Summary & Discussion
4:15 pm	Workshop Wrap Up & Closing Prayer by Local Elder

Appendix D

INDIGENOUS WATER WAYS:

Discussion Questions – Workshop E

Discussion Questions Part 1:

- 1) What do we understand about water from our culture?
- 2) What are our stories informing our relationship to water?
- 3) What can we share, and what can we not share?
- 4) What are our responsibilities toward the water?

Discussion Questions Part 2:

- 5) How has the history of BC water law describes affected this traditional territory?
- 6) What are our concerns for the waters on or near our territory?

Discussion Questions Part 3:

- 7) What are the assets we possess within our community for addressing concerns raised in the a.m.?
- 8) What strategies can we adopt to address our concerns, given what our strengths are?
- 9) What other resources would pursuing this strategy require and how might we obtain them?

Round Tables Part 1:

Sharing ideas from morning sessions on Discussion Questions 1 & 2

Round Tables Part 2:

Community Inventory and Envisioning Change (building on Discussion Questions Part 3)

Round Tables Part 3:

Input on outputs – how can the information shared today be most useful to you?

SIMPCW WATER DECLARATION

Relationship to Water

1. We, the Simpcw First Nation, affirm our relationship to Mother Earth and responsibility to future generations to raise our voices to speak for the protection of water. We were placed in a sacred manner on this earth, each in our own sacred and traditional lands and territories to care for all of creation and to care for water.
2. We recognize, honor and respect water as sacred and sustains all life. Our traditional knowledge, laws and ways of life teach us to be responsible in caring for this sacred gift that connects all life.
3. Our relationship with our lands, territories and water is the fundamental physical cultural and spiritual basis for our existence. This relationship to our Mother Earth requires us to conserve our freshwaters and oceans for the survival of present and future generations. We assert our role as caretakers with rights and responsibilities to defend and ensure the protection, availability and purity of water. We stand united to follow and implement our knowledge and traditional laws and exercise our right of self-determination to preserve water, and to preserve life.

Conditions of Our Waters

4. The ecosystems of the world have been compounding in change and in crisis. In our generation we see that our waters are being polluted with chemicals, pesticides, sewage, disease, radioactive contamination and ocean dumping from mining to shipping wastes. We see our waters being depleted or converted into destructive uses through the diversion and damming of water systems, mining and mineral extraction, mining of groundwater and aquifer for industrial and commercial purposes, and unsustainable economic, resource and recreational development, as well as the transformation of excessive amounts of water into energy. In the tropical southern and northern forest regions, deforestation has

resulted in soil erosion and thermal contamination of our water.

We also see the results of the mountain pine beetle on our forests and the resulting increased run off from dead trees and not holding water within the eco-system.

5. The burning of oil, gas, and coal, known collectively as fossil fuels is the primary source of human-induced climate change. Climate change, if not halted, will result in increased frequency and severity of storms, floods, drought and water shortage. Globally, climate change is worsening desertification. It is polluting and drying up the subterranean and water sources, and is causing the extinction of precious flora and fauna. Many countries in Africa have been suffering from unprecedented droughts. The most vulnerable communities to climate change are Indigenous Peoples and impoverished local communities occupying marginal rural and urban environments. Small island communities are threatened with becoming submerged by rising oceans.
6. We see our waters increasingly governed by imposed economic, foreign and colonial domination, as well as trade agreements and commercial practices that disconnect us as peoples from the ecosystem. Water is being treated as a commodity and as a property interest that can be bought, sold and traded in global and domestic market-based systems. These imposed and inhumane practices do not respect that all life is sacred, that water is sacred.
7. When water is disrespected, misused and poorly managed, we see the life threatening impacts on all of creation. We know that our right of self-determination and sovereignty, our traditional knowledge, and practices to protect the water are being disregarded violated and disrespected.
8. Throughout Indigenous territories worldwide, we witness the increasing pollution and scarcity of fresh waters and the lack of access that we and other life forms such as the land, forests, animals, birds, plants, marine life, and air have to our waters, including oceans. In these times of scarcity, we see governments creating commercial interests in water that lead to inequities in distribution and prevent our access to the life giving nature of water.

Right to Water and Self Determination

9. Secwepemc people have the right to self-determination. By virtue of that right we have the right to freely exercise full authority and control of our natural resources including water. We also refer to our right of permanent sovereignty over our natural resources, including water
10. Self-determination for Indigenous Peoples includes the right to control our institutions, territories, resources, social orders, and cultures without external domination or interference..
11. Self-determination includes the practice of our cultural and spiritual relationships with water, and the exercise of authority to govern, use, manage, regulate, recover, conserve, enhance and renew our water sources, without interference.
12. International law recognizes the rights of Indigenous Peoples to:
 - Self-determination
 - Ownership, control and management of our traditional territories, lands and natural resources
 - Exercise our customary law
 - Represent ourselves through our own institutions
 - Require free prior and informed consent to developments on our land
 - Control and share in the benefits of the use of, our traditional knowledge.
13. Member States of the United Nations and international trade organizations, international and regional financial institutions and international agencies of economic cooperation are legally and morally obligated to respect and observe these and other related collective human rights and fundamental freedoms. Despite international and universal recognition of our role as caretakers of Mother Earth, our rights to recover, administer, protect and develop our territories, natural resources and water systems are systematically denied and misrepresented by

governmental and international and domestic commercial interests. Our rights to conserve, recreate and transmit the totality of our cultural heritage to future generations, our human right to exist as Peoples is increasingly and alarmingly restricted, unduly impaired or totally denied.

14. Indigenous Peoples interests on water and customary uses must be recognized by governments, ensuring that Indigenous rights are enshrined in national legislation and policy. Such rights cover both water quantity and quality and extend to water as part of a healthy environment and to its cultural and spiritual values. Indigenous interests and rights must be respected by international agreements on trade and investment, and all plans for new water uses and allocations.

Traditional Knowledge

15. Our traditional practices are dynamically regulated systems. They are based on natural and spiritual laws, ensuring sustainable use through traditional resource conservation. Long-tenured and place-based traditional knowledge of the environment is extremely valuable, and has been proven to be valid and effective. Our traditional knowledge developed over the millennia should not be compromised by an over-reliance on relatively recent and narrowly defined western reductionist scientific methods and standards. We support the implementation of strong measures to allow the full and equal participation of Indigenous Peoples to share our experiences, knowledge and concerns. The indiscriminate and narrow application of modern scientific tools and technologies has contributed to the loss and degradation of water.

Consultation and Accommodation

16. To recover and retain our connection to our waters, we have the right to make decisions about waters at all levels. Governments, corporations and intergovernmental organizations must, under international human rights standards require Indigenous Peoples free prior and informed consent and consultation by cultural appropriate

means in all decision-making activities and all matters that may have affect. These consultations must be carried out with deep mutual respect, meaning there must be no fraud, manipulation, and duress nor guarantee that agreement will be reached on the specific project or measure.

Consultations include:

- a. To conduct the consultations under the communities own systems and mechanisms;
- b. The financial support of Simpcw First Nation to fully participate in such consultations; and;
- c. Simpcw First Nation peoples exercise of both their local and traditional decision-making processes, including the direct participation of their spiritual and ceremonial authorities, individual members and community authorities as well as traditional practitioners of subsistence and cultural ways in the consultation process and the expression of consent for the particular project or measure.
- d. Respect for the right to say no.
- e. Ethical guidelines for a transparent and specific outcome.

Plan of Action

17. We resolve to sustain our ancestral and historical relationships with and assert our inherent and inalienable rights to our lands and waters.
18. We resolve to maintain, strengthen and support Indigenous Peoples' movements, struggles and campaigns on water and enhance the role of Indigenous elders, women and youth to protect water.
19. We seek to establish a Working Group of Indigenous Peoples on Water, which will facilitate linkages between Indigenous Peoples and provide technical and legal assistance to Indigenous communities who need such support in their struggles for the right to land and water. We will encourage the creation of similar working groups at the local, national and regional levels.
20. We challenge the dominant paradigm, policies, and

programs on water development, which includes among others; government ownership of water, construction of large water infrastructures; corporatization; the privatization and commodification of water; the use of water as a tradeable commodity; and the liberalization of trade in water services, which do not recognize the rights of Indigenous Peoples to water.

21. We strongly support the recommendations of the World Commission on Dams (WCD) on water and energy development. These include the WCD report's core values, strategic priorities, the "rights and risks framework" and the use of multi-criteria assessment tools for strategic options assessment and project selection. Its rights-based development framework, including the recognition of the rights of Indigenous Peoples in water development is a major contribution to decision-making frameworks for sustainable development.
22. We call on the governments, multilateral organizations, academic institutions and think tanks to stop promoting and subsidizing the institutionalization and implementation of these anti-people and anti-nature policies and programs.
23. We demand a stop to mining, logging, energy and tourism projects that drain and pollute our waters and territories. We are not adverse to sustainable development on Simcpwulucw.
24. We demand that the World Bank, the International Monetary Fund (IMF), regional banks like the Asian Development Bank, African Development Bank, Inter-American Development Bank, stop the imposition of water privatization or 'full cost recovery' as a condition for new loans and renewal of loans of developing countries.
25. We ask the European Union to stop championing the liberalization of water services in the General Agreement on Services (GATS) of the World Trade Organization (WTO). This is not consistent with the European Commission's policy on Indigenous Peoples and development. We will not support any policy or proposal coming from the WTO or regional trade agreements like

the NAFTA (North American Free Trade Agreement, Free Trade Area of the Americas (FTAA), on water privatization and liberalization and we commit ourselves to fight against such agreements and proposals.

26. We resolve to replicate and transfer our traditional knowledge and practices on the sustainable use of water to our children and the future generations.
27. We encourage the broader society to support and learn from our water management practices for the sake of the conservation of water all over the world.
28. We call on the States to comply with their human rights obligations and commitments to legally binding international instruments to which they are signatories to, including but not limited to, such as the Covenant on Civil and Political Rights, the Covenant on Economic, Cultural and Social Rights, International Convention on the Elimination of all Forms of Racial Discrimination; as well as their obligations to conventions on the environment, such as the Convention on Biological Diversity, Climate Convention, and Convention to Combat Desertification.
29. We insist that the human rights obligations of States must be complied with and respected by their international trade organizations. These legally binding human rights and environmental obligations do not stop at the door of the WTO and other regional and bilateral trade agreements.
30. We resolve to use all political, technical and legal mechanisms on the domestic and international level, so that the States, as well as transnational corporations and international financial institutions will be held accountable for their actions or inactions that threaten the integrity of water, our land and our peoples.
31. We call on the States to respect the spirit of Article 8j of the Convention on Biological Diversity as it relates to the conservation of traditional knowledge on conservation of ecosystems and we demand that the Trade Related Aspects of the Intellectual Property Rights (TRIPS) Agreement be taken out of the World Trade Organization (WTO) Agreements as this violates our right to our traditional knowledge.

32. We call for the end of State financial subsidies to fossil fuel production and processing and for aggressive reduction of greenhouse gas emissions calling attention to the United Nations Intergovernmental Panel on Climate Change (IPCC) that reported an immediate 60% reduction of CO₂ is needed to stabilize global warming. We also call on governments to stop the profligate use of water in extracting oil and gas and the reckless use of water in the production of fossil fuels.
33. We will ensure that international and domestic systems of restoration and compensation be put in place to restore the integrity of water and ecosystems.

INDIGENOUS WATER WAYS:

Thematic Analysis of Workshop Notes

Challenges

1. Global Warming (3 mentions)

1. Drought (3)
2. Forest fires (3)
3. Fossil fuel use (2)
4. Lower snow packs (5)
5. Higher water temperatures (3)
6. Lower water levels (surface waters disappearing) (9)
7. Higher concentration of contaminants in water (1)
8. Smell of dead trees in forest (1)
9. Climate change (3)
10. Pine beetle (2)
11. More algae (2)
12. Flood and hurricane (2)
13. Migration of human diseases (1)
14. Fewer fish, wildlife effects (2)

2. Indigenous Education & Culture

1. Lack of respect and thanks for water we use (3)
2. Mistrust, belief that 'whites' are racist (3)
3. More awareness is needed (2)
4. Cultural perpetuity (2)
5. Looking after our own (1)
6. History is being ignored (1)
7. Efforts to help are not always good (2)

8. Stories not told, being forgotten (1)
9. Used to know when to fish/gather (1)
10. Money/greed not part of the tradition (1)

4. **“We are the laws of the land” (1)**

5. **Pollution & Contaminants**

1. Many contaminants from **many** sources (3)
2. Chemicals put into water ways (fertilizers, pesticides, septic fields) (1)
3. Contaminants & pollution (7)
4. local mines runoff (2)
5. pipelines, potential spill (2)
6. Effects on wildlife (4)
7. Tourists, non-natives, agriculture (1)
8. Railways, spills (1)
9. Industrial activities (3)
10. Effects of contaminants/turbidity on distribution system (1)
11. Dead cows in waterways (1)

6. **Infrastructure**

1. Concerned about having to build treatment plant in future (3)
2. Sewer systems (2)
3. Numerous reservoirs used operating on different circulation (1)
4. Chlorination often used as ‘pharmaceutical’ for stagnant water (1)
5. Need conservation and alternative uses (collect runoff, xeriscaping) (1)
6. Treatment & distribution systems not adequate for high turbidity or low water quality (2)
7. Want to protect water instead of bleaching (1)

8. Don't trust water in reserve system (2)
9. More maintenance and cleaning of infrastructure (1)
10. Bacteria growing in water system (1)

7. Land Use

1. Dams/hydro (4)
2. Industrial activities (3)
 1. Saw mills (2)
 2. Mines (12)
 3. Logging (11)
 4. Pipelines (2)
 5. Water extractions (1)
 6. Agriculture (2)
 7. Development (6)
 8. Oil drilling (1)
 9. Hunting (1)
3. Road Access (2)
4. Man-made rapids (1)
5. Removal of salmon (1)
6. FRO & FRA (2)
7. Railroads (fear of derailment) (3)
8. Destruction of riparian zones (2)
9. Recreation activities (2)
10. Want stream restoration projects (1)
11. Protected areas being destroyed (1)
12. Water use (too much) (1)
13. Water is a place for disposing of chemicals (1)

8. Physical qualities of water

1. Concerned about ground water (1)

2. Water advisory (1)
3. Creeks & rivers drying up (5)
4. Water shortage (5)
5. Concerns for waters on territories (1)
6. Effects of limited water on wildlife (2)
7. High mineral content (1)
8. Higher temperatures (1)
9. Floods (1)
10. No trees to hold water (1)
11. Not much snow (2)
12. People are sick from the water (1)
13. Water in the system isn't reliable (1)
14. Spring water is more trusted (1)

9. Economic Values

1. Commoditization of water (2)
2. Unequal economic positions (1)
3. Industry & big companies competing for water (1)
4. Neighbouring ranchers selling land (1)
5. Commercialize water for use by extractive industries (1)
6. Corporations (1)
7. Colonialism(1)
8. Greed (1)
9. Money (2)
10. Consumerism (1)
11. Increasing cost of water (1)
12. Economic leverage (1)

10. Ecological Integrity

1. Low returns of fish to spawning ground (2)
2. Ecosystem breakdown (1)
3. Mother nature affects water quality (1)
4. Wildlife (4)
5. More wildlife moving in (1)
6. Waters are connected (1)
7. Flora and fauna are source of food and medicine (1)
8. Habitat destruction (1)

11. Health

1. Ground water (drinking water) concerned about (1)
2. Super chlorinating not used safely, though this practice is changing (1)
3. Food security affected by contamination (1)
4. Medical problems in FN and non-native communities (1)
5. Reserves near unsafe water (1)
6. People used to live longer, being healthy and active, now people are sick from water (1)
7. Study of transmission lines showed increase in stress, anxiety, and cancer in affected areas (1)

12. Society and Policy

1. Senior water license holders (1)
2. Need for water advisory committee (1)
3. Lack of environmental assessment (1)
4. Aboriginal rights not recognized (9)
5. Colonization (1)
6. Agreements not dealt with (1)
7. Corruption in politics (1)
8. Treaties get broken (1)

9. Need community participation (1)
10. Lack of written information (2)
11. Testimony statements part of review panel (1)
12. Not getting consultation (3)
13. First Nations left out of 'mainstream' legislation (3)
14. WAM is particularly dangerous, for benefit of mining companies
15. FN not participating at meetings
16. Bill S-11 no more than a liability transfer
17. Agreeing to FRO/FRA out of desperation
18. Including all users in governance scheme could be complicated

Values

1. Economic Values

1. Financial support (1)
2. Protecting water from Americans (1)
3. We don't own the water, companies don't own it either (1)
4. Used to carry water, rather than buy is everywhere (3)
5. Water is our livelihood and wellbeing (2)
6. a non-renewable resource (1)
7. Cannot sell our water or our land (1)
8. Water is not to be sold or used to get rich on (1)

2. Connectedness

1. "When we talk about water, it flows through many things"
2. "Water has been the central focus in a lot of things we've been involved with over the years"
3. "If it wasn't for water nothing would be on this land today"
4. "Without it nothing works"
5. "[water] is a land's life blood. Without water and land, where are we going to be?"

6. “life cycle – if you harm one, you harm all; web of life”
7. “Life blood of mother earth, if it dies, mother earth dies”
8. All of our communities are connected by water
9. Every living thing needs water

3. Good Usage of Water

1. Used for basic necessities: to sustain us, cleanse us, sweat lodges, healing (loss, grief, sickness), and grow crops (9)
2. Ensured there was water near our lands (2)
3. Purifies mind, body, soul and spirit (2)
4. Cedar soaking, production of everyday goods
5. No waste, or over-use of water (4)
6. Less economic development, other strategies for water (1)
7. Using too much water for sewer system (1)
8. Same source used for hundreds of years
9. Some people need water for other (non-basic) i.e. agriculture, ranching (1)
10. Water is for consumption by people (1)
11. Travel (4)
12. Netting fish
13. Where animals go to feed, spawn, create life

4. Tradition and Language

1. Traditions known naturally, as that was how they lived (1)
(i.e.: value experiential learning)
2. As Indigenous people we have an obligation to protect the water (1)
3. We cannot share our stories about water (1)
4. Knowledge, wisdom, learning from our past (4)
5. More respect, where you love and how you live (2)

6. We value stories from our ancestry (3)
7. We can share our health and values (1)
8. Women give life, understand life and our connection to the land (1)
9. Been on the land a long time, way of life (2)
10. Legends of big monstrous fish (1)
11. [Our people] used to be part of the lake (1)
12. Relationship with our waters (1)
13. Semi-nomadic co-existence (1)
14. Language (2) (incl) “the laws of the land are in the language”

5. Mentions of Respect (10)

1. Respect water
2. Respect natural resources
3. Respect between water users
4. Respect for environment
5. Respect for dependents on water
6. Respect for the connectedness stemming from water

6. Mentions of Sacredness (12)

1. I'm a strong believer in my water
2. Sacred thing as a living thing
3. It's our sacred potential
4. Sacred places
5. Water is life
6. Sacred
7. Precious gift of life
8. God-given resource

7. Protecting Water

1. Obligation to protect water
2. Protecting water (3)

3. Keep water clean as possible (5)
4. Don't waste
5. Protect it for wildlife
6. Social Values
7. Share ideas/info (2)
8. Work together (1)
9. Trust, honesty (3)
10. Surviving for sake of children and grand children
11. Commitment
12. Open communication (2)
13. Acceptance & tolerance

Assets

1. Economic (2)

1. No funding

2. People (5)

1. Young people
2. Men and women who can help leadership
3. Our people are brilliant and talented, without enormous potential
4. With issues raised as a community we are more aware
5. Community members

3. Ecological assets

1. [river] brings the fish
2. [] spawning area for fish
3. Local spawning grounds

4. Cultural Assets

1. Words, knowledge, and stories passed down by Elders, can teach us to protect and preserve water ways (2)

2. Creativity in using resources and skills at hand
3. “Our achievements in UNPFII and UNDRIP are the work of generations: grass roots, spiritual, scholars, it’s legacy work”
4. Great written work
5. Language and laws
6. Culture as a lifeline to our ancestors
7. Elders

5. Programs and Infrastructure

1. Fisheries program
2. Community garden
3. Natural resource department (2)
4. Community plan
5. Car pooling program
6. Composting
7. Fisheries tech, environmental monitors, fuel management team
8. Lab for testing water
9. Fish fence
10. Chief & Council
11. Beach seining
12. Water testing

6. Rights, Jurisdiction, and Governance

1. Community never signed a treaty
2. We are the people who hold the rights
3. Public meetings help us air issues out

Actions

1. Legal, Policy, and Governance

1. Decision-making for good of everybody (2)
2. Protect watersheds (through by-laws, generate mandate) (6)
3. Joint natural resources working group
4. Declaration on our Indigenous water rights (7)
5. Standing up for our own laws (5)
6. Sovereignty/nation-building (2)
7. TEK people involved in consultation process (2)
8. Safety measures
9. Enforce environmental regulations
10. Connecting with others (3), with government (1)
11. Meetings which are more accessible
12. Use of media to share information

2. Education

1. Training (4) for water testing (2), filtration system (1)
2. Baseline (2) (i.e.: mining standards)
3. Education (9)
 1. Young people learning re: issues (1), learning re: traditions (3)
 2. General public on environmental issues (2)

3. Research & Documentation

1. Water ways need to be marked and preserved
2. Environmental water study concerning seepage from corporate activities
3. Document history of occupation of territory
4. Get info from government
5. Better understanding of industrial activities in territory
6. Investigate other water sources

7. Keep partners informed of activities, learning from others (2)
8. Research on salmon habitat and impacts
9. Water testing for contaminants
10. Impact of dams on social and economic climate
11. Workshops
12. Reports & publications, other written info (2)

4. Culture

1. Collaboration as a nation for water management (2)
2. Incorporate our traditional laws and teachings in all that we do
3. Sustain cultural practice of fishing
4. Self-involvement
5. Community involvement (2)
6. Meet spiritual and cultural needs, the rest will follow
7. Uphold values and teachings
8. Preserve, use, and learn from language
9. Respect the water in traditional ways

5. Financial/Economic Action

1. We need \$
2. Find more funding
3. Fisheries
4. Landscaping
5. Tourist information
6. Hunting & guiding
7. Approval then funding for treatment plant

6. Technical, Infrastructure Projects

1. Alternative energy, solar/clean energy
2. Infrastructure replacements (3)
3. Efficient water use (5)
4. Infrastructure maintenance (2)
5. Tree planting, xeriscaping (2)
6. Water purification
7. Recycling
8. Dams should release more water

Part IV

Additional Resources

Additional Resources

The following are networks, organizations, and institutes working in fields related to water and/or Indigenous health offered as an introduction to safe drinking water in British Columbia, Canada, and abroad. This collection of additional resources is not exhaustive.

Assembly of First Nations (AFN)

www.afn.ca

The Assembly of First Nations is a political organization representing Canada's First Nations at the national level. Through its 'Housing' and 'Water & Wastewater' policy areas, the AFN represents and protects the interests of First Nations in response to government policies. In the coming months an AFN national assessment of water systems in First Nations communities is expected to be released.

British Columbia Environmental and Occupational Health Research Network (BCEOHRN)

www.bceohrn.ca

The British Columbia Environmental and Occupational Health Research Network was founded in 2005 through a Michael Smith grant which established seven health research networks in BC. Though the funding program has now ended, the BCEOHRN continues to operate as a society in BC, connecting researchers, students, practitioners and policy makers for information sharing, networking, and support services.

CAHR Annotated Bibliography – Water and Aboriginal peoples' health

<http://cahr.uvic.ca/programs-research/publications/>

The staff of CAHR has done a lot of background reading in implementing our water research program. As a result of this work we've drawn together a collection of scientific and grey literature in an annotated bibliography which is available on our website. This bibliography is not intended as an exhaustive resource, but is shared in the hopes that others will find it useful.

CAHR Documentary – Crisis On Tap

<http://cahr.uvic.ca/videos/>

On Canada Day 2011, CAHR released the documentary *Crisis On Tap: First Nations Water for Life*, which builds on the March 2010 Consensus

Conference on Small Water Systems Management for the Promotion of Indigenous Health. This poignant piece takes a critical look at the need for access to safe water and its relation to environmental public health, as expressed by First Nations peoples living in Canada.

CAHR Videos – Consensus Conference Presentations

<http://cahr.uvic.ca/videos/>

Presentations made at the Consensus Conference on Small Water Systems Management for the Promotion of Indigenous Health have been made freely available to the public on the CAHR website.

Canada Water and Wastewater Association (CWWA)

www.cwwa.ca

The Canadian Water and Wastewater Association represents the interests of municipal water and wastewater systems to national decision-making bodies. With a strong presence in Ottawa, the CWWA “promotes sensible policies” and “advocates regulations that are effective but not burdensome”. Visitors to the website will find free publications relating to risk assessment tools and other technical aspects of water and wastewater management.

Canadian Institutes for Health Research – Institute for Aboriginal Peoples’ Health (CIHR-IAPH)

www.cihr-irsc.gc.ca/e/8668.html

The CIHR-IAPH is a federally-funded research institutes which sets research priorities and provides funding opportunities for Aboriginal health research in Canada. It seeks to advance a national health research agenda for First Nations, Métis, and Inuit health which respects community priorities and Indigenous knowledge.

Canadian Water Network (CWN)

www.cwn-rce.ca

The Canadian Water Network is a Network of Centres of Excellence (NCE) whose initiatives connect over 300 researchers and students at 37 universities across Canada. A CWN priority is to facilitate Canadian water research through networking and resource pooling, and to mobilize research for implementation in Canadian communities. Its research programs are based on end-user needs and include protecting watersheds and ecosystems, protecting public health, and ensuring sustainable water infrastructure.

Centre for Indigenous Environmental Resources (CIER)

www.cier.ca/

The Centre for Indigenous Environmental Resources is a First Nation-led, environmental non-profit organization based in Winnipeg, Manitoba. Through its programs on climate change, sustainable communities, biodiversity, and environmental protection, CIER partners with First Nations and hosts workshops to share environmental tools. CIER also supports the development of comprehensive community plans in First Nations across Canada.

CoPEH – Canada: Canadian community of practice in ecosystem approaches to health

www.copeh-canada.org

“CoPEH-Canada is an adaptive community of scholars and practitioners dedicated to the understanding, teaching and application of ecosystem approaches to address current challenges to a healthy and sustainable global future” - CoPEH homepage. To ensure their research has a maximum benefit to all members of society, the group prioritizes collaborative relationships and capacity building.

Council of Canadians

www.canadians.org/

The Council of Canadians is a citizens’ advocacy organization with chapters across the country. Its members aim to promote progressive policies in fair trade, climate change, energy, and water. Through its water campaign, the Council of Canadians advocates for a national water policy which protects Canadian water bodies from privatization and bulk exports.

National Collaborating Centre of Aboriginal Health (NCCAH)

www.nccah-ccnsa.ca

The NCC of Aboriginal Health is based in Prince George, BC and produces research on key topic areas on the health of Canada’s Aboriginal peoples. Current emerging priorities include pandemic planning, water quality, urban health planning, and diabetes. They have also developed core programs on child and youth health and the social determinants of health.

National Collaborating Centre of Environmental Health (NCCEH)
www.ncceh.ca

The NCC of Environmental Health, based at the British Columbia Centre for Disease Control in Vancouver, identifies research gaps and develops an evidence base for environmental health policy and practice. Visitors to their website will also find information on the various environmental health organizations in Canada and their role in protecting Canadians' health.

National Collaborating Centres for Public Health (NCCPH)
www.nccph.ca

There are six federally-funded National Collaborating Centres (NCCs) of Public Health which produce and share research on public health issues such as air quality, health policy, and infectious diseases. The NCC of Aboriginal Health and the NCC of Environmental Health will be of particular interest to people concerned about water quality and Indigenous peoples' health.

Network Environments for Aboriginal Research – British Columbia (NEARBC)
www.nearbc.ca

NEARBC was founded in 2005 as one of seven health research networks in BC funded by the Michael Smith Foundation. The network is currently partnered with the NCCAH and continues to share research, news, and opportunities in Aboriginal health with its 2500 members in weekly updates, as well as houses an abstracts database for Aboriginal health research.

Ontario First Nations Technical Services Corporation (OFNTSC)
www.ofntsc.org/

The OFNTSC is a technical advisory corporation serving the 134 First Nations of Ontario, with programs in many areas, including water and waste water. The OFNTSC assists with capital planning and infrastructure development. The corporation also updates the Circuit Rider Training Program and works with the Aboriginal Water and Wastewater Association of Ontario to evaluate the pay grid and job descriptions of water operators, highlighting their important role in a community.

Rés'eau-Waternet

www.reseauwaternet.ca/

Rés'eau-Waternet is a research network committed to developing cost-effective water treatment solutions for small, remote, and First Nations communities. Their main research topics are: source water quality; technology development; cost analysis and systems operations; and, technology validation and knowledge transfer.

Safe Drinking Water Foundation

www.safewater.org

This Saskatoon-based organization promotes the implementation of robust, high quality water treatment systems in First Nations communities. It also houses the Advanced Aboriginal Water Treatment Team which is able to assist communities in trouble-shooting their treatment systems and training water operators. The Safe Drinking Water Foundation also creates and circulates educational materials on water for use in classrooms.

Small Water Users Association of British Columbia

www.smallwaterusers.com

The Small Water Users Association of British Columbia is a new association with over two hundred small water systems represented in its membership. Its goals are to represent the interests of small water systems to municipal, provincial, and national levels of government and to promote cooperation and knowledge exchange amongst the users of small water systems. Their site contains helpful free publications relating to small water systems management.

UN Water

www.unwater.org

Water is an important topic connecting many UN branches, such as the UN Environmental Programme and the UN Development Programme. UN-Water brings together the resources generated by those organizations and “provides a platform for system-wide discussions”. Visitors to this site will find video and documents concerning water governance, UN water programmes, and task forces established to investigate specific issues, such as gender and water.

**University of Chemical and Bio-resource Engineering Department
(CHBE) – Environmental Research**

www.chbe.ubc.ca/research/environmental.php#waterpol

Many researchers and students in the CHBE are focused on the development and evaluation of drinking water treatment methods. Some faculty members engage in collaborative research designing water treatment tools and technologies for application in small and remote communities, to meet their water treatment needs within economic constraints.

University of Victoria Water and Aquatic Sciences Research Program

web.uvic.ca/water/

The Water and Aquatic Sciences Research Program at the University of Victoria provides opportunities for interdisciplinary research in such topics as water and watershed management, drinking water safety, and food web ecology. Visitors to their website will find information on their research activities and access peer-reviewed publications by program affiliates.



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