

ECOHEALTH AND WATERSHEDS

Watersheds as Settings for Health
and Well-Being in Canada

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Executive Summary: Canadian Watersheds as Settings for Health and Well-Being

Human health and well-being are largely determined by “upstream” environmental and social factors. These factors can be usefully viewed within the physical construct of watersheds (catchments) at various scales. In part, this is due to (i) the hydrological imperative that defines watersheds and determines the movement of water through the landscape and the quantity and quality of water available for human uses, (ii) the importance of water to our economic, social and physical well-being, and (iii) human activity on the landscape that influences the ability of watershed ecosystems to provide the ecosystem goods and services that underlie our health (e.g., attenuation of drinking water contamination, contaminant transport, recreational resources). It follows that health is impacted by governance and management of watersheds. In fact, good watershed governance and management can lead to a double dividend—improved environmental health and improved human health.

Yet many provinces and territories in Canada do not have clear governance structures at any scale, and where watershed organizations exist, they must grapple with complex interjurisdictional and intrajurisdictional division of powers and scarce resources when conceiving of relationships among watersheds, ecosystems, social systems and health.

The *Watersheds as Settings for Health and Well-Being Project* explored connections between watershed governance and human health in five watershed organizations serving a variety of scales across Canada: the Fraser Basin Council (BC), Cowichan Watershed Board (AB), Save Our Seine River Environment Inc. (MB), Otonabee Region Conservation Authority (ON) and Lake Simcoe Region Conservation Authority (ON). The application of a systemic framework known as the Watershed Governance Prism informed the development of case studies of these five watershed organizations. Watershed partners undertook a self-assessment and participated in a collaborative workshop that explored a variety of dimensions of their programs. Specifically, the Prism framework provided a basis for the watershed organizations to (a) identify and prioritize different types of relationships among watersheds, ecosystems, social systems and health, and (b) make a systematic analysis of how their watershed organization programs interact with determinants of health and well-being.

Results of the watershed organization self-assessment and the collaborative workshop demonstrate that watershed organizations operate largely from the perspective of water governance for sustainable development (linking watersheds, ecosystems and social systems). Where health is addressed, it is usually implicit rather than explicit. Even so, there was recognition of the range of health implications of watershed-based activities, ranging from source water protection and flood management, to the health promotion benefits of engagement with environmental stewardship. Despite these converging objectives, participating watershed organizations identified a lack of capacity to optimize synergies and interact with partners in the health sector.

The interactions and exchange among watershed partners and research team members generated a variety of insights and policy recommendations that have informed the broad conclusions from the *Watersheds as Settings for Health and Well-Being Project*. The specific experiences from watershed organizations provided new evidence watersheds and health are intimately linked, that these relationships extend well beyond the conventional contaminant/pollution perspective, and that addressing watersheds and health demands an integration of public policy across multiple sectors. Watersheds can serve as a linking or integrative mechanism to foster intersectoral action across many domains. However, there are jurisdictional and intersectoral gaps that need to be addressed. Collaboration, interaction and integration through watersheds are necessary steps toward improving and achieving the “double dividend” of both watershed management and public health. More specifically, six key lessons produced are:

- i. Improving core competencies and capacity in both public health and watershed management is necessary.
- ii. Public policy and programming must be place-appropriate and reflect the variability presented by watersheds.
- iii. The absence of a clear strategy and action plan for linking water, watersheds and watershed management to public health is a missed opportunity to improve the determinants of health.
- iv. Concepts such as subsidiarity and the precautionary principle have utility for both public health and watershed management, but need to be defined, operationalized and applied.
- v. There are stakeholders present in many domains intersecting with watersheds and public health (e.g., food security, education, infrastructure, planning, agriculture, forestry, tourism) who can make significant contributions to public health.
- vi. A strategic but incremental process of piloting, evaluating and comparing watershed-based public health interventions and initiatives is a viable way forward for both public health and watershed management.

The *Watersheds as Settings for Health and Well-Being Project* produced recommendations in terms of strategic directions for work, and action at the federal, provincial and local levels to address these findings. These range from developing and promoting Canadian and provincial integrated water and health strategies and action plans to building capacity for public health staff to recognize and address the links between social and environmental determinants of health occurring in watersheds. A key finding is the important leadership role for public health to act as a catalyst to promote intersectoral collaboration for watershed governance and management that simultaneously addresses human health and the environment.

Section 1: Introduction and Background

Introduction

Human health and well-being is fundamentally dependant upon the sustainable governance and management of land and water.¹ Therefore, we both benefit from, and are impacted by, the governance of the watersheds in which we live. Watersheds are natural boundaries, located at the ridge of highest elevation, that separate different drainage basins from each other. They can be defined at many different scales—for example, a storm water pond, a small stream, a lake or a large river basin, such as the Fraser River Basin in British Columbia. The definition of the watershed influences the issues and stakeholders identified, as well as the range of actions that are feasible and appropriate. Thus, the selection of a watershed boundary and the scale of the watershed reflect the concerns being addressed, directly influencing the perspectives taken on issues and the types of activities undertaken. For example, the massive Fraser River Basin may not be the most logical boundary for the organization and delivery of social programs, but it is the only appropriate boundary for the protection and enhancement of salmon populations in the Fraser River and its tributaries.

Many provinces and territories in Canada do not have clear watershed governance structures at any scale. Other parts of the country are widely known to be part of larger watershed systems (for example, Canadian boundary waters on the 49th parallel that are governed in part by the International Joint Commission), but this recognition has little impact on day-to-day decisions regarding land-use decisions and public health and well-being. In this working paper, we have focused on a range of watershed organizations that exist in more and less formal capacities across the country. They are, in many ways, the exception and not the rule.

All watershed organizations in Canada grapple with the complexity of interjurisdictional (e.g., federal, provincial, local) and intrajurisdictional (e.g., department, ministry, unit) division of powers as they relate to the environment, health and economic development. This complexity is a reality of Canadian life that is helpfully aired in placed-based fora that identify and address the issues falling through the cracks in our regulatory, administrative and enforcement systems.

Watershed organizations are entrusted to develop remediation measures and plans that seek a balance between economic, social and environmental goals. In some cases, efforts to maintain economically valuable services, such as vibrant local fisheries, require significant outside interventions. The stocking of fish and the trucking of fish upstream when river conditions impede smelting runs are not uncommon interventions. While these are important and, in some ways, very logical programs, they may also serve to reduce or mask a generally disengaged public's awareness of some of the significant environmental issues affecting their communities. Lakes that can no longer support viable fish populations are not red flags driving significant public concern, despite the fact that poor water quality and water scarcity directly impact human health. Watershed report cards and other programs attempt to raise public awareness of these issues, but crisis drives opportunity, and the Canadian public—sheltered by a myth of abundance—is well insulated from the ecological realities affecting them.

Watershed organizations are, for the most part, primarily focused on engineering and ecology. The original driving force behind watershed thinking was the need to grapple with water quantity issues affecting shipping, hydropower development, flooding and drought. As the negative consequences of human interventions in “hard” infrastructure on the ebb and flow of natural ecological systems became apparent, interest and attention slowly shifted to the restoration and maintenance of “natural” systems and a focus on pathogens and non-point sources of pollution. The idea of the watershed as a social unit of organization in and of itself is underdeveloped. Direct community engagement in stream cleaning, tree planting and community water monitoring is most effective when it is social and building community. The potential to invest in wellness campaigns focusing on connections to nature, neighbours and outdoor life could be strengthened by better dialogue between the public health and watershed governance sectors. Proactive environmental

¹ The project team and others have demonstrated such relationships elsewhere. The reader is directed, for example, to Falkenmark and Folke (2002), Parkes and Horwitz (2009), Parkes et al. (2010), and Bunch et al. (2011).

management activities, such as stewardship programs, succeed best when they support communal goals and are publically recognized. Health is a powerful driver for human behavioural change that is also an easy sell in the political arena. The win-win potential to connect ecological realities to the social and environmental determinants of health is one of the key reasons for this study.

The public health community has a vital role to play in helping to frame issues of environmental resilience and sustainability with respect to human health and well-being. This reframing has significant, unrealized potential to reshape social values and norms in ways that focus on connections between human beings and the land and water that support us. Events such as the Walkerton crisis highlight the social malaise that is created when Canadians begin to doubt the integrity of their water systems. The watersheds offer an appropriate spatial construct to frame, discuss and debate not only the social and environmental determinants of health, but also the overarching vision for watershed governance activities. Water resources and land management are not “solvable” problems; they are an integral part of our lives that will become more and more important as hydrological systems change with global climate change, waters become increasingly eutrophic, and water budgets are oversubscribed by industrial, agricultural and municipal users. The consensus in the international water community is toward watershed governance as a mechanism for peacebuilding, although the rhetoric of water wars serves to highlight the true significance of this issue to all people. Peacebuilding is yet another way of enhancing human health and well-being that can manifest at a variety of scales.

Methods

This project built on existing relationships between the Network for Ecosystem Sustainability and Health (NESH), the International Institute for Sustainable Development (IISD) and watershed organizations across Canada. It focused on the development and implementation of a self-assessment framework that investigated current public health linkages and expertise in watershed-based organizations as well as the application and testing of the previously developed Watershed Governance Prism heuristic (Figure 1, below).

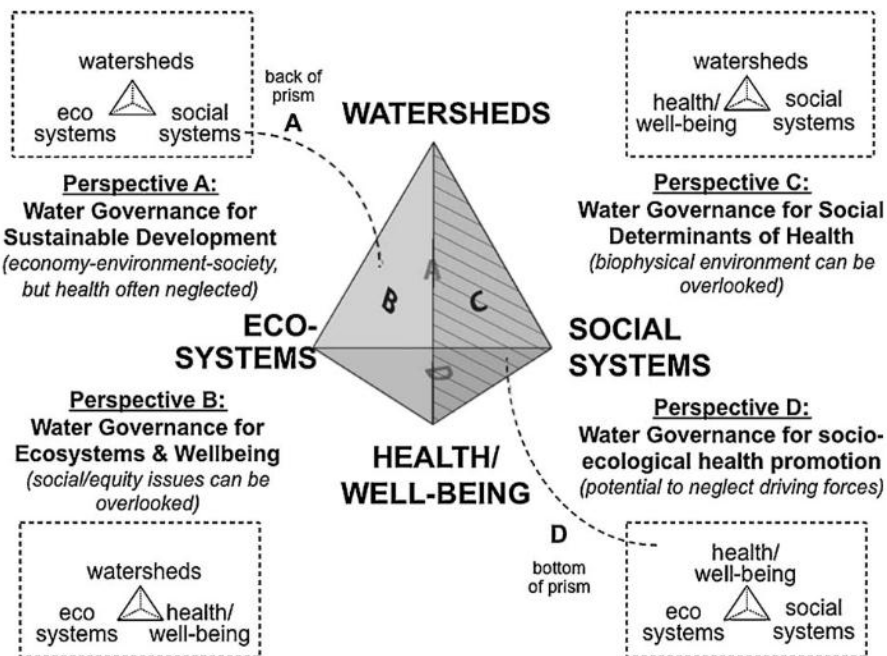


Figure 1. Watershed Governance Prism Heuristic.

ECOHEALTH AND WATERSHEDS

Watersheds as Settings for Health and Well-Being in Canada

The self-assessment was comprised of three sections: (i) background information about the organization, its history and its engagement with public health; (ii) the identification, description and analysis of at least five representative projects or programs that the organization has undertaken; and (iii) a reflection on both the process and content of the self-assessment.

The self-assessment document was delivered to the watershed partners via Survey Monkey and the results informed a face-to-face meeting of NESH investigators and watershed partners in Winnipeg, Manitoba, on March 8, 2011. The meeting was hosted by IISD, which has long supported this line of inquiry by NESH.

A copy of the self-assessment, the agenda and list of participants in the meeting are provided in the Appendices of this working paper. The information generated by the self-assessment and meeting provides the basis for this working paper.

Orientation to Working Paper

The working paper is organized in the following way (Parkes et al., 2010):

- Section 1 introduces the issues and provides an overview of the project methodology.
- Section 2 briefly summarizes the results of the watershed organizations' self-assessments.
- Section 3 discusses this information, as well as the key themes that emerged from the data collection and reflection processes.
- Section 4 summarizes the conclusions of the working paper and puts forward policy recommendations for the Public Health Agency of Canada and other stakeholders. Following the recommendations, a series of next steps is proposed.

The Appendices contain additional information about the self-assessment and the Winnipeg meeting.

Section 2: Summary of Watershed Council Self-Assessments

A. Otonabee Region Conservation Authority (ORCA)

Otonabee Conservation was established in 1959, with a focus on the watershed of the Otonabee River. Subsequent expansions increased the area of jurisdiction to include the watersheds of the Indian and Ouse Rivers, and today the Otonabee Region Conservation Authority (ORCA) watershed jurisdiction is nearly 2,000 square kilometres.

Mission

ORCA's vision is to provide leadership to achieve healthy watersheds, where human activity respects the need to conserve, restore, develop and manage the natural environment for current and future generations.

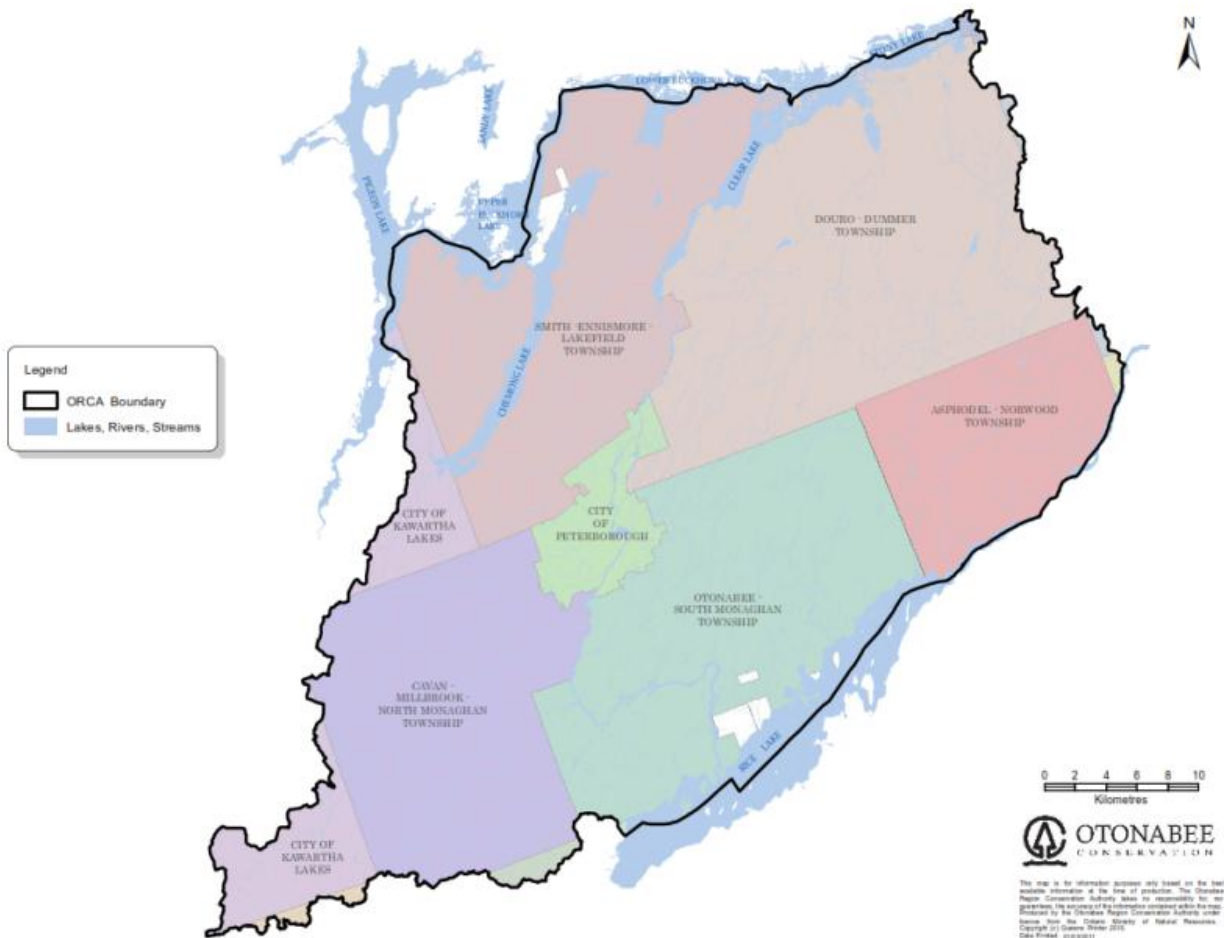


Figure 2: Map of the Otonabee Region Conservation Authority Watershed.

General Information

- Number of employees: 13 full time, 3 contract, 10 summer staff
- Number of volunteers: 5-20
- Population of area served (estimated): 100,000
- 2010 annual budget: \$2,123,292
- Watershed jurisdiction: 1,951 km² (Figure 2)

Peterborough County Socioeconomic Data

(Note: Data adequately represent the watershed area, given population distribution in watershed)

- 47.9 per cent of residents have post-secondary education
- 9.4 per cent have apprenticeship/trade certificates, 22.2 per cent have college diplomas
- Employment earnings make up 69 per cent of total income in Peterborough, government transfers make up 14 per cent, and other sources make up 17 per cent
- Ranked 20th in Maclean's survey of Canada's "most caring cities," which takes volunteering rates into account
- Median income is \$45,456, \$6,782 below the Ontario median
- 2.24 per cent of the County population self-identify as being a visible minority
- 73.39 per cent of Peterborough County residents are at least third-generation residents

Background

The 1946 Conservation Authorities Act provided the means by which the province and the municipalities of Ontario could join together to form a Conservation Authority on a watershed basis, to undertake programs for natural resource management. Three fundamental concepts were embodied in the Act:

Local Initiative

A Conservation Authority in any area could only be formed when the desires of the residents reached the point where they were willing to request the government of Ontario to form an Authority.

Cost Sharing

The Conservation Authorities Act stipulated that the costs of projects should be shared by municipalities and by the provincial government.

Watershed Jurisdiction

Conservation Authorities were to have jurisdiction over one or more watersheds. This stewardship was to cover all aspects of conservation in the area. This has meant that a Conservation Authority has been able to handle problems such as flood control in a complete and rational basis.

In the decades following their creation, Conservation Authorities have become involved in a wide range of activities depending on the resource management concerns of local residents, member municipalities and the province. Each Authority's watershed management program is geared to its own special needs and conditions.

Relationship to Public Health

The mandate of the Conservation Authority is focused on the conservation, management, restoration and development of natural resources. While there is a linkage between environmental health and public health, these links and associated activities are not clearly defined. Similarly, health organizations may be restricted from dealing with the environment specifically, unless there is a clear risk to public health. There may also be policy gaps with respect to the link between environment and health that result in challenges to integrating health and well-being into Conservation Authority activities.

The activities of ORCA related to public health are generally project-based and related to water quality, water quantity and outdoor recreation activities and opportunities. These activities change over time due to funding, capacity, provincial priorities and local issues. There is no in-house public health expertise, but the Authority works regularly with the Peterborough County–City Health Unit (PCCHU) on a variety of local issues related to both the environment and public health, including land-based contamination from historic industrial activities, research into bacterial contamination at local beaches, promotion of active living through the use of trails and public greenspace, and the Drinking Water Source Protection Program (DWSPP). The PCCHU representative became engaged in the DWSPP through the Clean Water Act and the identification of a need for a public health representative on the Source Protection Committee (SPC). Conservation Authorities are the local delivery agents for the DWSPP and, as such, maintain direct linkages and communications with SPC members. The SPC is responsible for developing a source protection plan for the Trent Conservation Coalition Source Protection Region, including the Otonabee Region Watershed. The role of the representative from the PCCHU is to ensure that the public health perspective is represented at the table and in the final source protection plan. It is important to recognize that while ORCA and the PCCHU work on many of the same issues, it is generally from the separate perspectives of environment and public health. While a mechanism or opportunity to facilitate further collaboration has not yet been identified, the value is recognized and this is something both organizations will work toward.

Brief Summary of Project/Program Self-Assessments

The self-assessment results (Table 1) highlight the multitude of ways in which the Authority engages with its watershed ecosystem. The public is engaged (directly and indirectly) in much of ORCA's work. While there is no explicit focus on broader issues of its social equity and justice dimensions, the links between public access to resources, empowerment through information, and engaging with both the community-at-large and specific populations is clearly part of the Authority's work. While the social and environmental determinants of health are not necessarily articulated or purposefully pursued, they are key elements of the programming that could be further refined.

Table 1. Summary of Results of Program Self-Assessment, Otonabee Region Conservation Authority.

Program/ Project Name	Brief Description	Prism Analysis Highlights
Flood Warning and Flood Forecasting	Planning and emergency response for both flood risk and low water events.	Program undertaken on a watershed basis, involving the community (social) and an understanding of ecosystem dynamics. It focuses on Perspective B (ecosystems and well-being), given its emphasis on the physical environment and the protection of life and property.
Drinking Water Source Protection	Development of a multi-barrier approach to municipal drinking water supply protection with the goal of developing science-based Source Protection Plans.	Emphasis on minimizing risk on a watershed basis by thinking about the implications of the loss of ecosystem services to communities and the integrated impacts of potential stressors. This program seems to integrate all of the perspectives (the full prism) to varying degrees, as it includes watershed, social, ecological and health and multi-stakeholder engagement dimensions. That said, from the full prism lens there may be elements that could be strengthened.
Watershed Health Monitoring	The collection and use of environmental monitoring data to inform the content of watershed report cards and assist planning.	The program focuses on the physical environment of the watershed as the unit of analysis and identifies representative sampling sites within it. It tracks cumulative watershed impacts and is best represented by Perspective B. The potential links to social and environmental equity and justice may be underdeveloped and could potentially be explored.
Conservation Lands Program	Includes the acquisition and management of land in the watershed for a variety of purposes.	Acquisition is considered from a watershed perspective as well as with an emphasis on ecological processes and functions. The program serves a social equity function by providing the only public access to several Kawartha lakes. It is best represented by Perspective D. The program is land-based but has a tangible positive impact on health and well-being.
Planning and Regulations Program	Review, comment and/or enforcement of various provincial and federal Acts related to natural hazards, wetland and shoreline development, fish and fish habitat, etc.	The program is based on the watershed unit and on regulating development on land adjacent to water. Processes are structured by provincial Acts. Public safety and the public good feature prominently in this work. Both Perspectives A and B are represented here, given the emphasis on the balance between environment, economy and society, as well as on the protection of the physical environment.

General Reflections

The incorporation of health over time in the activities of ORCA has been limited, but not absent. The availability of funding, provincial priorities, local issues and capacity may be key drivers. The orientation of the programs included in this assessment appears to be focused on the Watershed/Ecosystem/Sustainability perspective, which is entirely appropriate based on the mandate of the Authority and its responsibilities to local municipalities. The limited, explicit focus on health/social systems was expected, given that they are not the focus of the organization. The overall orientation of the projects according to the Prism heuristic does, however, usefully identify areas where there are significant new opportunities to expand and enhance programming, funding and public awareness.

The availability and accessibility of funding is always a challenge and definitely limits the programs and projects that ORCA can undertake. ORCA is a registered charity and a not-for-profit organization, making it eligible to receive funds from many private foundations, government granting programs and other funding sources. However, restrictions on the types of activities for which funding can be provided (equipment but not salaries) and ineligibility for grants from some funders (such as the Trillium Foundation) still make it challenging to run programs. Funding is usually available for a limited time, which also results in many programs with very short lifespans, fragmented programs, high staff turnover and public frustration. Overall, this case study highlights the important link between watersheds, ecosystems, social systems, and public health and well-being in the context of the Otonabee River Basin.

B. Lake Simcoe Region Conservation Authority (LSRCA)

Mission

LSRCA's mission is to provide leadership in the restoration and protection of the environmental health and quality of Lake Simcoe and its watershed.

General Information

- Number of employees: approximately 100
- Number of volunteers: fluctuates, formal student volunteer positions
- Population of area served (estimated): 400,000
- 2010 annual budget: \$15 million
- Watershed jurisdiction: 3,303 km² (Figure 3)

Socioeconomic data: None provided



Lake Simcoe Region Conservation Authority

Legend

- Municipal Boundary
- Township Boundary

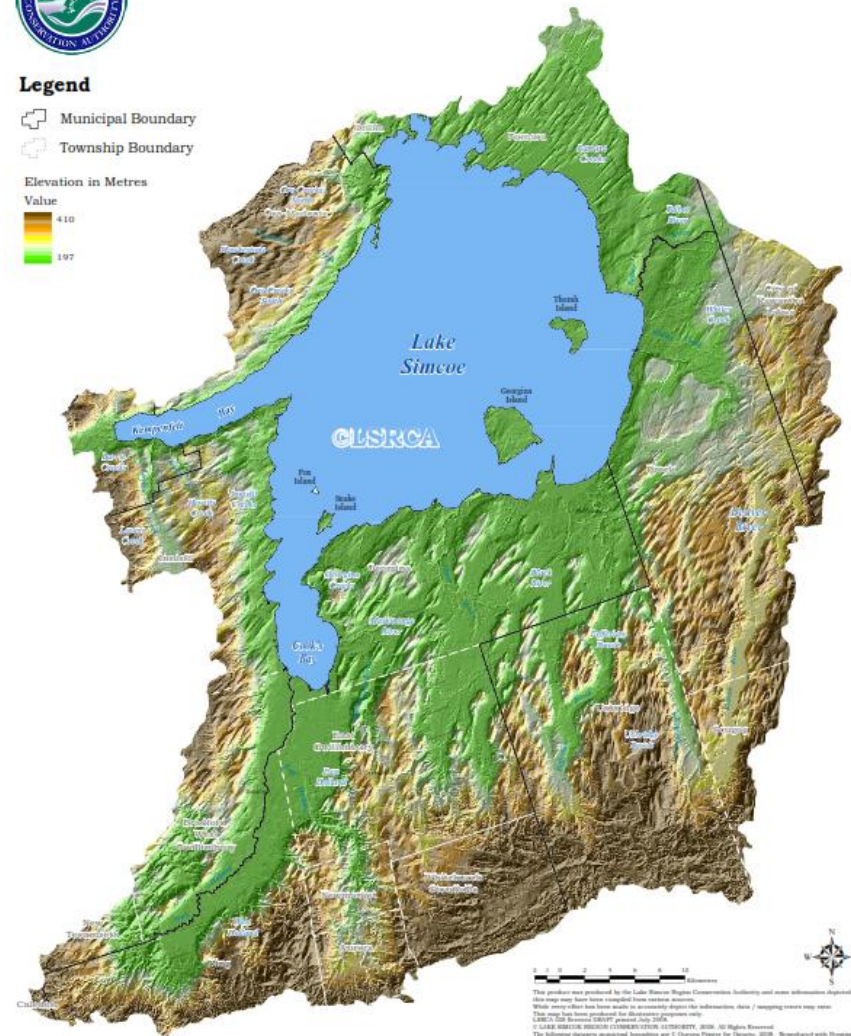
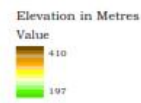


Figure 3: Map of the Lake Simcoe Region Conservation Authority Watershed.

Background

As with the Otonabee Region Conservation Authority, the 1946 Conservation Authorities Act provided the legislative framework for the development of Conservation Authorities in Ontario. The LSRCA began in the 1950s as the Upper Holland Valley Conservation Authority, which was formed by the municipalities of East Gwillimbury, King, Aurora, Newmarket and Whitchurch. Bradford, West Gwillimbury and Tecumseth joined in the 1960s.

In 1954, the devastating rains of Hurricane Hazel swept through the province and served to increase the mandate of Conservation Authorities in the area of flood protection. In the late 1950s, the Conservation Authority began to subsidize tree planting and farm pond construction on private lands and began to secure title to land in the watershed.

These programs continued, and a few million trees have been planted to date and many natural heritage properties have been secured. Environmental education efforts by the Conservation Authority increased in the 1970s, when Scanlon Creek Conservation Area's Educational Centre opened its doors.

In the 1970s this Conservation Authority became the South Lake Simcoe Conservation Authority (SLSCA) when the organization expanded to include the municipalities of Scott, Georgina and Innisfil. In 1986, it was renamed again, this time as the Lake Simcoe Region Conservation Authority (LSRCA), to better reflect its area of service. Programming increasingly focused on phosphorus loading to the lake. Since the Lake Simcoe Environmental Management Strategy's remedial program began in 1990, more than 800 environmental projects have been carried out, often through the Landowner Environmental Assistance Program (LEAP). In 2000, the township of Brock was included in the LSRCA jurisdiction. Work on the protection of the Oak Ridges Moraine continued to grow and the LSRCA joined LakeNet, an international forum focused on lake management issues. Currently, the LSRCA's four areas of focus are Science and Research, Protection and Restoration, Education and Engagement, and Leadership and Support.

Relationship to Public Health

The LSRCA has no in-house expertise specifically related to public health. The Authority used to collect bacteria samples in the 1990s, which aided the Ministry of Environment (MOE) in identifying where beach closures should occur. The Provincial Groundwater Monitoring Network (PGMN) is carried out by LSRCA in collaboration with the MOE; this program compares water chemistry to guidelines (e.g., for sodium, to which some people are sensitive). The MOE analyzes the samples and provides the interpretation. The MOE then notifies the Conservation Authorities and local health units if guidelines are exceeded. LSRCA occasionally deals directly with the public health authority to get a public health permit dealing with food handling to the public at any community events where they supply food to the public (e.g., a barbeque). In addition, there is an increased awareness of First Aid, including typical CPR training, as well as Wilderness First Aid and Ice Training. These courses are required for staff involved in field work. Time and cost and lack of resources (experts, experience) are limiting factors to including public health in the operations at LSRCA. The Authority has a wealth of information about the watershed, as well as expertise in communication, that might help with collaborative efforts, should they be undertaken.

Brief Summary of Project/Program Self-Assessments

The results of the seven projects included in the self-assessment (Table 2) highlight the multitude of ways in which the Authority engages with its watershed ecosystem. There is a clear focus on both community engagement and the integration of science with the development of best management practices. Scenarios and targets are used to inform and guide decision making.

Table 2. Summary of Results of Program Self-Assessment, Lake Simcoe Region Conservation Authority.

Program/ Project Name	Brief Description	Prism Analysis Highlights
Phosphorus Loads to Lake Simcoe	The identification and measurement of phosphorus in the watershed.	This program is operationalized on a watershed basis and focuses on both point and non-point sources of phosphorus and the driving forces affecting nutrient loads. It is mainly aimed at monitoring/quantifying loads, but includes public information campaigns to inform and educate the public and landowners. The link between land uses, fishery protection and other stewardship activities is also highlighted.
Phosphorus Loading Scenarios for Lake Simcoe	The objective of this report is to estimate phosphorus loadings to Lake Simcoe under various scenarios.	Focuses on Perspective A because it encompasses the social (group having ability to alter the watershed) and ecological systems (services including water quality and ability of the watershed to support human needs) that lie within a given watershed boundary. This project attempts to be transparent and equitable (identifies land-use changes and phosphorus loads in each subwatershed) and includes the objective of increasing understanding of sustainability and the need to take account of water quality conservation.
East Holland River Case Study	A variety of environmental restoration projects, supported by the community and other partners, to improve water quality and quantity in the river.	This is a subwatershed project whose guiding principles are to “Protect What is Healthy” and to “Rehabilitate What is Degraded.” A series of resource targets concentrate environmental restoration efforts. Given that much of the land is in private hands, the public was engaged. A 2005 fundraising campaign designed to raise public awareness resulted in the development of the East Holland River 2006–2012 Stewardship Workplan, which involves a wide range of community stakeholders.
Maskinonge River Recovery Project	A community-based environmental stewardship project modelled after Environment Canada’s Adopt-a-Watershed Pilot Project.	Implemented on a subwatershed basis, the case provides an excellent example of multi-level governance supporting a highly effective grassroots stewardship initiative. The project focuses on Perspective A. There was no determination of any restoration projects having an effect on health/well-being, because that was beyond the scope of the project and due to the difficulty of measuring the direct effects of these restoration projects on the ecosystem and on human well-being (recreational fisheries and enjoyment of the lake).
Flood Warning/ Forecasting	The two principle components are forecasting (surface runoff quantity and river response) and warning (communication of forecast to flood clients).	This project is mainly from Perspective D, where ecosystems, social systems and health/well-being are combined. The social system involving communication between forecasting/emergency personnel and affected groups is an important part of this program to protect health and well-being, but only after ecosystem services (flood potential) are evaluated. Perspective A is also apparent.
Environmental Education	Certified teachers deliver a curriculum-based presentation to primary and secondary school students.	Perspectives B and D are identifiable, because the goal of environmental education to youth is to give them a perspective of their role as a social group in protecting the ecosystem services (clean water, fish habitat) that will aid in human health (fresh water available for drinking and a sustainable ecosystem for whole populations around Lake Simcoe). This is in the watershed context because the watershed as a whole is considered, not just one piece of it.
Source Water Protection	The purpose is to develop a source protection plan for each watershed in the province.	All of the perspectives seem to be present because this program links social activities to problems with ecosystem services that occur in the watershed, and drinking water is a health issue. The link to power and (in)equities is unclear.

General Reflections

The LSRCA works with other organizations (government and academics) to understand the effects of decreased nutrient loading on the coldwater fishery of Lake Simcoe. Environmental protection is beneficial to the general well-being of communities around Lake Simcoe, but also to populations relying on the watershed and lake for food and water. The health of many people is dependent on Lake Simcoe (for agricultural goods, for example), but there have been very few projects/studies aimed at understanding the link between the Lake Simcoe environment and health/well-being in this area. Our projects and programs fit extremely well into our organization's overall mission (providing leadership in the restoration/protection of the environmental health and quality of Lake Simcoe and its watershed), with the help of community, municipal and other government partners. It seems that the work of the past 60 years has indeed helped the LSRCA progress toward its goal. The significant amount of work undertaken by the LSRCA and its partners seems to have had a tremendous effect on the watershed, ecosystem and social systems. Over the last few years, millions of dollars have been provided to the LSRCA by the federal and provincial governments through various funding sources, and this has boosted its mission. In the future, it will be important to understand the effects of conservation efforts and to determine which of these efforts should be continued (i.e., to focus on the biggest problems in the watershed).

C. Cowichan Watershed Board (CWB)

Mission

The CWB's mandate is to provide leadership for sustainable water management to protect and enhance environmental quality and the quality of life in the Cowichan Watershed and adjoining areas.

General Information

- Number of employees: 1 part time contractor
- Number of volunteers: approximately 24, including 12 Board members and Technical Advisory Committee
- Population of area served (estimated): approximately 34,000 within watershed boundary (Figure 4)
- Budget for the year 2009: approximately \$80,000

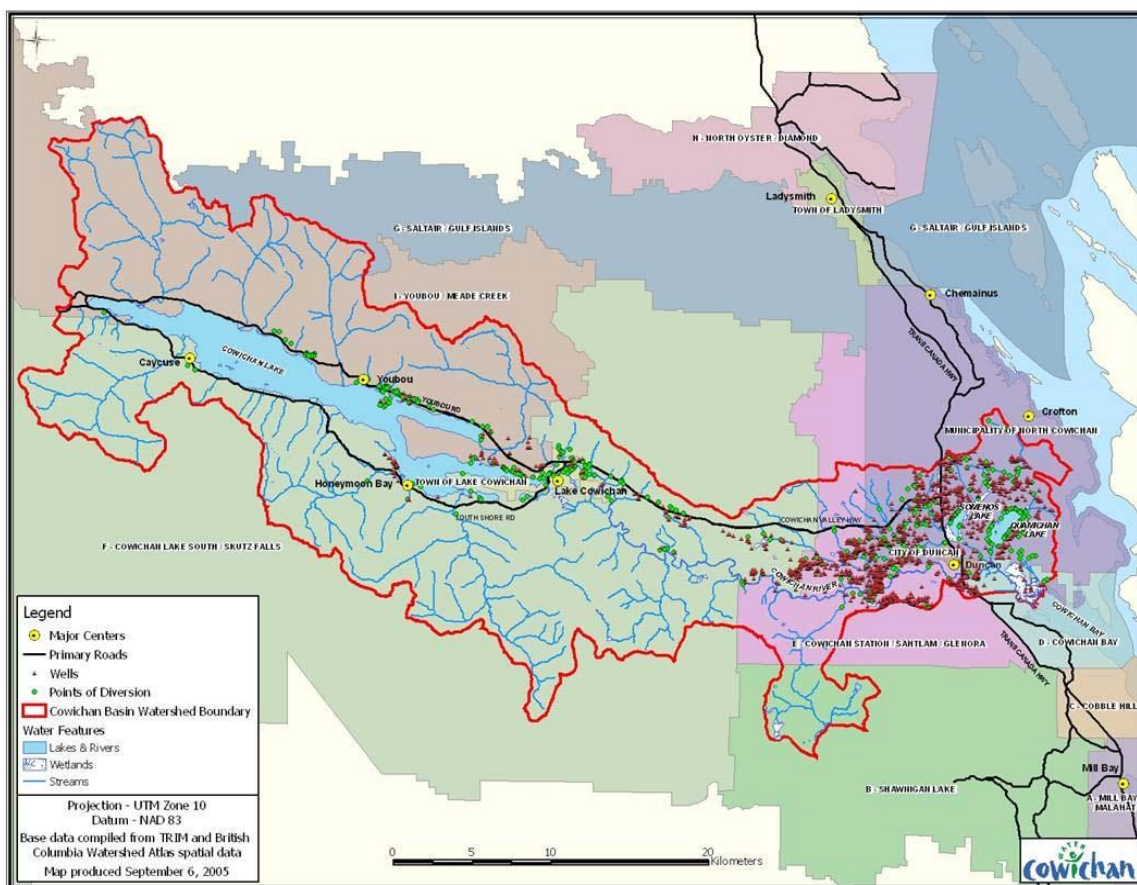


Figure 4: Map of the Cowichan Watershed.

Background

The CWB derived from a recommendation of the Cowichan Basin Water Management Plan, which was developed between 2004 and 2007 with funding from the Cowichan Valley Regional District (CVRD), Cowichan Tribes, British Columbia Ministry of Environment (MOE), Fisheries and Ocean Canada (DFO), Catalyst Paper (CP) and the Pacific Salmon Commission. The Plan was developed in response to serious drought in the watershed in 2003. It includes six goals related to demand management, water supply, habitat and biodiversity, flooding, monitoring and communications, and governance. Regarding governance, the Plan proposed establishing an advisory council representing basin-wide interests that could build trust and ownership among stakeholders, including the public. In January 2010 after limited success in implementing the Plan, the CVRD, Cowichan Tribes, DFO and MOE, with the support of the Living Rivers Trust Fund and Catalyst Paper, created the CWB to be accountable for overseeing the implementation of the 2007 Plan.

The CWB is co-chaired by CVRD and Cowichan Tribes and is structured to include provincial, federal and community (at-large) representatives. The Board is supported by a coordinator and special advisors, as well as a Technical Advisory Committee that represents a broad array of interests within the watershed.

The CWB has prioritized engagement with Public Health and the social and environmental determinants of health in a number of ways.

Board and Committee Membership/Support

The initiating partners requested public health representation on the CWB and the Board subsequently requested public health representation on its Technical Advisory Committee (TAC). Dr. Lorna Medd, a Medical Health Officer in British Columbia and now a consultant to the Vancouver Island Health Authority (VIHA), was appointed to the Board and, subsequently, representatives from Ministry of Health Services (MHS), VIHA and MOE with public health expertise agreed to participate on the TAC. It is anticipated that, over time, those organizations will contribute to CWB funding.

Public Health Dimensions of CWB Activities

Active participation in public health issues have included: a field trip that identified public health implications of development around Cowichan Lake; exploration of water quality related targets for the watershed; support of Cowichan Tribes to acquire funds to investigate public health/safety dimensions regarding flooding; Light Detection and Ranging (LiDAR) related flood zone mapping interpretation (Cowichan project that may represent a pilot methodology that will assist other provincial health authorities). Whole watershed thinking is leading to increased awareness that healthy ecosystems and public health are strongly linked.

Broad Engagement with Socioeconomic Issues and Community Groups

As well as the CWB board, the TAC includes members of Cowichan Tribes, four key local conservation organizations, the Living Rivers Trust, the economic development commission, forest landowners, agriculture, and Catalyst Paper, the largest water user in the watershed.

Future Developments and Overcoming Barriers

The CWB sees engagement with health issues as central to its mandate. Barriers include managing workloads and the transaction costs of collaborations. One step to support integration is a proposal to collaborate actively with VIHA to access sociodemographic and public health data on a watershed scale.

Brief Summary of Project/Program Self-Assessments

Because the CWB is a relatively new organization, many of the links with health and well-being have been initiated in the context of establishing the Board and the early work of the TAC, as above. The CWB's self-assessment (Table 3) provides a summary of two specific projects. We found looking at these issues through the perspectives of the Prism quite valuable, in that it lent a freshness to our thinking and reinforced the value of inclusive approaches to planning and problem solving.

Table 3. Summary of Results of Program Self-Assessment, Cowichan Watershed Board.

Program/ Project Name	Brief Description	Prism Analysis Highlights
Water Supply: Rule curve/ rule band studies in relation to weir at Cowichan River and Cowichan Lake	Re-assessment of protocols and guidance for water release to maintain summer flows in the lower watershed. Flow preferences vary for different stakeholders and more flexible tools are being proposed.	The project focuses on baseline water flows, land-water impacts on ecological services, and water supply, with explicit consideration of the drought and flood extremes. Beyond the biophysical features, this initiative links directly to socioeconomic and community development issues, and the social and cultural importance of water and ecological services, especially relating to low-flow impacts on salmon. The focus on new protocols for assessment and decision making reflects the broad stakeholder concern. The initiative has now become linked with a potential Ministry of Health Services supported pilot to test LiDAR remote sensing technology, a possible tool for health authorities and others to support decision making regarding siting of development and redevelopments from a public/environmental health perspective. Although the project has been traditionally more oriented to Perspective A (watersheds, ecosystems, social systems) the CWB is actively focused on understanding the relationships in other perspectives—including the health implications of sustainable ecosystems and the wider health and well-being benefits of fostering broad community engagement.
Collaborative Assessment of Hawes Bay Recreational Development: The struggle to manage “outlaw” development in a remote area of the watershed	Forestry-zoned Cowichan lakefront is being turned into recreational property. Large waterfront holdings are being acquired and distributed among “shareholders” to circumvent CVRD zoning bylaws that prevent sections smaller than 80 hectares. Collaborative CWB-led assessment (site visits) involved VIHA and environmental health officer, CVRD bylaws officer, provincial staff, First Nation representatives, and DFO officers and stream keepers.	This example focuses on a collaborative assessment initiative in a remote part of the watershed. The CWB coordinated a collaborative interagency site visit in response to complexity and resourcing issues surrounding non-compliance with bylaws/regulations that lie within the mandates of several public bodies. Each member of the collaborative site-visit team recognized concerns (CVRD regarding non-compliance with zoning bylaws; DFO and stream-keeper concerns regarding riparian management; environmental health officer and VIHA regarding sewerage disposal and water system violations; MOE regarding riparian legislation). The issue was how best to pursue compliance. The cumulative impacts of non-compliance are most material. The self-assessment process highlighted the importance of the social systems as the key factor in determining whether existing best practices, legislation and bylaws are being adhered to. The social dynamics had implications for both health and well-being (through unsafe drinking water and sewerage disposal) and ecosystem damage, especially relating to sensitive riparian areas. The project highlighted the potentially negative relationships that can play out in Perspective D (social systems-health-ecosystems), especially when different authorities and jurisdictions create challenges for integrated effort. The CWB intends to continue intersectoral/interagency dialogue on this issue, with the intention of identifying optimal approaches to compliance and enforcement.

General Reflections

The CWB is a relatively new watershed organization. Although the Cowichan Basin Water Management Plan, which led to the CWB's formation, barely mentioned public health, the partners involved committed to specifically including public health through Board member appointment and TAC membership.

This commitment to integrating health and well-being has and will continue to result in a range of activities that address these concerns as part of watershed management. Notable examples include proposals to develop targets to address issues of broad public health concern such as:

- reversing trends that resulted in banning of shellfish consumption
- engaging with health and safety concerns related to flood risks
- supporting attempts to address broad cultural and health implications of the Chinook salmon declines
- working to support more integrated sources of information regarding sociodemographic, population health and environmental data for the watershed

As an integrator, the CWB engages with issues that require broad interagency consideration, especially in relation to development, land use and zoning. Such issues highlight the limitations of current venues to address complex health, ecosystem and social dimensions of watershed issues. We anticipate that the broad "clearing house" role of the CWB and its TAC can prove to be extremely valuable.

For CWB members, the self-assessment process helped to confirm the broad relevance and benefits of including public health within the Board's mandate. The assessments and discussions affirmed the belief that they are on the right track in supporting broadly based collaboration and taking integrated approaches to gathering, archiving and sharing information that embraces watershed thinking, including public health dimensions.

Specific characteristics of the CWB that seem to complement strength-based public health approaches include building on:

- the breadth and diversity of the people involved with the watershed
- committed leadership at the grassroots and political levels
- the incredibly high diversity and value of the resources that are at stake
- the strong connection and relationships among the people associated with these resources
- the diversity and high importance of the issues affecting the watershed and its resources

Explicit recommendations from the CWB that were developed further during the March 8 meeting include:

- the importance of investing in watershed initiatives as pilots regarding converging health, social and ecosystem benefits
- the necessity of garnering adequate operational funding required to fulfill the integrative role of the Board
- the critical important of obtaining foundational information to better understand the relationships between ecological processes, socioeconomic, public health and other whole-of-watershed issues

D. Fraser Basin Council (FBC)

Mission

The primary mandate of the Fraser Basin Council is “to advance sustainability in British Columbia with a core focus on the Fraser River Basin.” The FBC vision is “social well-being supported by a vibrant economy and sustained by a healthy environment.”

General Information

- Number of employees: 32
- Number of volunteers: 37 Board members (Note: Numerous voluntary participants serve on committees of the Board and external project advisory committees. Some volunteers are paid by their employers.)
- Population of area served (estimated): 2.7 million
- Budget for the year 2010: \$5.6 million
- Budget for the year 2009: \$6.6 million
- Scale of the organization: Fraser River Basin (approximately 244,000 km²); see Figure 5
- Website: <http://www.fraserbasin.bc.ca>

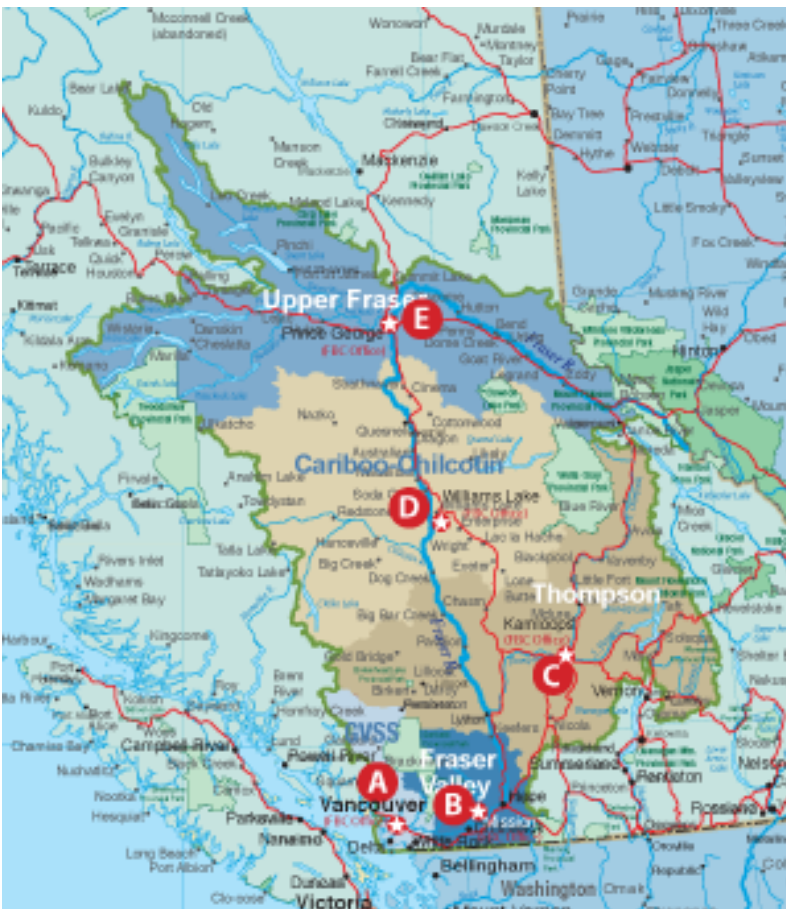


Figure 5: Map of the Fraser River Watershed.

ECOHEALTH AND WATERSHEDS

Watersheds as Settings for Health and Well-Being in Canada

Background

Formed in 1997, the FBC is a charitable, not-for-profit organization committed to advancing sustainability. Well into its second decade of service, FBC works to bring people together to find practical, common sense solutions to sustainability issues. FBC has a collaborative governance structure, led by 37 directors drawn from the four orders of government—federal, provincial, local and First Nations—and from the private sector and civil society. To achieve its organizational goals, FBC acts as an impartial, trusted facilitator operating under a unique model of collaborative leadership.

FBC was founded on the belief that major sustainability priorities, including management of the Fraser Basin, cannot be effectively addressed by any one jurisdiction. The reason so many contentious issues remain unresolved is often because leaders in different sectors are working in isolation from each other.

The FBC is the successor to a prior initiative called the Fraser Basin Management Board (FBMB), which was established in 1992 when the Fraser River was identified as a focus for activity under Canada's federal Green Plan. The primary reasons cited for establishing the FBMB were declining fish stocks, water quality problems, limited sewage treatment, and lack of coordination and planning, particularly at the watershed/river basin scale. The FBMB ran from 2002–2007, and its final task was the development and publication of the Charter for Sustainability, signed in 1997. The Charter is a “high-level” strategic vision and plan for the Fraser River Basin. The FBC was established as a successor organization with a role to oversee implementation of the Charter.

Relationship to Public Health

Although environmental and sustainability issues have been the focus of FBC, the links with health and well-being, including the social determinants of health, have increased in profile, prominence and attention in more recent years.

Board and Committees Membership and Support

A range of health and public health interests have been represented on the Fraser Basin Council Board and committees over time. These include: Dr. Bob Smilie (retired physician) is a Board member and regional representative in the Thompson region of the Fraser Basin; Dr. Charles Jago is the Chair of FBC's Board of Directors and also Chair of the Northern Health Authority; and previously, representatives from Health Canada have served on the FBC Board of Directors. The FBC staff has watershed and environmental expertise, as well as a diversity of skills, knowledge and expertise related to sustainability and community health and well-being.

Public Health Dimensions of FBC Activities

An indication of the perceived relevance of FBC to health and well-being includes invitation for FBC staff members to make presentations to health authorities and agencies (e.g., Northern Health Authority) and to present at the Public Health Association of BC Conference in 2006. The FBC has collaborated with the University of British Columbia School of Population and Public Health on links between sustainability and health (environmental health and linkages with community well-being/health).

Since 2008, FBC team members in different offices have worked with Dr. Margot Parkes on several Ecohealth and Watersheds related projects. Until the current project, these have not been specific program areas for FBC, but instead have consisted of in-kind contributions by FBC, collaboration in planning and design of research focused on the health and well-being benefits of environmental restoration (e.g., Murray Creek, Northern BC), participation in research planning meetings with other university and watershed partners, and co-presentation with Northern Health and University of Northern British Columbia on health and well-being aspects of watershed management at a rural sustainability conference in October 2010.

ECOHEALTH AND WATERSHEDS

Watersheds as Settings for Health and Well-Being in Canada

To maintain the financial viability of the organization, the design and delivery of FBC programs is somewhat influenced by specific funding opportunities and associated funding criteria. This may have limited the degree to which health considerations have been integrated within FBC programs.

Brief Summary of Project/Program Self-Assessments

The FBC has gained experience in considering health and well-being themes through projects such as the Britannia Mine Waste Water Remediation project (FBC helped to negotiate the remediation agreement behind the Britannia Waste Water Treatment facility, which opened in 2006), Nutrient Management in the Fraser Valley (including on-farm environmental plans to reduce nitrogen loadings that threatened groundwater quality), the BC Drinking Water Review Panel (tasked with developing key recommendations related to the protection of drinking water quality in BC), and State of the Fraser Basin Reports, which include Health, Agriculture & Food, Air Quality, and Water Quantity & Quality considerations (see Table 4).

Table 4. Summary of Results of Program Self-Assessment, Fraser Basin Council.

Program/ Project Name	Brief Description	Prism Analysis Highlights
Williams Lake and Area Interface Fire Plan	Project objectives are to coordinate and reduce risk of wildlands-urban interface fires; raise awareness of hazards; undertake treatments in high risk areas around Williams Lake; and provide employment for underemployed forest workers.	This project was not conducted at a watershed scale but highlighted numerous relationships among health, ecosystems and social systems. As such, it provided an informative example of Perspective D, with a project that was designed to reflect a strong connection between environment and society and to facilitate multiple benefits, including health and well-being. Of note, FBC was actively engaged in priority considerations relating to social systems, particularly facilitating decision making and collaboration among multiple stakeholders to develop the Williams Lake and Area Interface Fire Plan. The health relationships and issues included acute risk to personal properties and physical well-being, as well as longer-term psychosocial and socioeconomic implications of interface fires. The project aimed to enhance community and individual well-being through knowledge that the hazard has been reduced due to removal of fuel load. Of note, the project did not address health hazards from forest fire smoke.
Youth Watershed Mentoring and Leadership Initiative	A collaborative project to build the capacity of youth aged 16-24 to be “watershed champions” and create opportunities for mentorship and engagement within existing watershed stewardship groups in the Fraser Valley region.	This project was closely linked with watersheds at the high level, but operationally was more closely linked with ecosystem, social systems and health/well-being concerns. Of particular note was the focus on positive ecosystems-health and social systems-health relationships identified in the analysis. As well as mechanisms to address human impacts on the environment with a particular focus on ecosystem components (e.g., water, salmon, riparian habitat), positive health impacts were identified in terms of enhanced sense of well-being from connecting with/exposure to ecosystems and nature. The mentorship focus of the project involved participants in governance and decision making with direct outcomes for youth in terms of self-worth, ownership and empowerment associated with social determinants of health. The project highlighted health “spin-offs” of projects that would otherwise be considered “environmental.” This is captured in Metro Parks Newsletter, December 2010: “The mentoring relationships in Metro Vancouver Regional Parks...have demonstrated to staff that youth mentoring has valuable immediate and long term outcomes for parks and for young people.”

<p>Water and Watershed Planning Guide</p>	<p>A guide to help water and watershed planning in ways that integrate climate change adaptation. The guide is being developed for local governments, First Nations, stewardship organizations and other community stakeholders.</p>	<p>This project provided an example of a watershed-focused initiative that potentially engaged almost all axes of the Prism. The planning guide was seen to highlight the importance of ecosystems and water quality not just to reduce hazards but also to protect cultural, aesthetic, recreational and spiritual values (ecosystems–health); to illustrate the connections between human activities on the land (e.g., agriculture, forestry, urban development) and associated pressures on watershed-based ecosystems and services (watersheds–ecosystems); to pay explicit attention to provision and protection of drinking water supplies, source protection, management of waste discharges, and rainwater/stormwater management (watersheds–health); to focus on best management practices and guidelines for social processes to manage watersheds, including upstream and downstream dynamics between communities (watersheds–social systems); and to highlight the role of planning, management and governance in the protection of water and land-based ecosystems (ecosystems–social systems). This guide is seen to be a tool that could be applied to a range of other projects.</p>
<p>Sustainability Snapshot 4 (2009)</p>	<p>Profiles the social, economic and environmental health of the Fraser Basin, and is the fourth in a series of reports prepared by the FBC since January 2003.</p>	<p>The purpose of Snapshot 4 is to: Increase public awareness and understanding of sustainability issues and trends; identify critical issues and responses to improve progress toward sustainability; and inform and influence decisions and actions to advance sustainability. The report addresses 18 sustainability indicator topics (including the categories of Health, Agriculture & Food, Air Quality, and Water Quantity & Quality). The report also provides sustainability highlights by region, stories of sustainability in action and steps for sustainability that readers can initiate. The explicit engagement with watersheds, social, environment and health issues enabled connections with each of the six Prism relationships. Drawing on the knowledge of the project as a whole, the Sustainability Snapshot was seen to link most closely with Perspective A (watersheds–ecosystems–social systems) and Perspective D (ecosystems–social systems–health/well-being). Examples of Perspective A included the Farmland Riparian Interface Stewardship Program (FRISP) and a Waterwise program in Williams Lake initiated by the City and the Cariboo Chilcotin Conservation Society as part of a water conservation plan. Examples of Perspective D were the traditional food project of the Canim Lake Band, and Habitat for Humanity programming.</p>
<p>Shuswap Lake Integrated Planning Process</p>	<p>A collaborative, multi-agency planning process for the Shuswap Watershed, later named the Shuswap Lake Integrated Planning Process (SLIPP).</p>	<p>In 2008 a strategic plan was approved for SLIPP and it seeks to make decisions that support three goals: (i) development that respects environmental, economic and social interests; (ii) water quality that supports public and environmental health; and (iii) desirable recreational experiences that are safe and sustainable. The project seeks to minimize the impact of human activity on ecosystems and protect water quality for recreational and drinking purposes but also highlights the links between healthy ecosystems and recreational experiences that are safe and sustainable. The focus on social processes involved with managing these dynamics and the links among nature, society and health, in terms of recreation and lifestyles, highlighted the importance of Perspective C (watersheds–social systems–health/well-being) and Perspective D (ecosystems–social systems–health/well-being).</p>

General Reflections

The scale of the Fraser Basin Council's initiatives and the number of projects makes a full analysis of FBC projects very challenging, but the projects highlight a spectrum of ways in which health and well-being issues and activities are embedded within existing FBC regional and basin-wide programs and projects, as well as the incremental growth in the degree to which health and well-being considerations are being given explicit attention.

Incorporation of human health/well-being aspects was found to be implicit and indirect in many existing projects, not least since many of the projects are, by definition, defined by how they fit within the overall FBC mandate of "social wellbeing supported by a vibrant economy and sustained by a healthy environment." One area where this may be developed more fully is in bringing out the health considerations as an integral consideration within a "social" dimension of sustainability, i.e., not just focusing on environmental hazards but also recognizing social dynamics and their links with health.

E. Save Our Seine River Environment Inc. (SOS)

Mission

Save Our Seine River Environment Incorporated's (SOS) mission is to preserve, protect and enhance the natural environment and heritage resource of the Seine River in Winnipeg, Manitoba, Canada. SOS seeks to restore and repair features of the environment that have been degraded and to improve water level, flow and quality in the river. SOS seeks to raise public awareness of all aspects of the Seine River and improve the environmental behaviour of private industry, governments and the general public. SOS also seeks to improve public access along the Seine River via low impact nature trail and canoe.

General Information

- Number of employees: 0-1 paid employees, 4-5 Green Team summer students
- Number of volunteers: 20-25 active
- Population of area served (estimated): unknown
- 2010 Annual Budget: \$40,000-60,000
- Watershed Jurisdiction: N/A

Socioeconomic data: None provided

Background

SOS was established in 1990 as the Save Our Seine River Residents committee by a concerned group of citizens living around Egerton Road in the Old St. Vital neighbourhood of Winnipeg, Manitoba. The group formed to address the serious environmental degradation of the Seine River as it flowed through their neighbourhood. On October 13, 1990, the group staged their first Seine River community cleanup. Over the next four years, the group worked informally to clean up the river each spring. In 1994, the group became officially known as Save Our Seine River Environment Inc. and, in the same year, received funding to hire ten youths for the summer months, as part of the inaugural Green Team. From a committee of neighbours engaged in river cleanup, SOS has evolved over its 20-year existence into a steward of and an advocate for the Seine River and its riparian zone through St. Boniface and St. Vital. The group's most significant accomplishments have been the successful lobbying of the provincial and municipal governments to clean up the site of a former shingle manufacturer adjacent to the river in St. Boniface; the repair and overhaul of the Seine River Floodway siphon (a channel that diverts the Seine River under the Winnipeg Floodway); and the preservation of the 120-acre Bois-des-Esprits urban riparian forest.

Relationship to Public Health

Save Our Seine has no formal linkages or relationship with public health. The group does not work with health authorities or public health officials and has not engaged with public health actors in their past. Nonetheless, many of their activities have direct health linkages, i.e., river cleanup to improve water quality, floodway siphon repair to improve water quantity and flow, IKO shingle manufacturer site remediation to improve water quality, and Bois-des-Esprits walking trails system for physical, mental and spiritual health. However, because the group does not have formal grounding in the field of public health nor do the principle volunteers hold a public health orientation to their work, the group does not see themselves as engaged in public health activities. As a result of this self-assessment, the group realizes the need for education and awareness raising, in terms of what constitutes public health, and they might in the future contribute to enhancing public health.

Brief Summary of Project/Program Self-Assessments

The self-assessment results (Table 5) highlight the focused nature of SOS's work. The group operates on a very small scale and its work is focused on social-ecological health promotion. Their narrow focus on only the upper reach of the Seine River is commensurate with Perspective D's potential to neglect upstream driving forces. Indeed, the group has not looked at the connections with the upper Seine River watershed. The group's work is very much focused on ecosystems and improving ecosystem services and social-ecological interactions. Although there are very strong connections to health in all of the projects profiled, the group does not perceive itself as addressing health concerns. This case thus highlights a significant gap in public health outreach and the need for education and awareness-raising vis-a-vis the interconnections between environment and health.

Table 5. Summary of Results of Program Self-Assessment, Save Our Seine River Environment Inc.

Program/ Project Name	Brief Description	Prism Analysis Highlights
Seine River Cleanup	Annual spring/summer/fall cleanup of the Seine River.	Project is very small-scale in focus—not a watershed but a reach of a river—but does strongly focus on ecosystems, social systems and health. The project enhances ecological services of river, significantly improving the aquatic environment, also significant social capital benefits—this was how SOS was created and, year-over-year, is a community-building activity. The project has made the Seine River canoeable in summer and available for walking/skiing/snowshoeing/cycling in the winter. It focuses on Perspective D—water governance for social-ecological health promotion.
IKO Site Remediation	SOS lobbied the provincial and municipal governments for nearly 20 years to study and address environmental pollution along the river at the site of a former shingle manufacturer.	Very much site-focused (versus watershed-focused); capacity-building for the group in terms of their role as watchdog and advocate for the river; leveraged up to \$40 million for site remediation; contributed to capacity-building in the province on how to deal with contaminated sites when the current owner was not responsible for contamination (Manitoba developed a new rubric for measuring soil quality based on this work); very clear linkages among ecosystems, social systems and health. Again, Perspective D.

Floodway Siphon	Repairing the Seine River Floodway siphon to enhance water flow (quantity) in the river.	Also very much site-focused, though nested into the river system. Does not represent a perspective—rather, an ecosystem-health relationship, but contributes to their broader work, which is very much Perspective D-focused. Example of how specific projects can contribute to building a perspective.
Bois Des Esprits/Trails System	Fought to preserve a 120-acre urban riparian forest from development. Developing an urban trail system along the Seine River greenway.	Marks the expansion of the group's efforts from narrowly focusing on the river itself to the riparian zone and watershed. Operating at the sub-watershed scale but starting to consider watershed processes of land management and how that affects ecosystem services. Very strong linkages between social system and health. Very strong health impacts: both community health (creating trails for exercise, mental and spiritual health) and individual health benefits to the SOS members working on developing the trail system, though not understood or conceptualized to be a public health benefit.

General Reflections

SOS is a classic example of Margaret Mead's famous quote to never doubt the power of a small group of people to change the world. SOS's work demonstrates that significant health benefits can accrue via the work of environmental restoration. The very small-scale nature of their work means that results are much more immediate and locally tangible and have the potential to create a significant local impact. However, the narrow focus also means that upscale drivers are often ignored and the group does not have a clear understanding as to how their work fits into the larger social-ecological context. SOS feels that they would benefit greatly if a cohesive watershed management plan were developed for the whole Seine River watershed, one that would guide their activities and give them a context into which to integrate their research and ecological remediation efforts. A small, volunteer-driven watershed organization like SOS would benefit from education and awareness-raising as to the role of public health, linkages with environment, and collaborative opportunities. The self-assessment process was illuminating in terms of helping SOS identify the many health linkages and impacts of their work. Limited funding means that the group often works on whatever issue they can access funding for, which might not actually be the most pressing issue. A watershed management plan, in conjunction with increased funding, would facilitate a broadening of focus by the group to the watershed scale and development of a more rigorous action plan.

Section 3: Discussion

The self-assessment framework provided a basis for the watershed organizations to (a) identify and prioritize different types of relationships among watersheds, ecosystems, social systems and health, and (b) to make a systematic analysis of how their watershed organization programs interact with determinants of health and well-being. Individual project findings reported in the Appendices provide specific insights on relationships among (i) ecosystems–health/well-being, (ii) watersheds–ecosystems, (iii) watersheds–health/well-being, (iv) watersheds–social systems, (v) social systems–health/well-being, and (vi) ecosystems–social systems. Here, our discussion focuses on the synthesized information gained by comparison of the four different Prism Perspectives (Figure 1).

The importance of the four perspectives (faces) represented by watershed partner programs and projects varied with respect to the scale of the watershed partner organization (see Table 6). The smallest organization focused only on one perspective, while the larger organizations were able to address several of the perspectives. All of the four perspectives were deemed to be at least somewhat important in at least one of the watersheds, highlighting the diversity of interests and engagement. Nonetheless, three perspectives were reported to be dominant: Perspective A—water governance for sustainable development (very important by three groups), Perspective B—water governance for ecosystems and well-being (very important by two groups), and Perspective D—water governance for social-ecological health promotion (very important by two groups). Perspective C—water governance for social determinants of health, was found to be the least important perspective, with only one group noting it fairly important, and two groups finding this perspective somewhat important and not very important, respectively.

Table 6: Summary of Watershed Group Prism Analysis Findings from Self-Assessment Process.

Please indicate the importance of each of the Prism perspectives/faces in the Watershed Governance Prism to your organization's overall goals:	Not at all important	Not very important	Somewhat important	Fairly important	Very important
Perspective A: watersheds-ecosystems-social systems (Water Governance for Sustainable Development)		SOS		Fraser	Simcoe ORCA Cowichan
Perspective B: watersheds-ecosystems-health/well-being (Water Governance for Ecosystems and Well-being)		SOS		Simcoe Fraser	ORCA Cowichan
Perspective C: watersheds-social systems-health/well-being (Water Governance for Social Determinants of Health)		ORCA SOS	Simcoe Cowichan	Fraser	
Perspective D: ecosystems-social systems-health/well-being (Water Governance for Social-Ecological Health Promotion)			Simcoe ORCA Cowichan		SOS Fraser

In addition to summarizing the organizations' goals and activities in relation to the Prism framework, watershed partners were asked to: reflect on lessons and insights gained from the self-assessment process; their implications in terms of programming gaps; opportunities; changes in incorporation of health and coherence with organization's mandate; and policy recommendations and implications of funding.

Reflections and Insights

Watershed partners reported that the self-assessment provided a welcome and much needed opportunity for critical reflection and learning. The partners enjoyed the process; it was something they do not have the opportunity to do very often. The self-assessment provided an opportunity to take an objective look at programs and projects. Notable themes from the watershed groups' descriptions on lessons and insights include the opportunity to reflect on:

- connections between different points on the Prism (e.g., watersheds/ecosystem/social systems)
- ways to look holistically at the different dimensions within and between projects, which are often considered in isolation
- where the majority of project focus rests (e.g., for several groups, Perspective A) and the need to identify health impacts or include health, especially given fact that “health” is often cited as an overarching organizational goal
- opportunities for future linkages between environment and public health
- the links between watershed/ecosystem/social systems (Perspective A) and the traditional “sustainability” mandate of watershed organizations—highlighting coherence with their organizational mandates
- the dynamics of project funding, design, scope and delivery as a determinant of watershed partners' abilities to include a greater number of axes and perspectives
- the importance of geographic scale in defining appropriate axes and relationships
- the fact that the watershed is not always the “best” scale—sometimes larger or smaller—but need to relate back to this scale
- the ways in which the self-assessment highlighted data gaps to be filled to develop a holistic watershed management plan
- the benefits of critical reflection on watershed activities, which can be very illuminating
- new insights into health connections otherwise overlooked, e.g., prior to the self-assessment, SOS did not realize how much of their work actually had a health connection, not seeing it as such; the self-assessment provided a critical learning opportunity to understand how health is connected to what the group does
- the opportunities for taking a watershed perspective, which may not always be present, e.g., SOS learned how limited their perspective has been to date with respect to the watershed (since they are just starting to look at watershed issues)

Gaps in Programming

Watershed partners pointed to a range of gaps in programming identified through the self-assessment process. Two groups identified a lack of an overall vision for where their management activities are heading. Often, the focus is on “fixing” parts of the watershed, without a clear vision for the future or a plan on how to measure whether and how a partner has been successful in moving toward realizing that vision. These findings highlighted a clear need for visioning to guide future work so that groups are not just being reactive. Three groups specifically highlighted gaps in their programming where linkages could be made between environment and health and gaps where their programming could be strengthened to enhance linkages to health.

Future Opportunities

While the self-assessment process helped to identify a range of “future opportunities” for their respective organizations, three common themes were highlighted from across the watershed self-assessments:

1. A need to develop stronger relationships with local health and social service sectors.
2. A common need for more detailed and integrated watershed data and information to manage watersheds, guide projects and facilitate the assessment of benchmarking and monitoring progress in moving toward their goals.
3. A need for greater capacity and training to focus on health implications of their watershed organizations. This includes both a better understanding of the linkages with health sector, and the need for training and capacity-building to understand how social and environmental determinants of health relate to their programming.

In addition, the self-assessment process and ecohealth-oriented training and workshops were also identified as first steps in a longer process of reflection on these themes.

Trends in Incorporation of Health over Time and Coherence with Mandate

All five watershed partners reported that health has not traditionally been well-incorporated into their programs and projects, but several watersheds reported on a growing awareness of health and well-being concerns that were beginning to be implicitly or explicitly addressed in watershed group activities. This is summed up by a comment from the Fraser Basin Council:

Overall, there has been incremental growth in the degree to which health issues and activities have been included within Fraser Basin Council regional and basin-wide programs and projects. The environmental dimension was a more dominant focus of FBC activities in the earlier stages of its development. Health/well-being and issues related to the social determinants of health have increased in profile and attention in more recent years.

Many of the watershed groups reported that the lack of explicit focus on health interrelationships in the past was a reflection that health had not been an explicit part of the mandate of their watershed boards and/or was not central to funders. In more established watershed groups (e.g., Otonabee), new funding scenarios were beginning to highlight innovative opportunities for synergies with public health. In newer groups (e.g., Cowichan) there was an early commitment to ensure that health and well-being were seen as integral to the watershed group through board and committee membership, and explicit programming designed in collaboration with health organizations. At the smaller scale, Save Our Seine reported recognition that they have been increasingly incorporating health into their work without realizing it. Five years ago they had to rationalize the health benefits of their trail system, but now it is widely accepted and/or understood as part of the public consciousness.

All watershed groups reported that the self-assessment process helped to identify that they were doing a good job in meeting their mandates in terms of their overall mission or vision. Partners also found that the projects and programming reflected their mission and goals and that they were, in general, oriented around the “perspectives” consistent with their mandates—which they took as an encouraging sign!

Policy and Funding

Policy recommendations focused primarily on areas of need that policies could help address. These included the need for policies to:

- promote an adaptive management perspective
- provide a framework to learn what is working, what is not, and provide guidance with moving forward
- encourage a view of watershed organizations as an integrated learning forum to address complex health, ecosystem and social issues (investment in key watersheds as learning laboratories)
- specifically support integration of health and environment perspectives
- create opportunities for education and awareness-raising to integrate health and well-being into watershed mandates

Funding was identified as a common challenge for all watershed partners. Lack of funding was considered a challenge by some, but others noted the challenges of funding that restricts the focus and does not encourage big-pictures thinking. Funding is often at too short a time-scale to enable integration among fragmented projects. A narrow funding orientation translates into a narrow, instead of holistic, focus on projects. The lack of funding for integrated work limits the capacity to reflect and build on what is already known or to learn how best to create synergies.

Lessons Learned from Ecohealth and Watersheds Project

This section builds on the reflections and lessons from the self-assessment process, in order to share key findings and lessons from participation in the Ecohealth and Watersheds project as a whole, synthesizing feedback and observations during and after the March 8 meeting.

Lessons Learned from Self-Assessment, for Individuals within Their Watershed Organizations

The Prism framework provides a very useful lens through which to examine the scoping, design and delivery of projects and programs—to imagine how to do things differently. It provokes imaginative thinking when examining watershed issues, integrates different perspectives that may not normally be considered, and challenges partners to consider multi-disciplinary and intersectoral thinking. Watershed partners especially found the Prism useful for integrating biophysical and social perspectives and for thinking about health and social dynamics. It motivated thinking about the ideal—the overall, integrated picture (all axes and perspectives)—even though such integration may not be appropriate or possible in all cases. Overall, to be a useful heuristic, the Prism framework needs to be very clearly described, using plain language and with clear definitions of typology. Users need to be guided to use the Prism as a typology, as opposed to a strict definitional terminology, and as a conversational guide, as opposed to a rigid or prescribed model.

Lessons for Individual Watershed Groups Regarding Watershed Health Synergies

Watershed organizations recognize the need to look for synergies with public health and believe they can benefit from understanding how their programming links with broader health and well-being goals—e.g., looking for synergies with healthy/active lifestyle projects and/or programming on public access, or understanding how public health could become a part of watershed report cards. Watershed organizations benefit from examining and understanding the different social-ecological-health dynamics occurring at different geographic scales. The participating partners learned that the watershed orientation is not as strong as previously thought for some projects. At the same time, the process was instructive to highlight how non-watershed focused projects engage with health aspects of the Prism, e.g., the FBC youth engagement project had few links with the watershed per se, but had broader linkages with social determinants of health.

The assessment process highlighted the biophysical, socioeconomic and health data available at the watershed scale, leading to three important lessons. First, there are watershed-level data gaps that need to be filled, e.g., socioeconomic data on income disparity, First Nations data and, especially, off-reserve data. Second, there is a need to consider a historical perspective on watershed and health relationships, in terms of trends in both socioeconomic data and historical land-use patterns, along with how these might inform current land-use decisions. Third, the watershed scale provides a unique perspective for managing eco-social-health relationships, and watershed organizations hold an untapped potential to act as clearinghouses to bring this information together and to share it with others. However, leadership is needed to ensure that jurisdictional boundaries align with watershed territories.

Valuable lessons can be learned from processes—such as the self-assessment and using a heuristic like the Prism—that encourage organizations to “unpack” projects and programs and look at them in different ways. For example, what was previously seen as a “source protection program” focused on infrastructure can now be seen to have an explicitly social aspect with far-reaching implications in terms of social structure (i.e., cost, equity components and compensation for loss of land use).

Lessons on Integration and Exchange among Watershed, Health and Research Partners

This assessment found that different language, terminology, concepts, and interpretations and variability of definitions potentially pose a barrier to collaboration within and between organizations, despite common goals. System thinking

such as that promoted by application of the Watershed Governance Prism, however, can provide a basis for collaborative communication among colleagues and help remove barriers to collaboration both within and between organizations working in the watershed. The partners felt the Prism framework provided a good basis for conversation, via a common typology, and that working through these issues together (Prism apexes, axes, perspectives) helped to break down barriers.

The opportunity for collaboration with new partners was found to be invigorating—an excellent way to think outside the box, look at different points of view and broader perspectives, and push into new ways of thinking. Watershed partners felt that finding a new way to look at their activities can help them identify new partnerships and expand their collaborative potentials. It can allow them to rethink their programs, find new allies and potentially access new funding for integrative work.

Importantly, the exercise helped the partners to see a new perspective on the ways in which watershed organizations are investing in health and well-being and the significant potential to expand these activities. There are many potential synergies, and the Prism framework helps to highlight the multiple perspectives on watershed management and the need to balance relationships among community, education and public health.

Finally, the self-assessment process helped partners to re-evaluate the purpose of their organizations' mandates and rethink core questions such as, What is the purpose behind our activities?

Selected Feedback, Post-Meeting

The following comments from the watershed representatives give a feeling for participants' reflections and comments on the self-assessment and meeting process:

... I particularly enjoyed the interaction between academics, IISD and watershed organizations—great discussion from a variety of perspectives...

... I appreciated the chance to hear about other people's watersheds and for such open and frank discussion.

... I really appreciated the opportunity to discuss the watershed self-assessment, and learn more about NESH, and after the meeting I feel that I have a much better understanding of the entire process and your desired outcomes. It was wonderful to hear about the activities and perspectives of different watershed groups, and to then discuss these activities from an academic/theoretical perspective. I left Winnipeg with lots of food for thought, and some wonderful new connections.

...The conversation was stimulating and the notes would be a great resource to refresh my memory and put thought into any future collaborations.

...It might even be fun to repeat this winter's meeting with a visit to the Cowichan in March 2012. We could organize a great winter field trip that would provide some real as opposed to virtual food for discussion in Winnipeg. Or if you just happen to be in the neighbourhood on your own. Let us know that you are coming. We love our watershed and we love to show it off.

... Thanks again for the opportunity to attend a truly inspiring meeting. I left feeling recharged...

... if we had the chance it would be good to have more provincial and federal health representatives at future meetings...

... I appreciated the chance to learn with others (watershed groups and academics).

... I especially liked the chance to learn about what other people and organizations are doing.

... I would have appreciated some more training about ecohealth prior to the workshop.

... It would be good to see new watershed groups and health agencies being added to these discussions where possible.

... I especially liked the chance to meet other people who are grappling with these health issues and the chance for an informative and free-wheeling discussion about policy.

...I will continue information sharing and developing frameworks for thinking about public health and watersheds (evaluation).

...I will look to public health for new programming opportunities and initiate discussions to connect watersheds and public health

Section 4: Key Findings, Recommendations and Conclusions

Multiple recommendations emerged from both the self-assessment process and the collaborative workshop conducted as part of this project. These recommendations can be organized across multiple policy domains or themes (see Appendix II) and also categorized in terms of the target of the recommendation (from specific organizations through provincial and federal levels of government). In addition to the themes and specific recommendations listed below, it is possible to distil both broad messages from this project and specific “take away” lessons, namely:

- Watersheds and health are intimately linked, and public policy across multiple domains needs to acknowledge this beyond the conventional contaminant/pollution perspective.
- Watersheds can serve as a linking or integrative mechanism to foster intersectoral action across many domains.
- Jurisdictional and intersectoral gaps can pose critical obstacles to synergies.
- Collaboration, interaction and integration through watersheds are necessary steps toward improving both watershed management and public health.

In order to address these key messages, it will be necessary to improve core competencies and capacity in both public health and watershed management. In addition, public policy and programming must be place-appropriate and reflect the variability presented by watersheds.

Concepts such as subsidiarity and the precautionary principle have utility for both public health and watershed management, but need to be defined, operationalized and applied.

The assessment found that the absence of a clear strategy and action plan for linking water, watersheds and watershed management to public health is a significant gap and that there are stakeholders present in many domains that intersect with watersheds and public health (e.g., food security, education, infrastructure, planning, agriculture, forestry, tourism) who can make significant contributions to public health. In addition, a strategic but incremental process of piloting, evaluating and comparing watershed-based public health interventions and initiatives is a viable way forward for both public health and watershed management.

Recommendations for Public Health Policy

The following recommendations are organized according to the following categories: strategic directions; federal, provincial and local; and organizational.

Strategic Directions

- *Develop* best practice guidelines for integrating public health, social and environment considerations into land-use planning and collaborative assessment.
- *Support* and assess different approaches to community–university partnerships as mechanisms to bridge research, practice and knowledge translation in the context and watershed governance.
- *Invest* in the health of next generations through design and use of multi-functional and multi-purpose infrastructure, emphasizing that food security policy must be seen within the social and ecological landscape (i.e., emphasize the food/watershed/health nexus, connecting foodscapes and waterways).
- *Identify* strategies to link public health with land-use planning. For example, what are emerging/best practices and guidelines including public health, environmental and social policy?
- *Consolidate* learning and develop integrated best practices guidelines for relevant/applicable policy areas.
- *Support* and test collaborative approaches to land-use development/planning assessment.
- *Develop* and promote both Canadian and provincial integrated water and health strategies and action plans.
- *Identify/pursue* strategies to make/use public health as the catalyst to promote intersectoral collaborations in and for environment, health and watersheds.

Federal-Level Recommendations

- Develop and promote Canadian and provincial integrated water and health strategies and action plans.
- Increase mental health awareness and health promotion strategies targeted at youth and seniors through environmental stewardship.
- Support and assess different approaches to community-university partnerships.
- Encourage federal health funding transfer to provinces to articulate broader health sector options, including intersectoral collaboration.
- Support/develop public education/public health competencies in this area.
- Target explicitly intersectoral projects for public health training (support and assess).
- Foster community-university-health authority partnerships as one method of doing so.
- Increase budget to foster the intersectoral collaboration and integration required to ensure that integrated water and health strategies and action plans are possible.
- Tie federal health spending to the development/provision/assessment/sharing of integrated programs and services (intersectoral action).

Provincial-Level Recommendations

- Assess the degree to which efficiencies and economies of scale can be achieved by shifting resources to watershed management to provide a holistic, place-based approach to planning.
- Identify strategies and legislative mechanisms to facilitate public health engagement in water resources management (e.g., BC Drinking Water Act and Regional Drinking Water Teams).

Local Recommendations

- Increase mental health awareness and health promotion strategies targeted at youth and seniors through environmental stewardship, i.e., land, water and habitat stewardship.
- Identify and implement an education and training module for public health staff and practitioners.
- Support and assess different approaches to community-university partnerships.

Organizational (General) Recommendations

- Facilitate mechanisms (funding, reward structures) for public health practitioners and sectoral leaders to have funding to engage in sectoral collaboration (organizations would like to be able to do so, but rarely can).
- Develop and pilot career development training.
- Explore avenues and strategies to provide education on public health for watershed groups.
- Watershed management does not consider proximal and distal causes—are there models that the Public Health Agency of Canada can promote within watershed organizations?
- Enhance and increase mental health and well-being awareness and prevention through environmental stewardship to youth and seniors.
- Test and assess environmental stewardship as a mental health intervention in youth and seniors.
- Make and use public health as the catalyst to promote intersectoral collaborations in and for environment, health, watershed and social policy.

Organizational (Specific) Recommendations

[Lake Simcoe Region Conservation Authority](#)

The Lake Simcoe Protection Plan must continue to be followed in light of the Lake Simcoe Protection Act (2008), as important policies (including continued monitoring and efforts to improve water quality) are covered here. An adaptive management approach is underway at LSRCA, where we have a cycle of identifying watershed conditions and stressors, a review of current management and management needs, and recommendations. Each cycle ends with the development of implementation and monitoring plans, and then the cycle begins again. Increased knowledge of the linkages between public and environmental health would complement efforts to manage the watershed condition.

[Otonabee Region Conservation Authority](#)

Conservation Authorities and their programs support the watershed approach/Integrated Water Research Management, and the adoption of this approach in other sectors could be very beneficial, particularly in the context of strengthening linkages between public and environmental health. The development and updating of policies that recognize the ecological goods and services would also be very beneficial and would support the concepts of sustainable development (balance among social/economic/environmental).

[Fraser Basin Council](#)

If a goal of the FBC was to maximize delivery in relation to the ecohealth Prism, there may be benefits associated with strengthening health and economic perspectives on the FBC Board, Board committees and/or external project advisory committees. In addition, it would be helpful to consider ecohealth as a relevant lens in the selection, design, planning and/or delivery of projects.

[Cowichan Watershed Board](#)

Senior governments should invest in the Cowichan and several other watershed initiatives as pilots from which to learn. There must be a number of other such policy incubators around to provide a range of practical examples. The cultural dimensions of the Cowichan are significant and require additional attention.

[Save Our Seine River Environment Inc.](#)

SOS would significantly benefit from education and awareness-raising training that would explain the relationship of public health to watershed management and build capacity to explore and include these synergies in their activities.

Conclusions

This study provided a valuable opportunity for watershed managers and academics from across Canada to reflect on the theme of watersheds as settings for health and well-being and to assess how this concept is currently being operationalized by watershed organizations across the country at a variety of scales. The six key lessons generated from the exercise are:

1. Improving core competencies and capacity in both public health and watershed management is necessary.
2. Public policy and programming must be place-appropriate, and reflect the variability presented by watersheds.
3. The absence of a clear strategy and action plan for linking water, watersheds and watershed management to public health is a missed opportunity to improve the determinants of health.
4. Concepts such as subsidiarity and the precautionary principle have utility for both public health and watershed management, but need to be defined, operationalized and applied.
5. There are stakeholders present in many domains intersecting with watersheds and public health (e.g., food security, education, infrastructure, planning, agriculture, forestry, tourism) who can make significant contributions to public health.
6. A strategic but incremental process of piloting, evaluating and comparing watershed-based public health interventions and initiatives is a viable way forward for both public health and watershed management.

There was a clear consensus that additional research is required on this theme to better articulate and operationalize the potential win-win opportunities that come from a more focused engagement with the environment and social determinants of health as these play out on a watershed basis. A key finding is the important leadership role for public health to act as a catalyst in promoting intersectoral collaboration for watershed governance and management that simultaneously addresses human health and environment.

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Appendix I: Ecohealth and Watersheds Meeting Agenda



Date: March 8, 2011
 Location: IISD Office, 6th floor, 161 Portage Ave. E., Winnipeg
 Time: 8:30 am – 5:30 pm

Meeting Objectives

- a) To discuss the findings of the watershed and ecohealth self-assessment process.
- b) To identify key policy messages related to watershed governance, public health and well-being.
- c) To reflect on the Prism framework and the learning process.
- d) To identify next steps for the watersheds and ecohealth project.

Agenda

Time	Topic	Presenters/Facilitators
8:30 - 9:30	Introductions and Review of Project and Agenda • Common Themes, Policy Implications	Cynthia, Hank, Karen
9:30 - 10:30	Watershed Self-Assessment Results, Part 1* 5 x 30 minutes (15 min contribution + 15 min discussion)	Watershed Representatives
10:30 - 11:00	Coffee	
11:00 - 12:30	Watershed Self-Assessment Results, Part 2*	Watershed Representatives
12:30 - 1:30	Lunch at IISD	
1:30 - 3:00	Discussion of common themes, policy implications	Lars
3:00 - 3:20	Coffee	
3:20 - 4:30	Discussion of prism framework	Margot
4:30 - 5:00	Reflection on self-assessment and group learning process	Margot
5:00 - 5:30	Final Thoughts and Next Steps	
6:30 ...	Group Dinner	

Participants

Watershed and Public Health colleagues

- Meredith Carter, Otonabee River Conservation Authority
- Steve Litke, Fraser Basin Council
- Rodger Hunter, Cowichan Watershed Board
- Eavan O'Connor, Lake Simcoe Region Conservation Authority
- Lorna Medd, Cowichan Watershed Board (ex Vancouver Island Health Authority)

NESH and IISD colleagues

- Lars Hallstrom, NESH, University of Alberta
- Karen Elizabeth Morrison, NESH, Univ. of Guelph
- Cynthia Neudoerffer, NESH, Univ. of Manitoba
- Margot Parkes, NESH, Univ. of Northern BC
- Henry David (Hank) Venema, NESH, IISD
- Karla Zubrycki, IISD

(Apologies: Martin Bunch, NESH, York University)

Meeting Outputs

- Input into report to the Public Health Agency of Canada
- Meeting summary for participants (includes summary of next steps)

Appendix II: Summary of Watershed and Health Workshop Themes

Table A1. Summary of Watershed and Health Workshop Themes.

Domain	Themes
Social	<p>Place-based and engagement processes</p> <ul style="list-style-type: none"> Place and experience matters and have the potential to engage issues beyond the social domain <p>Watershed governance and engagement fills and bridges gaps</p> <ul style="list-style-type: none"> Links to “building community” as a policy goal There is no clear vision of the role of public health in watershed management any integrated water and health strategy needs to be watershed based Climate change may be an imperative to guide and justify action Can be arenas for conversations that need to happen about complex social-ecological issues (e.g., across scales from Fraser to SOS) <p>Watershed groups have under-utilized potential to build community (especially in terms of intergenerational effects)</p> <ul style="list-style-type: none"> Builds social capital and wellness Ripple and spill-over effects (both intersectoral and intergenerational effects)
Economics	<p>Precautionary approaches may be mechanisms toward cost-saving</p> <p>Efficiencies and economies of scale can be achieved</p> <ul style="list-style-type: none"> Shift resources to watershed management with and within provinces Avoid cost, protect/increase revenues, cost saving, presence assets, other policy issues – human, health and safety, First Nations <p>Increase budget to foster/grow:</p> <ul style="list-style-type: none"> intersectoral collaboration and integration <p>Invest in health of next generations by:</p> <ul style="list-style-type: none"> multi-functional/purpose, design and use of infrastructure food security policy in the landscape (food/watershed) <p>Tie federal health budgets to the provision and performance of integrated programs/services</p> <ul style="list-style-type: none"> (intersectoral actions are critical)
Governance	<p>Intersectoral integration and collaboration</p> <ul style="list-style-type: none"> These are things that are not going away Public health needs to be part of adaptive management cycle Shift from problem solving to problem management/minimization Provinces are struggling with the provision of non-health services through health funding, and health services through non-health funding Is it possible to talk about achieving integration/intersectorality without restructuring? Using telehealth facilities for watershed management may be an easy success and incremental step toward improved collaboration and integration <p>Enforcement/communication/information flow among health and watershed and other sectors:</p> <ul style="list-style-type: none"> Vertical integration is necessary/appropriate Horizontal integration is necessary/appropriate There is a concern from watershed partners that despite the efforts, the true state of ecosystem degradation is not well reflected or well known from current information The reality of watersheds is often not reflected by data (thus providing an often false sense of security); current data may not suit emerging problems Undertaking co-design and reflecting on new/different questions can lead to new approaches There are fundamental challenges created by the absence or form of baseline data <p>Need for reflection and integrated self-assessment tools (new problems need new tools)</p> <ul style="list-style-type: none"> Application of the Prism drives new conversations – presents both holistic thinking and refreshment refreshing perspective. This is innovative thinking (but shouldn't be)! <p>There is a need to engage a “pilot/test/assess” process for collaboration, integration and intersectoral initiatives that can originate in public health</p> <p>There is a need to identify and assess strategies to value/acknowledge/develop spin-off benefits and costs:</p> <ul style="list-style-type: none"> Need to realize/design and assess for the reality of both positive and negative effects, both intentional and unintentional (law of unintended consequences) Human and animal health (One Health) may have real benefits

Ecohealth and Watersheds:

Watersheds as Settings for Health and Well-Being in Canada

Human health and well-being are largely determined by “upstream” environmental and social factors. The “upstream” metaphor manifests directly with respect to watersheds, understood as critical socioecological systems subject to human intervention. This report demonstrates how human health is influenced by governance and management of watersheds. In fact, good watershed governance can lead to a double dividend, where both social and environmental improvements have positive influences on human health.

Watershed organizations are part of this governance process and, within Canada, must grapple with complex division of powers and scarce resources when conceiving of relationships among watersheds, ecosystems, social systems and health. This paper explores connections between watershed governance and human health in five watershed organizations across Canada. The application of a systemic framework known as the Watershed Governance Prism, developed in the previous paper in this series, informs self-assessments by each of the groups. These assessments, as well as a collaborative workshop, have identified how the organizations interact with determinants of health and well-being. Results indicate that synergies with potential partners in the health sector are not being optimized and, where health and well-being are under consideration by watershed organizations, it is usually implicit rather than explicit. Key lessons and policy recommendations outline how watershed governance, programming and public policy can address jurisdictional and intersectoral gaps.