

# **Water Security in Canada: Responsibilities of the federal government**

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April 2011

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## Executive Summary

In taking on the responsibility of governing Canada, the federal government agrees to a social contract—that it will protect Canadian citizens from harm and that they, in exchange, will give up some degree of freedom for this security. In the Canadian Constitution, this social contract takes the form of the “peace, order and good governance” (POGG) power bestowed upon the federal government. Canadians who elect a government to power have the right to expect the government to pursue actions that will maintain peace and stability in both the short and long-term.

Water security is part of the social contract; the maintenance of social order and the well-being of citizens are tied to the adequate quantity and quality of water. Canada’s water is not as secure as its citizens and governments believe. Canadian apathy to water security concerns has led to mounting risks that periodically come to the fore and threaten the health and well-being of Canadians, their economies and the environment—witness Walkerton, the 2001–2002 drought or the state of Lake Winnipeg, respectively. The appropriate policies are not entirely in place to safeguard citizens from these health, economic and environmental threats.

Many of the current policies are also insufficient on a practical level. Federal government action does not meet the expectations of its own 1987 Federal Water Policy, which recognized that the federal government must provide leadership in water management. In the absence of national-level leadership, many provincial governments have independently created their own water management policies. While provincial and territorial governments certainly have a major role in water management, not all water management should be subsidiary. It is increasingly recognized that water is best managed on a watershed basis. However, watersheds do not follow political boundaries. It is commonplace in Canada for one watershed to be managed by two or more provincial frameworks, as well as by American states. This cross-jurisdictional situation strongly invites an over-arching federal role, for instance as allowed under the Canada Water Act in the pursuit of POGG and the national interest. Federal leadership is necessary to create consistency across all provinces and territories, build cross-boundary collaboration and help save money by providing strong guidance that could reduce duplication of efforts and point to best management practices for Canadian water resources.

The Constitution offers the federal government several domains of fairly clear jurisdiction, particularly for fisheries and fish habitat, navigation and bulk water exports—though conflicts with the provinces can and do arise over these topics. Causing further jurisdictional ambiguity, there are overlapping federal-provincial responsibilities for many subjects, such as monitoring, pollution control and interprovincial water issues. Uncertainty around water responsibilities in Canada has led

to irregular attention to water issues and leaves some concerns insufficiently addressed by either level of government. Where action is lacking in Canada (and this inertia threatens public interest) POGG allows the federal government to be decisive.

This report takes into consideration the responsibilities provided to the levels of government by the Constitution, discusses the confusion that has arisen in key water security areas and suggests potential federal roles for each area. We assert that, in all areas, there are key roles the federal government must fill in order to guarantee a high level of water security to Canadians. Tensions with provinces and territories cannot be an excuse for inaction. Paths forward, cooperatively or constitutionally, must be actively sought.

Specifically, this report discusses the following water security themes:

- **Fisheries and fish habitat** is a federal responsibility according to the Constitution Act, and, although some fisheries management has been delegated to the provinces, the federal government remains responsible for protecting fish habitat. Through the powerful Fisheries Act, the federal government can achieve significant water security improvements, particularly by pursuing appropriate water quality and quantity (instream flows) for fish.
- **Monitoring of water quality and quantity** by the federal government is required by the Canada Water Act and CEPA 1999 and is essential to provide information for policy development at all governmental levels. While monitoring is a shared responsibility, Canada's commissioner of the environment and sustainable development released a report in 2010 that urged increased federal action in surface water monitoring. In particular, an increased focus on risk-based monitoring is suggested.
- **Pollution control** is a provincial responsibility, but federal involvement is not uncommon nor is it necessarily unwelcome. Co-funding of wastewater upgrades, federal initiatives to clean up major waterways and the drafting of wastewater effluent regulations have all been well-received by the provinces.
- **Hydroelectric development** is a provincial authority, but where it affects **instream flows** and fish habitat, the federal government may become involved. Both judicial and consultative approaches to protecting fisheries are discussed.
- **Boundary and transboundary waters** require significant federal involvement to help manage the more than 300 lakes and rivers that Canada shares with the U.S. While numerous entities, treaties and agreements exist to help the two countries jointly manage these waters, improvements could include the strengthening of the International Joint Commission's abilities and further pursuit of watershed-level management.
- **Interprovincial waters** necessitate a federal role, particularly where dispute resolution is needed or where instream flows could be compromised. Different frameworks of

cooperation exist across Canada, and a federal role in all is beneficial to maximise ecological, economic and social benefits of all stakeholders.

- **Bulk water exports** are primarily a federal responsibility from a legal perspective, due to this level of government's responsibility for international trade and foreign policy. However, disagreement over responsibility exists. The uncertainty has contributed to the vulnerability to challenge of existing federal and provincial legislation on bulk exports. Key concerns are ecological threats from inter-basin transfers, as well as persistent citizen disapproval of bulk exports. Under NAFTA, the federal government is able to ban bulk exports on ecosystem protection grounds.
- **Navigation** must be maintained and protected by the federal government according to the Constitution Act. From an environmental perspective, the Navigable Waters Protection Act can trigger an environmental assessment when projects are carried out along navigable waterways. Navigable waters are also important to the economy due to shipping, fishing and recreation.
- **Water demand management**, if improved, could change Canada's current standing as the second-highest per capita water user in the world and could also save Canadians money. Federal involvement in this area of provincial control could include co-funding for water efficiency improvements, better labelling of water-using appliances (a federal responsibility), communications, public outreach and the encouragement of conservation-oriented pricing.
- **Water on federal lands** presents an opportunity for the federal government to lead by example, providing a model of water management to provinces. Water security can be strengthened on federal lands by increased water monitoring, the construction of advanced water and wastewater treatment, source water protection and water-efficient infrastructure. The improvement of drinking water on First Nation reserves should be a priority.
- **Drinking water** is a shared responsibility on non-federal lands, with the legislative responsibilities generally resting with the provinces and territories, but with federal involvement through the provision of voluntary drinking water guidelines and guidance. Calls have been made for the federal government to develop mandatory drinking water regulations, and, in light of the federal government's development of draft wastewater effluent regulations, we suggest similar federal involvement should be pursued in order to ensure consistently high drinking water quality for all Canadians. The federal government could take on a leadership role in areas of federal jurisdiction, such as crown lands and First Nations reserves.
- **Peace, order and good government (POGG)** offers a constitutional case for increased federal involvement in all aspects of water security. When a matter is of national concern, such as in the case of water security in Canada, POGG can bestow powers on the federal government even in areas normally of provincial authority.

For the federal government to meet its constitutional obligations for peace, order and good government, it must confront its obligation to improve water security for all Canadians. We therefore make these high priority recommendations:

- 1) That an inter-departmental panel be established to review the 1987 Federal Water Policy and determine the status of each specific action and define where policies need to be adjusted, amended, or augmented, and also where new policies should be established.
- 2) That the federal government take the lead on water quality and quantity monitoring for surface and ground waters to ensure that adequate information is available on water resources to all decision-makers. Specifically, a well-funded federal panel should be convened to study water monitoring in Canada and to provide detailed recommendations that build on the Commissioner's report.
- 3) That the federal government lead by example on federal lands by implementing high-level wastewater treatment, drinking water treatment, water efficiency, monitoring and overall water management. First Nation communities on federal lands should be prioritized.
- 4) That adaptive management be built into federal water planning initiatives, and that the federal government encourage provinces, territories and municipalities to do likewise by providing resources for the integration of adaptive management. This integration will build resilience into water management and significantly strengthen water security.
- 5) That the federal government encourage municipalities to pursue water and wastewater pricing that realistically reflects the cost of the services and helps pay for upgrades. It should also consider tying federal infrastructure funding to more progressive pricing structures, such as increasing block rates. Finally, it should encourage municipalities to consider the value of ecological infrastructure<sup>1</sup> to provide such services at low-cost or no-cost.
- 6) That drinking water standards be upgraded and mandated through a consultative approach similar to how draft wastewater effluent standards were developed.
- 7) That the federal government facilitate ecosystem-based management across jurisdictions and sectors towards a systems approach that increases the realization of multiple benefits. We recommend an integrated water resources management<sup>2</sup> (IWRM) approach.
- 8) That major Canadian groundwater aquifers should be completely mapped by 2015 in order to ensure that decision-making (e.g. regarding water withdrawal licensing) can be based on an understanding of available resources. Leadership and coordination to create a national inventory should be federal, though provincial collaboration is strongly encouraged.
- 9) That the federal government consider developing a framework analogous to Europe's Water Framework Directive (WFD) which provides an overarching entity for water management in European Union countries; in Canada's case, the federal government (equivalent to the EU)

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<sup>1</sup> For instance, see Voora et al., 2010.

<sup>2</sup> For instance, see Roy, Osborne & Venema, 2009.



would provide a framework for Canadian provinces and territories (equivalent to the EU member countries).

## 1.0 Introduction

The Canadian Constitution is the premise for the division of responsibilities for water between the federal and provincial governments. While some areas are identified as clearly federal—for instance, the management of water on federal lands—the majority of responsibilities overlap in some way between the two jurisdictions. Even some areas that appear to be indisputably provincial in the Constitution—for instance, the management of hydroelectricity—have shades of grey (see section 3.4). As such, the management of Canadian waters all too often results in confusion and varying degrees of disagreement.

Federal government involvement in water regulation spans roughly 20 federal agencies and includes a wide range of Acts, Regulations and Agreements (see Table 1.1 for key documents: see Appendix A for complete list). Environment Canada is the main department responsible for water security, but Natural Resources Canada, Fisheries and Oceans Canada, and Indian and Northern Affairs Canada also have significant responsibilities (National Round Table on the Environment and the Economy 2010; Saunders and Wong 2007).

The National Round Table on the Environment and the Economy (2010) explains that the Canadian situation is one that “has necessarily led to a very complex legislative and policy water management framework across Canada, with shared and sometimes duplicated responsibilities.” The federal government developed the Federal Water Policy in 1987, and it has been praised by numerous water experts as a strong document, but few of its actions have been implemented in the 24 years since its creation (Brooks, 2008; Brooks, 2010; Boyd, 2003; Morris *et al.*, 2007).

Brooks (2008) comments that Canada has fallen behind the United States and many OECD countries in its water regulation, writing “the Canadian government has been more reluctant to intervene than have central governments in most other federal states around the world.”

Within Canada, there are many water-related topics of interest. These include fisheries and fish habitats, water monitoring, pollution control, instream flows, transboundary water issues, navigation, water conservation and drinking water—topics that are the focus of this report. Together, these

**Table 1.1: Key Federal Acts and Guidelines**

- Fisheries Act
- CEPA, 1999
- Constitution Act 1867
- Navigable Waters Act
- Canadian Environmental Protection Act
- Canadian Environmental Assessment Act (1992)
- International Boundary Waters Treaty Act
- International River Improvements Act
- Guidelines for Canadian Drinking Water Quality
- Federal Water Policy (1987)
- Canada Water Act (1970)
- Canada National Parks Act

topics and how Canadian governments approach them contribute to the understanding of “water security” in Canada.

The term “water security” has been in use for at least 20 years, and has increasingly entered political parlance (Norman *et al.*, 2010B). Its usage increased in the late 2000s, but “little agreement exists over the definition.” Given that the term is becoming a cornerstone of decision-making discourse, a common understanding of the phrase is necessary; section 2 of this report makes an attempt to reconcile different views of “water security.”

Canadians tend to view themselves as being in a situation of boundless water security; an oft-repeated myth is that Canada has 20 per cent of the world’s fresh water. In reality, Canada has only 6.5 per cent, and much of this is rather inaccessible, as it flows to the Arctic Ocean or Hudson Bay. Moreover, much of it is non-renewable. For instance, in the Great Lakes, only about one per cent of the water is renewed every year (Larson and Schaetzl, 2001). Canada’s Dr. David Schindler explains the situation as follows: “While Canada has a large freshwater ‘bank account,’ the interest rate is very low” (Schindler, 2007).

Even so, Canada’s water abundance relative to many countries is enviable. However, this situation has led to apathy about water security concerns and is resulting in mounting vulnerabilities. Periodic events such as Walkerton, the economically devastating 2001-2002 drought and the state of Lake Winnipeg are indicators that adequate water quality protection and resilience are not built into Canadian society. The frequency and severity of problems are likely to get worse in the future without action to improve water security. Climate change is one driver of the obligation on Canada’s government to act. Aquatic ecosystems will undoubtedly be affected due to decreased flows as precipitation patterns change and glacial runoff decreases. In order to protect fish habitat, changes in human water use may be required—for instance, changes in hydro dam operation to protect instream flows. Human health will also be put at increased risk as extreme rainfall events contribute to toxic algal blooms, increase contamination of drinking water and produce floods. More extreme droughts, floods and temperatures will also jeopardize Canadian agriculture; linking water security to agricultural production and taking anticipatory action is thus essential for the Canadian economy. Other socio-economic and environmental uncertainties provide added incentive to address water security in a timely manner.

The shared water governance situation combined with the uncertain understanding of the term “water security” is problematic to the achievement of good water management, with the federal government at times being hesitant to infringe upon provincial jurisdiction and vice versa; as a result, it can be difficult at times to pursue action (Bailey, 2008; Boyd, 2003; Morris *et al.*, 2007). This report aims to provide an overview and guidance on federal responsibilities regarding water security in the following manner:

1. Reviewing the two main views of water security and placing them within a contemporary Canadian context;
2. Explaining in what ways and to what extent the federal government has responsibility in the different areas of water security; and
3. Suggesting actions the federal government could undertake to improve water security

Not all water responsibilities will be addressed in this report. Themes were selected from sections 91 and 92 of the Canadian Constitution, which delineate federal and provincial legislative powers (further discussed in section 3). The topics of health and agriculture were deemed too broad to be considered explicitly in the present paper, though their relationships to water security are considerable. In addition, the topic of water extremes (floods and drought), is also not emphasized, but this report would be remiss not to at least acknowledge their relationship to water security. Other topics have had their scope deliberately limited to meet space and time requirements; for instance, the discussion of pollution control focuses primarily on wastewater management.

## 2.0 Introduction to water security

The term “water security” is used in many disciplines, particularly the political, physical and social sciences, and in contexts from the local to the global. Despite its frequent use, definitions of the term are still fragmented, with different disciplines claiming markedly different meanings. Concepts within the realm of political science and international relations often focus on elements such as threats to water from terrorism, legal protection of water resources, water sovereignty and transboundary issues. Physical science literature often relates water security to the natural legacy of a country—floods and droughts, and resultant impacts on economies. Within the social science disciplines, common emphases include the sustainable use of water resources (balancing environmental, social/health and economic needs), watershed-focused management and equitable access. While there is often overlap between the perspectives—for instance, all address the availability and quality of drinking water—the apparent divergence in views warrants reflection.

In particular, it is worthwhile to consider what these disparate views might mean for decision-making. Policy-makers come from varied backgrounds, including the political, physical and social sciences. The term “water security” is being used increasingly, and a shared understanding is necessary to facilitate discussions.

The following outlines three main views of water security—1) the political science/international relations perspective; 2) the physical sciences perspective and 3) the social science perspective—and then identifies areas of convergence in these views, resolves tensions between the definitions and places the concept of “water security” in a contemporary Canadian context.

### 2.1 Political science/international relations definitions of water security

Perspectives of water security in the field of political science tend to emphasize the security aspect of the term. For example, in their discussion of the term, Norman *et al.* (2010a) note that the meaning of water security in the United States is often focused on threats from terrorism to water and related infrastructure, particularly when the term is used within the political sphere. For instance, an Arkansas State Health Department article emphasizes this concern: “A water system is an attractive target to a terrorist ... The potential for causing panic among the public is great due to the essential nature of safe drinking water and the public’s trust in their drinking water system” (Stone, 2004). This focus on terrorism is also reflected in academic articles (e.g. Clark & Deininger, 2000; Matalas *et al.*, 1998; Meinhardt, 2005). Norman *et al.* (2010b) note that the counter-terrorism perception is also present in Canadian political discourse. In their survey of Canadian water managers and policy-makers’ perceptions of water security, they found that 14 per cent of respondents considered “counter-terrorism” as part of the definition.

In some instances, the role of the military is also linked to water security; in their article on the future of water, Glenn & Gordon (2002) muse over “potential military requirements” for water security both within the U.S. and globally.

Legal protection of water is another emphasis of the political science perspective of water security. Within Canada, one fairly recent example of a water security concern that was met with legal intervention was the possibility of bulk water exports under the North American Free Trade Agreement (NAFTA). Concerns over Canadian water sovereignty arose out of NAFTA, which did not clearly exclude bulk water exports from the agreement (Boyd, 2003; Clarke, 2008; Quinn, 2007). The Canadian response to this perceived threat to water sovereignty included amendments to existing federal legislation and the creation of new provincial legislation, as described in section 3.7. Concerns over water sovereignty are not exclusive to Canada; Pachova *et al.* (2008) discuss it in many international contexts.

Linked to sovereignty and legal concerns are many transboundary issues. In the Canada-U.S. context, more than 300 rivers and lakes lie along, or flow across, the national border (Foreign Affairs and International Trade Canada, 2008), and there is an undetermined number of aquifers that underlie the border. There are many transboundary issues that can arise, for instance decreased water quality (e.g. from wastewater, industry, agriculture, land management practices), decreased water quantity, increased water quantity (e.g. actions upstream that increase flooding downstream) and invasive species. Transboundary waters require cooperation, diplomacy and, at times, dispute resolution between the two countries. In some instances, arrangements work well and are hailed as successes, as with the Yukon River Panel. At other times, international relations are fractious and resolution difficult to reach, as in the Devil’s Lake/Garrison Diversion dispute.

**Political Science/International Relations Perspectives:**

- “...comprehensive security has two intertwined components: political security, with its military, economic and humanitarian subcomponents, and environmental security, including the protection and use of resources and the environment...” (Trondalen 2009, 20-21).
- “The gossamer that links together the web of food, energy, climate, economic growth and human security challenges that the world economy faces over the next two decades” (World Economic Forum, 2009).
- “Water and Security: water disputes revolve around one or more of three issues: quantity, quality and timing. The dynamics of these three issues play out very differently within various scales related to water and security, whether internationally, intranationally, or regionally and indirectly.” (UNEP, 2009, 5).
- “[W]ater security in U.S. policy usually refers to prevention of terrorist threats to water and water infrastructure.” (Norman et al. 2010a, 12).

## 2.2 Physical science definitions of water security

A second perspective relates to whether there is too much or too little water; throughout the world, water availability is rarely “just right.” Floods and droughts often rise to the forefront of water policy. This can be called the physical science view of water security, and it has economic implications.

Floods and droughts are a concern to water security first due to their immediate threats. Floods threaten infrastructure, lives and livelihoods. For instance, the regular flooding of the Red River Valley in Manitoba led to the decision to build a C\$63 million (1968 dollars) floodway around the city of Winnipeg to protect it after a 1950 flood inundated roughly one-eighth of the city, killing one person and forcing 100,000 people from their homes (Manitoba Floodway Authority, n.d.; City of Winnipeg, n.d.). In fact, chronic flooding has been a major part of Manitoban policy since the 1800s in southern Manitoba, and the federal government has often been a contributor to solutions, such as by providing funding (Stunden Bower, 2006). Drought protection is also part of the decision-making in Canada. For instance, the 1930s Dust Bowl led the federal government to enable crop insurance to provide a degree of income security to farmers, first through the formation of the Prairie Farm Assistance Act in 1939 and then through the Crop Insurance Act in 1959 (AAFC, 2009; Galan, 1981; Smithers, 1998). Floods and droughts are also strongly linked to water security in the international context (Global Water Partnership, 2010; Warner, 2011).

### Physical Science Perspectives

- “Ultimately, water security is not so much about precise quantities of water availability, but ensuring that under a range of conditions (droughts, floods and everything in between) the environment and farming systems are resilient to shocks.” (Connell & Grafton, 2007, 5)
- “Flood politics are not like normal politics—they are about survival, they are security issues. Security is being ‘without a care’ (*sine cura*)—in German *Sicherheit* is safety, security and certainty in one. Floods deeply challenge *Sicherheit* in each of its three meanings.” (Warner, 2011, 5)
- “... unlike food or energy, it is not just the absence of water but also its presence that can be a threat. This destructive quality of the resource in its natural, unmanaged state is arguably unique” (Grey & Sadoff, 2007, 547)

On a less immediate scale, the physical science dimension considers the harnessing of water to promote economic growth. Grey and Sadoff (2007) observe that developed countries have fostered large amounts of institutional capacity, infrastructure and human capacity to “reduce the destructive potential” of water while “increasing the productive potential.” Among other things, this development has come in the form of flood control systems, water storage, agricultural water systems, dams (both to store water and produce energy), river management, drinking water treatment and wastewater treatment. The authors write:

Water provides a range of productive opportunities, so investments in water for agriculture, hydropower and industry, for example, can be seen as drivers of growth...effective water management can be seen as a consequence of growth, where broader progress in governance, institutions and capacity have led to superior performance in developing and managing water infrastructure and institutions.

Grey and Sadoff also note that while many 20<sup>th</sup>-century pursuits of water security focused on economic development while paying relatively little consideration to environmental effects of water management, 21<sup>st</sup>-century water security recognizes the need for greater balance between these considerations. Innovations in infrastructural and institutional design for the benefit of social and environmental well-being, even at some cost to economic productivity, are increasingly occurring.

### 2.3 Social science definitions of water security

Social science definitions are arguably more holistic than political and physical science ones, encompassing environmental, social and economic elements—the building blocks of sustainable development. They come from broader perspectives than the flood- and drought-based emphases in the physical sciences. Like political science views, social science perspectives may still include transboundary considerations. However, a key difference is the social science emphasis on watershed approaches to management that work across political boundaries. For example, the preferred definition of “water security” used by those working with the Canadian Water Network-funded Program on Water Governance, is “sustainable access, on a *watershed basis* [emphasis added], to adequate quantities of water, of acceptable quality, to ensure human and ecosystem health” (Norman *et al.*, 2010b). Arguably, this group comes from a predominantly “social science” perspective.

Inherent in the watershed focus is ecosystem health; when reference is made to “watersheds,” it is not only to humans in the watershed but also to other species in the watershed that benefit from adequate water quality and quantity. Therefore, the social science perspective introduces such considerations as minimum flows and appropriate timing of flows required to support fish habitat (see section 3.1) and the effects of pollution on aquatic ecosystems. Though political science/international relations perspectives may include ecosystems, the emphasis is rarely as strong.

On the whole, social science definitions of water security appear to be more holistic and integrative than those in political or physical science discourse. Common themes throughout the various existing social science definitions include:



- Ecosystem health/resilience (e.g. minimum flows)
- Water quality (for both humans and ecosystems)
- Water quantity (for both humans and ecosystems)
- Incorporation of sustainable development ideals (social, environmental, economic)
- Water as a human right
- Equity
- Access

In their article on water security definitions, in which they discuss both “narrow” and “broad” definitions at length, Cook & Bakker (2010) favour the broad ones; they underscore the importance of comprehensive approaches to water security, asserting that they will ultimately better inform decision-making.

#### **Social Science Perspectives**

- “Sustainable access on a watershed basis to adequate quantities of water of acceptable quality, to ensure human and ecosystem health” (Norman et al., 2010).
- “Water security involves the sustainable use and protection of water systems, the protection against water related hazards (floods and droughts), the sustainable development of water resources and the safeguarding of (access to) water functions and services for humans and the environment.” (Schultz & Uhlenbrook, 2007).
- “Because water is a basic need for all life and good health, access to enough safe water, or water security, is defined as a human right by international law.” (Hesperian Foundation, 2005).
- “[Water] security at any level from the household to the global means that every person has access to enough safe water at affordable cost to lead a clean, healthy and productive life, while ensuring that the natural environment is protected and enhanced” (Global Water Partnership 2000, as cited in Norman et al., 2010).
- “A multi-dimensional concept that recognizes that sufficient good quality water is needed for social, economic and cultural uses while, at the same time, adequate water is required to sustain and enhance importance ecosystem functions” (de Loë et al., 2007).

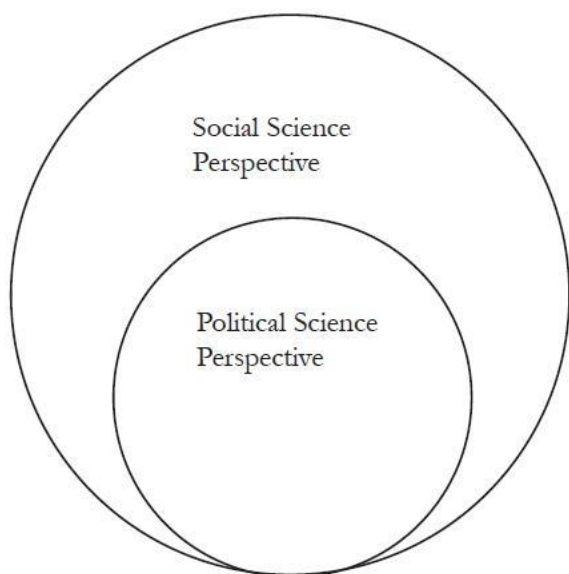
## **2.4 Reconciling the definitions**

It is not uncommon for decision-makers in a given meeting to have differing perspectives of water security. Some might hold a perspective that relates more to political science, others might be primarily concerned about flooding, while still others might see water security more through the social science lens. This discussion will first consider the social and political science views. While there are marked differences between these perspectives, there are also many elements in common, including:

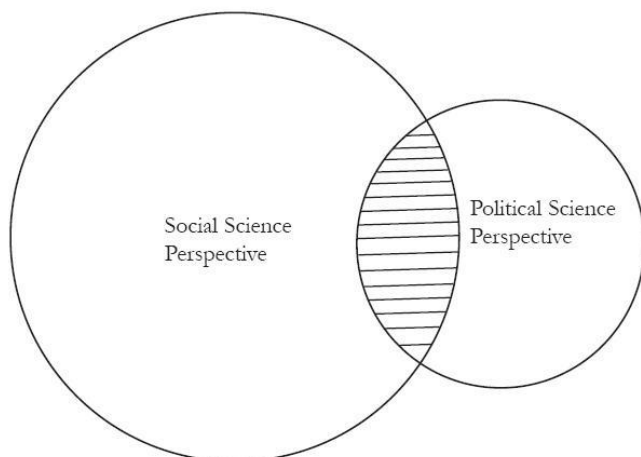
- Adequate quantities for each human (though, in some cases, political science focuses on the citizens of a particular nation)
- Adequate quantities for ecosystems (though this concern may be less dominant in political science)
- Human health/drinking water
- Water quality (though the political science view may focus more on human concerns and less on ecosystems)
- Water quantity (though the political science view may focus more on human concerns and less on ecosystems)
- Temporal dimensions/considerations—e.g. effects of climate change on water security

Therefore, the two definitions are far from being mutually exclusive. There is considerable overlap and agreement between them. As mentioned in section 2.3, social science definitions are generally more comprehensive and integrative, while political science definitions tend to be more narrowly-focused—for instance, on counter-terrorism or water sovereignty. Therefore, the two differing perspectives can be depicted visually as the social science view being larger/broader than the political science one, with a significant area of overlap between the perspectives (see Figure 2.1). In addition, it may be conceivable that the holistic approach of the social science perspective could allow for many elements of the political science perspective to be integrated into it. If this were the case, the political science perspective could become nested within the social science view (see Figure 2.2). Both the political and social science views also recognize the need for protection against the hazards of floods and droughts. As such, the physical science perspective can be integrated readily into these other perspectives.

It can also be observed that the social science perspective may already be the dominant view in Canada, perhaps more so than in the U.S. where counter-terrorism is a stronger concern. In a survey of water managers' perspectives of water security (Cook & Bakker, 2010), the political science elements of the concept appeared to be dwarfed by elements more related to the social science definition. Six key themes were identified as part of water security: sustainability (28 per cent of respondents), access/availability (21 per cent), safety/human health (17 per cent), counter-terrorism (14 per cent), governance and government (13 per cent) and infrastructure (10 per cent). The inclusion of sustainability as the topmost element of a “Canadian” perspective of water security suggests that the social science perspective, which clearly encompasses sustainable development, is the best fit.



**Figure 2.1: Indicative visual of the social science and political science perspectives**



**Figure 2.2: Political science perspective nested within the social science perspective**

The increase in watershed-level management in Canada is also an indication that the social science perspective is dominant. Conservation authorities in Ontario, which are essentially formed along watershed boundaries, are examples of watershed-based water governance structures. As noted in section 2.2, watershed focus is a unique aspect of the social science perspective. In the Ontario case, the boundaries for decision-making have become less politically-based and more environmentally-based. Notably, Cook and Bakker (2010) also observe the complementary nature of water security and integrated water resources management, a practice often carried out at the watershed level.

Decision-making in Canada reflects the social science perspective in recent legislation. Cook and Bakker (2010) note examples in Ontario such as “sustainable” accounting and pricing of water (i.e. full cost recovery for water and sewer services) in the Sustainable Water and Sewage Systems Act of 2002, and the “integration of ecosystem and human health concerns,” such as through the Clean Water Act of 2006. This paper will highlight opportunities where the federal government can further enhance through its actions this perspective of water security that embraces ecosystem, health and economic concerns.

### 3.0 Introduction to water responsibilities

Legislative responsibilities for water in Canada are determined by the Canadian Constitution of 1867. Unlike for resources such as timber and fisheries, responsibility for water resources is not specifically delineated. Therefore, power over water is divided between the two levels of government in sections 91 and 92 of the Act. Provincial responsibilities stem from their Constitutional jurisdiction over public lands and generally include water supply, pollution control, thermal and hydroelectric development, authorization of water use and flow development. The roles for the federal government most clearly implied in the Constitution are in fisheries, navigation, water on federal lands and transboundary waters. In addition, there is recognized shared jurisdiction over agriculture, health, interprovincial water issues and significant national water issues (Côté, 2004).

However, these jurisdictions are not absolute. Considerable overlap exists, which has led to confusion and sometimes conflict, as detailed throughout section 3. At times, the federal government has been hesitant to involve itself in areas where jurisdiction overlaps because any foray into “grey” territory can lead to challenges from the provinces; such has often been the case in the past, as detailed in section 3.4 in a discussion of water flows and hydro development. There is significant literature discussing these intersecting responsibilities, and many authors reach the conclusion that the state of affairs has resulted in undesirable fragmentation, gaps and uncertainty (Bailey, 2008; Boyd, 2003; Morris *et al.*, 2007; Muldoon and McClenaghan, 2007; Owen and Saunders, 2007). As Bailey observes (2008):

A brief examination of water policy, and the status of Canadian water legislation, has revealed a deeply troubling situation. Interprovincial agreements have led to very limited coherence in the relevant legislation nation-wide. Even where the federal government appears to have constitutional authority, federal leadership has not emerged. In addition, legislation has proven to be relatively impotent. The Canada Water Act allows the federal government to take unilateral action in instances where water quality has become a matter of “national concern.” However, this section has never been implemented, largely due to provincial pressure. While the public has demonstrated an urgent concern over matters such as international water exports, this concern appears to have led only to a more complicated patchwork of laws and loopholes. It appears that, until the desire for provincial autonomy over resources is remedied, Canadian water quality and quantity will remain at risk.

No policy researcher who has analyzed jurisdiction over water in Canada has succeeded in placing all responsibilities in clear categories that eliminate the existing uncertainties. This report will also not

be able to do so. However, it will discuss areas in which the federal government could potentially act, highlighting both areas where the federal government is currently exerting its influence and where the federal government could venture if it endeavours to contribute to improved water security in Canada. Finally, each section will interpret the relationship of the topic to Canadian water security.

### 3.1 Fisheries and fish habitat

The Constitution Act gives the federal government jurisdiction over ocean and inland fisheries. However, over time, responsibility for a considerable amount of freshwater fisheries management has been delegated to the provinces and territories. That said, “the federal government maintains exclusive legislative authority under the Constitution Act to regulate, protect and conserve all of Canada's fisheries, sea-coast and inland” (Department of Fisheries and Oceans, 2010). Therefore, the federal government still has the responsibility to be involved in the protection of fisheries habitat.

#### Water Security, Fisheries and the Federal Government

Federal role stems from:

- The Constitution Act
- The Fisheries Act
- The Species at Risk Act

A key legislation for this purpose is the Fisheries Act (1985), which prohibits the deposition of “deleterious substances” into fish-bearing waters (Government of Canada 1985). This protection of fish habitat from pollution has proven to be powerful, as numerous cases exist where either legislation has been passed under the authority of the Fisheries Act to protect fish, or action has been taken by the Federal government after a pollution event occurred. Boyd (2003) calls the Fisheries Act one of the two most important laws for the environment at the federal level. The other “important law” is CEPA (1999).

For example, Boyd (2003) cites the effectiveness of regulations governing the petroleum industry passed under the Fisheries Act that led to significant reductions in pollutants from petroleum refineries between 1980 and 1994. The regulations resulted in “reduced discharges of phenols by 74 percent, oil and grease by 72 percent, sulphides by 71 percent, ammonia nitrogen by 65 percent, and total suspended matter by 57 percent” (Boyd, 2003). Regulations have also been passed under the Fisheries Act for other sectors, including “chlor-alkali plants, meat and poultry plants, metal mining facilities ... potato processing plants, and pulp and paper mills” (Canadian Environmental Law Association, 2004). Similarly, the Wastewater Systems Effluent Regulations (under consideration by Parliament in 2011) stem from the federal government’s ability to protect fish habitat under the Fisheries Act (Government of Canada, 2010). These regulations are explained further in section 3.3.

### **Synthesis and relevance to water security**

Water security in respect to fisheries relates to whether or not there is sufficient water quantity (i.e. instream flows) to support fish populations, and whether or not this water is of acceptable quality for fish health. Environmental, social and economic (i.e. sustainable development) concerns all relate when one considers the linkages between water security and fisheries: healthy fish populations (supported by water of adequate quantity and quality) are not only integral parts of their ecosystems, but they also support human economic activities and the social well-being of many communities, including that of many First Nations. Political science matters related to fisheries include water quality and quantity issues that could arise at political boundaries, such as the concerns over water pollution from Devil's Lake outflow affecting Lake Winnipeg fisheries.

However, the state of Canada's fisheries has implications that reach even farther. Aquatic organism health is one indicator of how well Canada is managing its water resources. It is important for Canadian economic, social and environmental well-being and resilience that the government ensure this indicator points to Canada taking the right steps to protect its water resources. Canada's natural capital is a key reason why Canada enjoys a strong economy and a generally positive environmental image on the world stage. As will be further developed throughout this report, the federal government has multiple tools, both regulatory and other, that enable it to pursue rigorous aquatic ecosystem protection that would make Canada more robust in the 21<sup>st</sup> century.

### **3.2 Monitoring of surface water quality and quantity**

Responsibility for monitoring surface water and groundwater is shared between the federal and provincial governments. The Canada Water Act requires the federal government to “provide data on the quality of Canadian waters through research and monitoring” and also allows the federal government to enter into shared monitoring with provinces. CEPA “obligates the Government of Canada to establish and maintain environmental monitoring systems, including for water” (Environment Canada 2010).

#### **Water Security, Monitoring and the Federal Government**

Federal role stems from:

- The *Canada Water Act*
- *CEPA, 1999*
- Constitutional responsibility for federal lands
- Constitutional responsibility when issues are deemed a “national concern”

Federal monitoring of water declined markedly in the late 1990s. Comments Brooks (2008): “What used to be a world-class set of institutions in the 1980s is not capable today of tracking water quantity and quality. Canada now lacks the basic data to measure its water resources and to price them on a cost-recovery basis.” The state of federal surface and groundwater monitoring have been assessed and found wanting by various parties, including in a 2010 audit by the Commissioner of



Environment and Sustainable Development (described below) and by Environment Canada's own employees. A 2005 standing senate committee on energy, the environment and natural resources that looked at "water in the west" quotes Dr. John Carey of the department, who said:

We would not manage our bank accounts without monitoring what was in them and trying to do some planning, but we attempt to manage natural resources without a real good understanding of how much we have, how much is renewable and whether we are spending capital or living off the interest. The very first thing I would do is develop better information and trend monitoring of the state and the status.

The provinces appear to be open to help and collaboration on monitoring. In 2005, Alberta Environment's Director of its Environmental Policy Branch spoke to the standing senate committee and suggested the federal government could be of great aid in the monitoring of water:

One way that the federal government can help Alberta and help Albertans with respect to water is by partnering regarding information knowledge, research. That has been a real strength. In many instances, federal government involvement in those activities has helped Alberta and Albertans deal with water issues, and we would like to see that continue. If there are opportunities to increase or expand that role of the federal government related to water, we would encourage that. (Standing Senate Committee on Energy, the Environment and Natural Resources 2005).

Environment Canada is the main federal department responsible for monitoring surface water, which it does mainly through two programs: the Fresh Water Quality Monitoring Program and the National Hydrometric Program.

The Fresh Water Quality Monitoring Program measures water quality on a long-term basis at 456 sites across Canada (Vaughan 2010). According to the program's web pages, the program is meant to help "establish baseline and reference conditions of water quality; determine spatial and temporal trends; determine compliance with established guidelines for water, fish, sediment; detect emerging issues and threats; and measure response to remedial measures and regulatory decisions (i.e. performance measurement)" as well as provide information for "the establishing of water quality guidelines and risk assessment/management" (Environment Canada 2010). The program also provides data for the Canadian Environmental Sustainable Indicators (CESI) initiative, "intended to provide an overall measure of the ability of water bodies to support aquatic life" (Vaughan 2010). The long-term nature of the data is meant to help inform regulatory decisions.



The National Hydrometric Program monitors water quantity at 2,107 sites (Vaughan 2010). Environment Canada provides a list of 23 “principal uses” of hydrometric data on its website. Some of these uses clearly relate to constitutionally mandated federal responsibilities, such as:

- Fisheries management
- International relations
- Transportation/navigation
- Watershed studies (likely to cross boundaries)

Other uses are also key to the sound and secure management of water, including climate change research, environmental impact studies, irrigation and drainage, flood forecasting, forest management, hydro-electric power generation (which may affect fisheries, as discussed in section 3.4), infrastructure planning and design, and aquatic ecosystems research (Environment Canada 2010). Therefore, the hydrometric data has far-reaching implications for the governance of Canada.

For that reason, the findings of a 2010 audit by the Commissioner of the Environment and Sustainable Development, Scott Vaughan, were concerning. Amongst Vaughan’s findings was that the federal government was not monitoring water quality on most federal lands, that monitoring stations were not located with the aim to best detect potential risks, and that each of the program’s “monitoring responsibilities” and “risk-based priorities” was poorly defined.

The non-responsive (i.e. not risk-based) approach to monitoring was indicated by the 2001 identification by Environment Canada of blue-green algal toxins as an inadequately monitored substance that poses a risk to human and fish health, and the subsequent lack of action in this area. There was no long-term monitoring station on Lake Winnipeg, the tenth largest freshwater lake in the world, until 2006, after the Manitoban government sought federal collaboration to address the lake’s water quality (2010). Similarly, inadequate monitoring of pollutants from oil sands was identified in 2001 and no actions were made to address it until 2011; the lack of Fresh Water Quality monitoring stations near the Athabasca tar sands can be seen in Figure 3.1. At the time of Vaughan’s audit, only one monitoring station was located near the tar sands, 150 kilometres downstream (2010). Provincial and private monitoring also occurs, but this data is “not available in the Department’s regional long-term water quality database” (Vaughan 2010). Presumably the data also then has less influence over decision-making.

In essence, this report identified significant flaws in federal water monitoring. While the provinces also conduct varying degrees of surface water monitoring, sometimes in cooperation with the federal government, the Canada Water Act and CEPA clearly place considerable responsibility on the federal government to carry out this task. Given the absence of adequate data from any level of

government to appropriately inform decision-making, responsibility appears to fall to the federal government to lead in reinvigorating Canada's surface water monitoring capabilities.



**Figure 3.1: Water Quality Monitoring Stations**

Source: Environment Canada, Fresh Water Quality Monitoring Program

### **Synthesis and relevance to water security**

According to a 2011 Ipsos Reid poll on Canadian attitudes towards water, 80 per cent of Canadians are concerned about the long-term supply and quality of the country's fresh water. Therefore, it is notable that there is not adequate monitoring capacity at the moment to detect changes in water quality or quantity in many water courses, information that could help governments to protect Canada's water in the long-term. In order to make sound management decisions, long-term data on water resources are necessary. Similarly, in order to detect water quality and quantity problems in a timely manner, water monitoring is needed. Vaughan (2010) points to eight federal Acts alone that rely upon information from long-term monitoring. The data also inform decision-making at provincial and municipal levels. At present, adequate information is not available to properly enact this legislation to its full extent.

Given the link to decision-making, the implications of a weak water monitoring system to Canadian water security are fairly evident. From a U.S.-Canada perspective, monitoring serves to provide information on transboundary waters, for instance by detecting when pollutants flowing from one country into another rise above allowable levels. Monitoring data is also key to transboundary water allocation. Within Canada, monitoring relates to the social and health dimensions by providing information on water for human uses (e.g. drinking) and to the economic dimension by allowing for long-term development planning. Monitoring can help build economic stability by allowing decision-makers to determine if their policies are sustainable in the long term. In short, monitoring allows Canada's three levels of government to make decisions with their eyes fully open, and also provides the Canadian public with the knowledge that this resource—which a majority (55 per cent) view as Canada's most important natural resource—is in good hands.

### 3.3 Assessment and monitoring of groundwater

There is an even greater information gap in understanding Canada's groundwater. Jurisdiction over groundwater on non-federal land is generally provincial or territorial—for instance, the provinces provide withdrawal licenses—but the federal government still has a role in both monitoring and coordination.

Natural Resources Canada (NRCan) runs a Groundwater Geoscience Program, which aims to bring the number of Canadian regional aquifers having undergone assessment up to 19 (out of 30) by the year 2014 (Natural Resources Canada 2011, "Groundwater Geoscience Program overview"). NRCan "is responsible for implementation of the federal government's commitments to understanding the physical components of groundwater systems, namely, groundwater quantity and characterization" (Canadian Council of Ministers of the Environment, 2010), but an assessment by the Canadian Council of Ministers of the Environment (CCME) of groundwater management found that the division of responsibilities between Environment Canada and NRCan are not always clear<sup>3</sup>.

#### **Water Security, Groundwater and the Federal Government**

Federal role stems from:

- The Canada Water Act
- CEPA, 1999
- Constitutional responsibility for federal lands
- Constitutional responsibility when issues are deemed a "national concern"

Various parties have commented on a need for improved understanding of Canada's groundwater supplies (Morris *et al.*, 2007; Nowlan 2005; Rivera, 2005). Morris *et al.* (2007) called for the mapping of all major aquifers by 2010 so that the amount of groundwater available in Canada is known and can inform policy. This 2010 deadline was missed.

<sup>3</sup> No specifics on this confusion were provided.

Not only is aquifer assessment valuable, but so, too, is ongoing monitoring. In total, there are between 1,500 and 2,000 monitoring wells in Canada, compared to 42,000 in the U.S. and 15,000 in Mexico. Some are installed by the federal government, mostly by the Geological Survey of Canada (GSC), while others are provincial. These wells help assess groundwater storage, groundwater flow and direction, aquifer recharge, climate change effects and water quality changes. They provide baseline data, help evaluate effects of groundwater pumping and enable improved forecasting (Rivera, 2003).

The CCME (2010) indicates that data availability is insufficient in many of these areas. Key concerns include lack of groundwater monitoring for nitrates, pathogens and pharmaceutical contamination. In addition, analyses that consider the cumulative impacts of groundwater withdrawals (e.g. by industry, commercial, residential, ecosystems) are “rare,” and consideration of the potential effects of climate change is included in only a “limited” number of groundwater studies.

Finally, groundwater monitoring is highly fragmented (CCME, 2010; Rivera, 2003). There is very little central coordination, despite the fact that many aquifers cross provincial or national boundaries. Reports Rivera (2003) of the findings in a federal-provincial workshop on groundwater:

It was noted that some provinces are already rejuvenating their own networks and that it was up to federal departments to coordinate their efforts to work with the provinces to establish a nation-wide network.

A national groundwater framework would provide improved consistency between the provinces and territories and help coordinate the data. The Government of Canada developed an inter-agency national ad hoc committee on groundwater in 2003 which drafted a framework for groundwater collaboration (Rivera *et al.* 2003), but it appears that not all recommendations were pursued in earnest. Canadian groundwater assessment, monitoring and collaboration continue to be criticized.

### **Synthesis and relevance to water security**

Groundwater is a source of drinking water for approximately 10 million Canadians. It is also a key input to agriculture and industry in many parts of Canada. In addition, it serves an ecological function by helping to sustain wetlands and contributing to surface water flows (Rivera, 2003). Despite its importance, it is not in plain sight and, as such, is often overlooked.

Canadian dependence on groundwater means that steps must be taken to understand this resource. Its quantity and quality must be assessed and monitored on an ongoing basis to allow for early detection of risks. Understanding of groundwater is essential in the proper development of many

policies. For instance, monitoring data could indicate that groundwater supplies are sufficient for a new development.

Although groundwater is primarily a provincial responsibility, the federal government can help address fragmentation and inconsistency by coordinating a national inventory. It also clearly has a role in ensuring that aquifers that cross boundaries are properly assessed and monitored, and could play a role in encouraging cooperation between governments. Its current efforts to map key aquifers should be completed, since understanding of these aquifers should inform decision-making.

### 3.4 Pollution control

The issue of pollution control is an illustrative example of how an area of responsibility often considered as “provincial” (Côté, 2004) has multiple exceptions that make it a shared jurisdiction in many instances. While the provinces are responsible for regulating such pollution sources as wastewater treatment plants, and many industrial effluents, pesticides and fertilizers, federal involvement in water pollution can be triggered under the Fisheries Act and by pollution that can be harmful to fish (see section 3.1 for a discussion of federal jurisdiction over Fisheries). Other federal acts that relate to water pollution include the Oceans Act, the Canadian Environmental Protection Act, CEAA and the Arctic Waters Pollution Prevention Act (Côté, 2004). The ability under the Fisheries Act to legislate has already been exercised by the federal regulation of six sectors through the creation of:

- the Pulp and Paper Effluent Regulations
- the Metal Mining Effluent Regulations
- the Meat and Poultry Plant Liquid Effluent Regulations
- the Potato Processing Plant Liquid Effluent Regulations
- the Chlor-Alkali Mercury Liquid Effluent Regulations
- the Petroleum Refinery Liquid Effluent Regulations (Department of Justice Canada 2011)

These regulations have had considerable benefits. Those governing petroleum refineries resulted in a 74 per cent decrease in phenols, 71 per cent decrease in sulphides, 65 per cent decrease in ammonia nitrogen between 1980 and 1994. Those on the pulp and paper industry, which also included CEPA, contributed to a decrease in biological oxygen demand of 95 per cent by 1997 from the pulp and

#### **Water Security, Pollution and the Federal Government**

Federal role stems from:

- The *Fisheries Act*
- *CEPA 1999*
- The *Canada Water Act*
- The *Oceans Act*
- The *CEAA*
- The *Arctic Waters Pollution Prevention Act*
- Constitutional responsibility for issues of national concern

paper industry. The regulations on mining and smelting also involved CEPA, which listed lead, mercury and cadmium as “toxic” substances (2002).

More recently, the federal government drafted Wastewater Systems Effluent Regulations under the statutory authority of the Fisheries Act (Government of Canada, 2010). These regulations, if enacted, would require a secondary level of wastewater treatment or equivalent for wastewater systems that deposit 10 cubic metres per day, and also specifies acceptable levels for “biological oxygen demanding (BOD matter), suspended solids, total residue chlorine and un-ionized ammonia” (2010). These standards would bring Canadian treatment more in line with the United States and the European Union, both of which require secondary treatment or better.

The process that led to the creation of these draft regulations provides an illustrative example of how the federal and provincial governments can cooperatively develop national standards. When the 1987 Federal Water Policy was created, wastewater infrastructure was described in the text as a provincial or territorial responsibility. However, in 2002, Environment Canada held consultation sessions on a “risk management strategy for wastewater effluent” and found that stakeholders strongly supported a harmonized approach to developing national standards, with authority stemming from the Fisheries Act. In 2003, the CCME began to develop a strategy for wastewater management, and in 2009 it endorsed the resulting Canada-wide Strategy for the Management of Municipal Wastewater Effluent. In 2010, the Government of Canada published the draft guidelines and background information in the Canada Gazette (2010) and asked for comments. Environment Canada aims to publish the final regulations in the Canadian Gazette in 2011 (Environment Canada, 2010). While the Wastewater Systems Effluent Regulations are an example of a regulatory approach to pollution (with cooperation of the provinces), there are also non-regulatory approaches that the federal government can pursue. Existing initiatives include the Lake Winnipeg Basin Initiative, the St. Lawrence plan for Sustainable Development, the Lake Simcoe Cleanup Fund and various activities around the Great Lakes (e.g. Great Lakes Areas of Concern, Great Lakes Binational Toxics Strategy), oftentimes in cooperation with provinces and states (Environment Canada, 2011). These programs are a way in which the federal government is contributing to the control of non-point source pollution, for instance through the funding of projects to reduce surface runoff, control erosion, create vegetative buffers and create nutrient management plans (Environment Canada, 2010). As an example, in the St. Lawrence River within the province of Quebec, a provincial-federal co-funded program called Prime-Vert funds 90 per cent (50 per cent from Agriculture and Agri-Food Canada (AAFC); 40 per cent from the province of Quebec) of many beneficial management techniques for on-farm improvements that reduce nutrient loading (both point and non-point), pesticide loading and erosion. Farmer uptake has been high, in part due to the generous funding. In this initiative, federal involvement was primarily financial, with the province dispensing the funds and implementation at a local scale by parties such as agri-environmental advisory clubs and farmers’ cooperatives (Roy, 2011).



Drinking water pollution is also an issue of concern and is addressed in section 3.11.

### **Synthesis and relevance to water security**

The path to improved pollution control is one of federal-provincial-municipal cooperation. As highlighted above, the deterioration of Canada's wastewater infrastructure, the source of many pollution events, cannot be fixed by any one level of government alone. There is willingness on all sides to work together to reduce pollution from these sources, and notable progress has already been made through the development of draft legislation on wastewater effluent. This is one example of how policies are being developed to protect water security—ensuring that Canadian waterways are of high quality both for human and ecosystem uses.

Non-governmental actors must also be involved in addressing water pollution. The involvement of land-owners in reducing non-point nutrient pollution is an important way to build water security. The increase in eutrophication in recent years is an indicator of decreasing water quality and, therefore, decreasing water security. Water from affected lakes may not be safe for human uses such as drinking and recreation, and the species that depend on that water are at risk. Therefore, it is essential for Canada's governments and public to work together to reduce threats to water quality from pollution sources.

Water pollution affects both human uses of water (recreation, drinking, aesthetics) and ecosystem uses, the degradation of which also has implications for society. There are also considerable political concerns, notably those due to transboundary pollution, both between the U.S. and Canada and interprovincial. Canada's water resources must be protected from pollution in order to ensure that our economy continues to benefit from this resource, that our renowned natural capital remains healthy and that our political ties are not hampered by transboundary disputes.

### **3.5 Instream flows and hydroelectric power**

Rivers have multiple and competing uses, and hydro development on a river can conflict with one or more of these uses (e.g. recreation, fisheries, habitat). Therefore, in the context of river development, instream flow needs—the amount of water that must be maintained in a river to continue to support fish and their habitat and the timing of flows downstream from the dam—must be considered (Government of B.C., 2004; National Water Research Institute, 2004; Morris *et al.*, 2007).

#### **Water Security, Instream flows and the Federal Government**

Federal role stems from:

- The *Fisheries Act*
- The *Species at Risk Act*

Constitutionally, legislative responsibility for hydroelectric power development and flow regulation lies with the provinces. Despite this seemingly clear jurisdiction, the federal government can become involved in hydro matters if fish habitat and health are threatened. Boyd (2003) writes that “under the Fisheries Act, the federal government has the power, but not the duty, to order dam operators to ensure that there is adequate water downstream to protect fish.”

However, the federal government very rarely becomes involved in hydro flow regulation. In 1980, the Department of Fisheries and Oceans (DFO) ordered the company Alcan to release more water into the Nechako River in order to increase water for fisheries protection. This order led to the government of B.C. asserting that water flows were provincial jurisdiction, and joining Alcan as a co-defendant in a trial (Sheedy, 2005). An agreement was negotiated out of court, but this case clearly illustrates the tension between the provincial and federal governments, and the confusion over jurisdiction.

In a similar case in 1997, the DFO issued a minimum flow order for the Daisy Lake Dam on the Cheakamus River in B.C. due to concerns that flows were “inadequate and detrimental to fish and fish habitat.” While the federal court reversed the order in 1998 due to a procedural problem, the judge also noted that the Fisheries Act does provide for federal involvement, citing Section 22(3):

The owner or occupier of any obstruction shall permit the escape into the river-bed below the obstruction of such quantity of water, at all times, as will, in the opinion of the Minister, *be sufficient for the safety of fish and for the flooding of the spawning grounds* to such depth as will, in the opinion of the Minister, *be necessary for the safety of the ova deposited thereon* [emphasis added]. (Government of Canada, 2011).

Therefore, the decision did not disallow the federal government from becoming involved in water flows. This power through the Fisheries Act was also given support by a Commission for Environmental Cooperation (CEC) factual report that investigated whether or not the Government of Canada was failing to “effectively enforce section 35(1) of the federal Fisheries Act against B.C. Hydro and Power Authority” and if failure to enforce the act was contributing to the destruction of fish and their habitat (CEC, 2000). The CEC factual report did note instances in which fish habitat was not adequately protected, but the powers of the CEC’s “are limited to fact-finding and do not provide for sanctions or even recommendations” (Boyd, 2003). Therefore, it could not require action.

Other recent documents also refer to the importance of maintaining instream flows for fish habitat, and concerns that they are not being maintained within Canada (NRTEE, 2010, Morris *et al.*, 2007). Morris *et al.* (2007) place responsibility on the federal government for the enforcement of instream



flow needs, citing the Fisheries Act and the Species At Risk Act as legislation that mandates the federal government to “act as advocates for aquatic ecosystem health” and writing that “fish do not confine themselves to provincial boundaries.” The authors note a clear role for the federal government in enforcement, but also encourage less judicial approaches to obtaining instream flow needs. For example, consultative planning is an option that can be considered. British Columbia now implements “Water Use Planning” for waterways, including those that have hydro development. Such a planning process exists for the Cheakamus River and involves a consultative process that engages citizens, First Nations, government and interest groups (B.C. Hydro, 2011); minimum instream flows are set in this plan (B.C. Hydro, 2009). Both research and public opinion have come, over the past decade, to support the need for maintenance of ecosystems, including, of course, fish habitat.

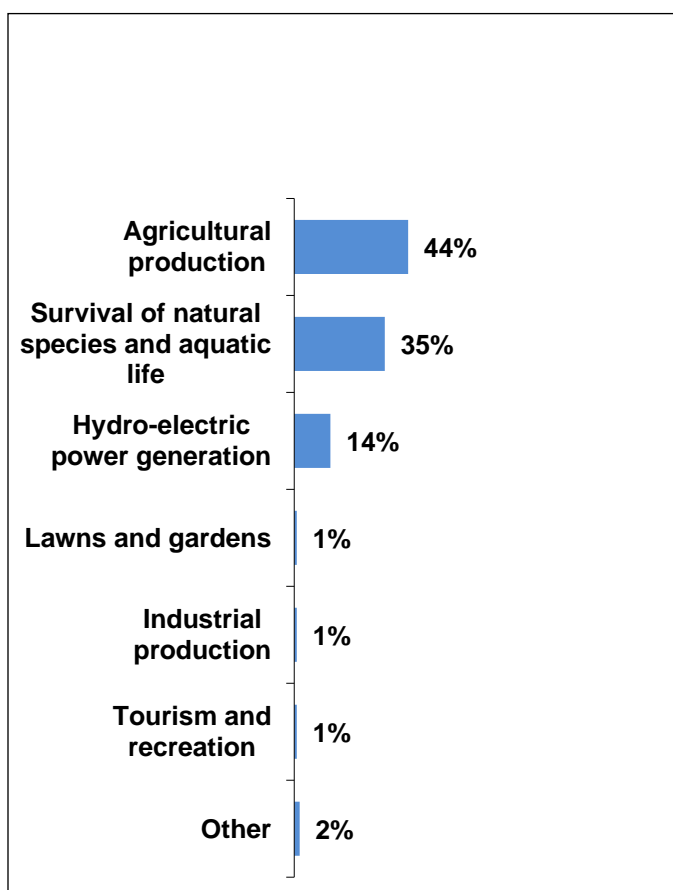


Figure 3.2: Canadian priorities for water during scarcity

Source: Ipsos Reid 2011

### **Synthesis and relevance to water security**

The integrity of ecosystems is of topmost importance to Canadians. When an Ipsos Reid polls asked Canadians “what should be a top priority for fresh water during times of water scarcity, aside from drinking water?” the survival of natural species and aquatic life was second only to agricultural production, at 35 and 44 per cent, respectively. In comparison, hydroelectric power generation was seen as a top priority by only 14 per cent of respondents (see Figure 3.2).

Governments are responsible for making decisions based on the interests of those who elect them. If ecosystem health is prioritized by constituents, this value should be reflected in the actions taken by government. It appears that Canadians would expect some compromise from Hydro in order to protect ecosystem habitat; they do not view the benefits of water solely in economic terms, but also value its environmental services and the life it supports. There is both intrinsic value in healthy ecosystems, and also many values offered to humans including recreation, tourism, food and aesthetics. Therefore, it is essential that all governments develop the knowledge and policy to attend to instream flow concerns when they arise, as they certainly will as development occurs and as the effects of climate change reduces water flows in some rivers currently used for hydro power generation (see section 4). The federal government has the authority to protect instream flows through the Fisheries Act. It can take significant action, both in cooperation with the provinces and industry and through its legal powers, to fulfill this responsibility to protect aquatic life.

### **3.6 Boundary and transboundary waters**

There are 23 major river basins in Canada, eight of which share boundary waters with the United States. Three-quarters of the 23 basins straddle the boundaries of provinces or territories. Shared waters comprise more than 40 per cent of the 8,800-kilometre frontier between Canada and the United States, and more than 300 lakes and rivers are part of, or traverse, the international boundary (International Joint Commission, 2009).

The federal government of Canada has jurisdiction over boundary and transboundary water issues.<sup>4</sup> On the other hand, it shares responsibilities with the provinces on issues surrounding interprovincial water issues (Côté, 2004).

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<sup>4</sup> Defined by the Boundary Waters Treaty, boundary waters are the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the U.S. and Canada passes, including all bays, arms and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers and waterways, or waters flowing from such lakes, rivers and waterways, or the waters of the rivers flowing across the boundary. According to the Transboundary Waters Protection Act, transboundary waters are those waters that in their natural channels flow across the international boundary between Canada and the United States.

The Boundary Waters Treaty provides a foundation for cooperation on shared waters between Canada and the United States. The treaty establishes protocols for sharing boundary waters, and also established an organization called the International Joint Commission, to investigate, resolve and prevent boundary water disputes between the two countries.

The Transboundary Waters Protection Act was introduced in 2010 to protect Canadian water by strengthening prohibitions on bulk water removal of Canada's water outside the country. (See the "Bulk water exports" section for a more detailed understanding of bulk water export issues between Canada and the United States.)

The International Joint Commission (IJC) is the main transboundary waters management institution between Canada and the United States. It comprises six commissioners, three representing each country and appointed by the respective federal governments. The IJC does not have any formal authority over groundwater issues.

**Water Security,  
Boundary/Transboundary Waters and  
the Federal Government**

Federal role stems from:

- Constitutional powers, including the responsibility to implement treaties
- The *Boundary Waters Treaty*
- Responsibility for international relations

(Source: Morris et al. 2007)

In the last decade, recognising the need for a watershed management approach, the IJC launched its International Watershed Initiative. This initiative acknowledges the fact that water resource and environmental problems can be anticipated, prevented or resolved at the local level before developing into international issues and that an integrated, ecosystem approach would help meet this challenge. This initiative has identified the St. Croix, Rainy, Red and Souris River basins as pilot areas for the establishment of international watershed boards. In the past several years, the existing boards have been developing or refining action plans for the implementation of a watershed approach (IJC, 2009). The Great Lakes–St Lawrence River Basin Sustainable Water Resources Agreement (2005) was signed between Great Lakes states and Ontario and Quebec and is aimed at improving the health and economic vitality of the Great Lakes. There is a ban on new diversions of water from the Basin (exceptions include drinking water, which includes relatively small quantities of water). This agreement provides consistent standards to review proposed uses of Great Lakes water, technical data collection, and regional goals and objectives for water conservation and efficiency (to be reviewed every five years).

Many have noted that a challenge in dealing with transboundary issues is that there is strong, centralized control over water in the U.S. compared to the regional approach in Canada. This means that powerful U.S. agencies are often negotiating directly with provinces or local interests (Pollution Probe 2007).

This inequity between the federal U.S. agencies dealing with local and provincial Canadian agencies might mean that Canadian interests may be outweighed at times and may require support from the Canadian federal government. On the other hand, the increasing number of provincial/state agreements combined with the growing assertiveness of the provinces on international issues may pose problems for federal agencies, such as the IJC.

Nevertheless, the federal government and IJC have been long admired as effective institutions for transboundary cooperation on water, and this role should be further developed through better linkages with local institutions. A recent study on the work of the IJC's International Red River Basin Board (IRRB) recommended that the board work to complement the watershed-based natural resources framework plan developed by the Red River Basin Commission, a non-governmental organization. This model of cooperative, adaptive management through stronger partnerships with organizations more grounded in local needs and aspirations is a "win-win" that should be supported was increased water security.

Though federal authority on transboundary issues is clear in principle, it can't be exercised in isolation from the provinces. Based on the range of watershed issues and local circumstances, the federal government is not always the best equipped to lead transboundary processes. A watershed approach with all relevant levels of government and non-government represented in decision-making at a watershed-level is desirable. In addition to interrelated land and water issues, watersheds take surface and groundwater into consideration and represent a logical ecosystem unit of management. Integrated watershed approaches also require sustained and open dialogue and collaboration among different stakeholders. Watershed-based management focuses on methods to integrate land use with water quantity, water quality, supply and balance for both human and ecosystem use (Côté, 2005).

#### **Boundary Waters Treaty**

The Boundary Waters Treaty establishes protocols for freedom of navigation; control over waters that flow across the boundary; projects that affect the natural level or flow of boundary waters; projects that raise water levels in the upstream country; pollution of waters that causes injury in the other country; establishes protocols for managing existing disputes such as those over water use in the Niagara, St. Mary and Milk Rivers; establishment of the International Joint Commission (IJC); rules and principles the IJC follows when it approves projects; referring matters to the IJC for examination and report; referring matters to the IJC for decision; transmittal of IJC reports; IJC operations; special agreements between the two countries; and ratification and termination of the treaty.

Despite the existence of these institutions and governance mechanisms, the potential for conflicts still exists (NRTEE, 2010). Recent disagreements involving surface water illustrate the variety of issues that might arise, such as: the Devil's Lake dispute between Manitoba and North Dakota; the

potential transboundary pollution in the Flathead River originating from a proposed coal mine in British Columbia and flowing into Montana; and the continuing pollution and water-level issues in the Great Lakes (IJC, 2008). Water allocation and quality, invasive species and energy are all transboundary issues requiring some close attention in coming years. It has also been suggested that American authorities regret the basic framing of the treaty and that it is based on “equal and similar rights to use” and not formulated based on population and economic size: this might be the reason that issues such as Devil’s Lake have not been referred to the IJC for resolution despite suggestions from Manitoba and U.S. states.

#### **Red River Basin Management**

The Red River Basin covers approximately 116,550 sq. km of central North America, and includes portions of the states of Minnesota, North Dakota and South Dakota and the Canadian province of Manitoba. Problems, issues, challenges and opportunities in the basin are well documented in many studies. The Devil’s Lake Basin, located within the North Dakota portion of the basin, does not contribute to the Red River system except when its level exceed approximately 445 metres above mean sea level or when an outlet into the Sheyenne River is operated (de Loë, 2009). Another issue is that of extremely variable flows and the related issues of flooding and droughts. Flows and associated quantities vary enormously from year-to-year at Emerson (where the Red crosses the international boundary). Annual flows have ranged from lows of 296,754 cubic decametres (dam<sup>3</sup>) to highs of approximately 11.7 million dam<sup>3</sup>. Flooding normally occurs in the spring and early summer, with the 1997, 2009 and 2011 flooding events being prominent in recent memory. Droughts and dry periods are also not uncommon. Groundwater is also an important resource within the U.S. portion of the Red River Basin. Water quality is an issue of increasing concern, and the Red River is known to contribute 54 per cent of the total phosphorous to Lake Winnipeg, of which 32 per cent is from beyond the U.S. border (Lake Winnipeg Stewardship Board, 2006). This is especially concerning given that Lake Winnipeg is facing significant nutrient-overloading and resultant algal blooms in the last few years.

In addition to the role of the two national governments, the governments of North Dakota, South Dakota, Minnesota and Manitoba are involved in the management of the Red River Basin. The IJC has formed the International Red River Board to oversee water governance in the Basin which deals with both water quality and quantity issues. In addition, the Red River Basin Commission, a non-governmental organization with representation from all levels of government, as well as from local communities, mobilizes basin-level management. Municipal governments on both sides of the border are involved in basin issues highly relevant to them; floods, droughts and water levels in general. In essence, the range of stakeholders involved in water management of these transboundary waters is complex and involves a range of legal and cooperative systems in both countries.

#### **Synthesis and relevance to water security**

Water does not recognize political boundaries and will flow across them. Therefore, it is incumbent upon Canada and the U.S. to find ways to sustainably and fairly manage the water quality and quantity of the more than 300 rivers and lakes that the two countries share, both for the benefit of humans and for ecosystems. According to Canada’s laws, the federal government should be a prominent player in transboundary discussions; the Constitution assigns it the responsibility, the

federal government implements the Boundary Waters Treaty and it is also responsible for international relations (Morris *et al.*, 2007). That said, transboundary relations must almost always involve more local actors who may have more nuanced understanding of situations and who may be more directly affected by decisions.

Many institutions already exist to carry out transboundary management (e.g. the IJC, the Red River Basin Board), and some are functioning well. Others have not yet reached their full potential. Given Canada's close ties with the U.S., the desire to resolve disputes that arise (and several unresolved disputes that currently exist), and growing recognition on both sides that surface water is best managed on a watershed basis—not based on political boundaries—it should be a high priority to ensure that strong, cooperative cross-boundary management exists for all waters. Such a development would create better water security for both countries.

### 3.7 Interprovincial water issues

The federal government shares responsibilities with the provincial government with respect to interprovincial issues. There are a number of existing mechanisms for interjurisdictional cooperation on water. These include the Prairie Provinces Water Board that manages the Master

#### Water Security, Interprovincial Waters and the Federal Government

Federal role stems from:

- The *Canada Water Act*

Agreement on Apportionment for the waters of Alberta, Saskatchewan and Manitoba and includes two federal representatives; the Canada–Manitoba agreement for cleaning up Lake Winnipeg; a memorandum between British Columbia and Alberta on bilateral water management; agreements between Québec and Ontario and between Québec and New Brunswick, etc. Additionally, there are some working groups of the CCME that address water, such as the Water Agenda Development Committee. However, the large variations between provincial water management regimes make interjurisdictional water management a challenging task. There are no overall directions or principles in Canada that provide guidance to the various water managers in a way that would facilitate the collection and exchange of comparable data throughout the country, or facilitate the integration of interests from all water users.

The Mackenzie River Basin Transboundary Water Master Agreement (1997) is one framework for coordination of water allocation systems across multiple political boundaries. The agreement was signed by the governments of Canada, B.C., Alberta, Saskatchewan, Yukon and the Northwest Territories. The agreement is founded on cooperative management guiding principles: equitable utilization, prior consultation, sustainable development and maintenance of ecological integrity. On the other hand, the continuing disagreement between the Province of Alberta and the Northwest Territories over the quantity and quality of the water in the rivers flowing northward is an example



of a situation where the federal government can play a stronger role in facilitating common ground, particularly given the wide divergence of philosophical positions between the two governments (Government of the Northwest Territories, 2009).

Water allocation systems can enhance water security by addressing the need for coordination of allocation schemes across political boundaries, such as those dividing municipalities, provinces and countries (de Loë, 2007). Another important area for coordination in water allocation is monitoring and information sharing to facilitate more transparent decision-making. As most existing water allocation agreements in Canada do not currently take into account issues such as instream flows, a potential role for the federal government could be to help ensure that existing and new water allocation agreements incorporate provisions to ensure ecological integrity of aquatic ecosystems, reflecting current societal values.

#### **Water Framework Directive**

The Water Framework Directive (WFD) is an overarching policy that requires all of its member states to aim to achieve good chemical and ecological status of all of their waters by the year 2015. Under the WFD, “good status” is defined as biological, physic-chemical and hydromorphological conditions deviating only slightly from those found under undisturbed conditions (Le Quesne, 2010). The WFD has recently been quoted by Margaret Caley-Carson, an internationally renowned Canadian water expert, as possibly the most ambitious integrated water policy in place anywhere in the world (Lagacé, 2010).

The WFD sets guiding principles, objectives and timelines, while allowing individual jurisdictions to define the objectives in practical terms and determine the best methods for achieving them. Implementation mechanisms can be locally adapted and context-specific, based on local trends, culture and institutions. An enabling aspect of the WFD is its approach to articulating clear outputs and outcomes, but not prescribing the means to achieve these.

In 2000, when member states signed the WFD, the EU consisted of 15 countries. Since that time, its membership has increased to 27, and all members are required to implement the WFD. In fact, because of shared river basins, the implementation of the Directive also involves jurisdictions outside the EU, such as Norway and Switzerland.

In addition to the central policy, the WFD also provides two daughter (supplemental) directives: the Groundwater Directive and the Priority Substances Directive—both of which were announced in the WFD as forthcoming policies that would complement the central policy.

EU member states are required to achieve the EU objectives of the WFD by the prescribed timelines. To facilitate the meeting of objectives, interim deadlines and a combination of methods and tools have been established. These include the River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs).

Since its establishment in 2000, member states have achieved a number of milestones: the Directive has been transposed into national law (2003); water management units have been identified (there are 110 river basin districts under the WFD); the pressures affecting these river basin districts have been characterized (2004); monitoring networks have been established and public consultations were held (2006-2008). Most importantly, this work culminated in the production of the first set of RBMPs that member states submitted to the Commission in March 2010 (Lagacé, 2010).

The challenge of managing interjurisdictional water is even more acute when dealing with groundwater. Cases where two or more provinces share groundwater from the same aquifer (sometimes in addition to the neighbouring U.S. states) may give rise to water disputes and governance challenges. The case of the Abbotsford–Sumas aquifer on the West Coast is an example of how nitrate contamination migrates from Canada to American wells (NRTEE, 2010). Since groundwater aquifers do not often follow the same boundaries as surface watersheds, watershed-based management, although effective in surface water management, may not be the best governance tool for groundwater. In recent years, a number of multi-stakeholder working groups have emerged in the interest of coordinated groundwater strategies (The Council of Canadian Academies 2009). However, formal multilateral governance bodies having the authority to make decisions about groundwater do not currently exist in Canada.

It is worth noting how inter-jurisdictional water is managed elsewhere in the world. In the European Union, all waters (including surface, groundwater, and coastal) are included in the Water Framework Directive (WFD), a legally binding policy for the management and protection of water.

### ***Synthesis and relevance to water security***

As described in the section on transboundary waters (section 3.5), water resources do not fit neatly into the political boundaries humans create. In order to ensure sustainable water quality and quantity and to avoid disputes, mechanisms must exist to manage shared waters. If each province and territory were to make its own decisions on the use of shared waters without consulting and cooperating with the other entities that share these waters, there could be no assurance that adequate instream flows would be maintained for aquatic life, that downstream humans would have reliable flows (e.g. for municipal usage and/or development), and that pollutants would be kept within acceptable levels. To lack strong mechanisms to manage shared waters is to risk significant environmental, economic, social and political problems.

The federal government can play an important role in this area. It can act as mediator for disputes that arise, insuring that some level of equity and balance is maintained, and also help proactively create effective interprovincial bodies to manage shared surface and ground waters. In the case of surface waters, it can encourage the establishment of watershed-based management entities, given that watersheds are nature's natural boundaries. In the case of both groundwater and surface water, it can also play a strong role in monitoring, an activity that is essential to informed decision-making across boundaries (see section 3.2).

Water security can be greatly increased by careful planning for shared waters. Foresight will help avoid problems in the future. Factors to take into account include climate change (and the possibility



of increased or decreased flows), population trends, ecosystem needs and aquifer stress. An adaptive systems approach to planning across boundaries that takes into account the current and future needs of people, their economies and the environment would be optimal—one that finds an acceptable balance between the many demands placed on shared water.

### 3.8 Bulk water exports

Canada is viewed as a water-rich nation, possessing 6.5 per cent of the world's renewable water supply (Clarke, 2008). The idea of bulk water exports has existed since at least the 1960s. It was at this time that proposals such as the North American Water and Power Alliance (NAWAPA), which sought to channel water from British Columbia to the U.S., raised the concern of the Canadian public.

Despite the topic's half-century history on the political and public radars, the question of whether or not Canada's water is "secure" from export is still unclear. Part of this lack of clarity stems from mixed jurisdictions on the issue, though the stronger jurisdiction appears to lie with the federal government, which has power over international trade and foreign policy. In addition, Morris *et al.* (2007) assert federal jurisdiction is primary because "bulk water exports are an issue of national concern and thus fall under the purview of the federal government's residual power of peace, order and good government" and that the federal government signed the NAFTA agreement and, therefore, bulk water exports under NAFTA, or the prevention thereof, are part of its responsibility.

#### Water Security, Bulk Water Export and the Federal Government

Federal role stems from:

- Constitutional responsibility for trade and commerce
- Constitutional responsibility for issues of national concern (under peace, order and good government—see section 3.12)
- Ability to negotiate NAFTA (not a provincial ability)

(Source: Morris *et al.* 2007)

The chronology of bulk water issues in Canada indicates that there have been multiple occasions where attempts have been made to address the concern. In the 1980s, the Mulroney government put forward a bill on water exports, the Canada Water Preservation Bill (1987), which could have banned bulk exports; it stated "The federal government ... will take all possible measures within the limits of its constitutional authority to prohibit the export of Canadian water by interbasin diversions and strengthen federal legislation to the extent necessary to fully implement this policy" (as cited in Clarke, 2008). However, the bill was not passed due to the dissolution of Parliament.

More recently, in May 2010, the federal government put forward amendments to the International Boundary Waters Treaty Act and the International Rivers Improvement Act that it said would strengthen protection of Canadian water from bulk exports. However, Karunanathan (2010) criticizes the amendments for their unsubstantiated definition of bulk removals, for their limitation

to boundary waters—only 20 per cent of the country’s water, their “random” definition of bulk water as exports of “50,000 litres or more” per water basin per day, and the fact that the federal government has not pursued a NAFTA exemption for water. The proposed amendments did not go beyond first reading (Parliament of Canada, 2011).

The free trade agreements into which Canada has entered (and uncertainty about whether or not water is included in these agreements) are key catalysts for this ongoing concern about bulk water exports. In 1988, the Canada–U.S. Free Trade Agreement was passed, making it more difficult for Canada to regulate the export of water. Concern over whether or not bulk water exports was included under this agreement and its successor, the North American Free Trade Agreement (NAFTA), has existed since the inception of free trade, but the first major test to bulk water exports occurred in the 1990s. In 1991, U.S. Company Sun Belt Water Inc. filed a \$10 billion suit against the government of British Columbia for halting its plan to export water from coastal streams to California via tankers, an action it contended was “illegal” under NAFTA (Sun Belt, 1990; Boyd, 2003; Clarke, 2008). Similarly, in 1995, a company called Nova Corp. applied to extract water from Lake Superior for bulk export, initially received permission from the Ontario government (notably, a provincial decision; the Ontario government had a degree of jurisdiction due to its control over the management of resources), and then had permission rescinded due to the ensuing public outcry (Clarke, 2008). In addition, the province’s jurisdiction was disputed. The U.S. pointed out that since Canada and the U.S. share jurisdiction over the Great Lakes, Ontario could not export bulk water without U.S. approval (2008). The Sun Belt suit was eventually withdrawn, and Nova Corp. ultimately lost the case in court, but the cases are indicative of the vulnerability of Canadian waters to export.

Since the Nova Corp. and Sun Belt cases, several attempts have been made by Canadian governments to prevent bulk exports, but they have been criticized by legal experts as having loopholes. Firstly, the federal government amended the International Boundary Waters Treaty in 2002 in order to prohibit bulk water removals from boundary watersheds; the law reads, “no person shall use or divert boundary waters by removing water from the boundary waters and taking it outside the water basin in which the boundary waters are located” (Government of Canada, 2011).

Secondly, all provincial governments except New Brunswick’s have passed legislation prohibiting large-scale diversions of water (Boyd, 2003; National Water Research Institute, 2004; Morris *et al.*, 2007). However, these measures are not seen as ironclad barriers to export. In particular, Boyd (2003) notes that some provincial laws preventing exports may be unconstitutional: “Although regulating water use is primarily a provincial responsibility, regulating international trade is a matter of federal jurisdiction under Canada’s Constitution Act, 1867.”

In that case, responsibility for bulk water falls to the federal government. According to several legal analyses (Boyd, 2003; Shrybman, 1999), the best approach to prohibiting bulk water exports would be on ecosystem sustainability grounds. Article 2101(1) of NAFTA does allow for trade exceptions where “environmental measures [are] necessary to protect human, animal or plant life or health ... [which] applies to measures relating to the conservation of living and non-living exhaustible natural resources” (SICE, 2011). According to Boyd (2003), “The bottom line is that NAFTA constrains but does not eliminate Canada’s ability to ban or restrict water exports. Any ban or limitation imposed by Canada or the provinces must have a legitimate health or environmental objective and must be ‘in proportion’ to those objectives.”

In the late 2000s, there were renewed calls for federal action to prevent bulk water exports (Clarke, 2008; Council of Canadians, 2007; Nikiforuk, 2007; Quinn, 2007).

In 2007, concern arose over leaked documents from closed-door meetings about the North American Future 2025 Project, a project headed by the U.S. Center for Strategic and International Studies (CSIS) in collaboration with the Conference Board of Canada and the Centro de Investigación y Docencia Económicas. The Project was created to provide advice to political leaders of Canada, the U.S. and Mexico in relation to the Security and Prosperity Partnership, and included water transfers in its recommendations:

Because water availability, quality, and allocation are likely to undergo profound changes between 2006 and 2025, policymakers will benefit from a more proactive approach to exploring different creative solutions beyond the current transboundary water management agreements that the United States has reached with both Mexico and Canada. One such option could be regional agreements between Canada, the United States, and Mexico on issues such as water consumption, water transfers, artificial diversions of fresh water, water conservation technologies for agricultural irrigation, and urban consumption. (Center for Strategic and International Studies, 2007)

In the late 2000s, the Canadian Water Issues Council and the University of Toronto’s Munk Centre for International Studies (Program on Water Issues) addressed the need for more airtight protection from bulk water transfers by putting forward a federal “Model Act” to prohibit bulk water removals, particularly based on ecosystem effects that could result from interbasin transfers of water (2008). The authors suggest that the federal government has the ability to set minimal national standards because the issue is a national concern and many related effects cross provincial boundaries (e.g. invasive species), but also recognizes provincial jurisdiction over resources. The “Model Act” attempts to reconcile the conflict between federal and provincial jurisdictions by giving provincial legal regimes primacy when there is a federal-provincial equivalency agreement in place.

Concerns over the security of Canada's water from bulk exports have arisen repeatedly over the last 50 years, and no action taken thus far has secured Canada's water, despite the fact that polls show the majority of Canadians are against such exports. Writes Clarke (2008): "If a company or consortium of companies were to come forward now with a plan to extract and transport water in bulk form from a Canadian lake, river or aquifer, to the U.S., it is not at all clear that Canada has in place the kind of water governance plan needed to deal with such an issue. Indeed, this is a serious policy gap and vacuum."

### **Synthesis and relevance to water security**

There are two compelling reasons why bulk water export is a water security concern. Firstly, Canadians have identified it as such. Numerous polls have found that at least two-thirds of Canadians are opposed to bulk water exports and have remained constant in their opposition for decades (Clarke, 2008; Morgan, 2010). This finding alone indicates that Canadians want their water protected.

Secondly, there is a strong ecological argument for banning bulk water removals. Environmental concerns include the introduction of invasive pests and diseases, damage to biological diversity and loss of natural flows. In fact, even water export from one *Canadian* basin to another—there are five large Canadian basins—would present a threat to ecology (Canadian Water Issues Council, 2008). For that reason, there have been calls to prohibit not only transboundary water exports, but also interbasin exports within Canada (Canadian Water Issues Council, 2008; Pentland and Hurley, 2010).

The Canadian desire to protect water from export, and the ecological concerns that come from interbasin diversion should compel the federal government to take further action to prevent exports. Only the federal government can do so, as provincial abilities to prevent bulk exports are limited. Legally, the government has the ability under NAFTA's provision that allows governments to pass laws to protect the environment.

### 3.9 Navigation

The Constitution Act also gives the federal government responsibility to protect navigable waters. The main legislation in this area is the Navigable Waters Protection Act (NWPA), which is administered and enforced by the Canadian Coast Guard (CCG) (a special operating agency of Fisheries and Oceans Canada) and the Ministry of

#### Water Security, Navigation and the Federal Government

Federal role stems from:

- Constitutional responsibility for navigable waters

Transport. Its main purpose is to protect the public right of navigation on navigable waterways. From an environmental perspective, one can note that the CCG is responsible for “ensuring response to mystery spills, offshore spills and for spills north of 60°N latitude ... [as well as] the thoroughness of industry clean-up operations for ship-source spills, monitoring the effectiveness of the regime and for providing back-up preparedness and response for spills that go beyond industry capability, or if they are unwilling to respond” (Department of Fisheries and Oceans, 2010).

The NWMP can also trigger an environmental assessment under the Canadian Environmental Assessment Act in certain cases, though these cases were diminished in 2009 when the Environment Minister issued an order exempting “minor works and waters” from triggering an environmental assessment. Minor navigable waters include waterways with an average width of less than 1.2 metres and average depth of less than 0.3 metres, outlined in 200 metre sections. This amendment was embedded in Bill C-10 (the Budget Implementation Act) and drew criticism from numerous interests (Brooks, 2010; Canadian Wildlife Federation, 2009; Lake Ontario Waterkeeper, 2009).

#### **Synthesis and relevance to water security**

For centuries, the waterways of Canada served as a vast transportation network. They opened up the West to exploration, and they enabled development and trade, for instance along the St. Lawrence River. While road and air transport are now common alternatives to water transportation, the federal government is still responsible for protecting navigable waters, and navigation is still important to Canada’s well-being. Interference in/with navigable waters could have economic implications, notably on shipping and fishing. In addition, the recreational usages of navigable waters are integrated into Canadian culture; Canada is known internationally for its outdoor recreational opportunities, including those by boat (e.g. canoeing, kayaking, sailing, fishing, power-boating, sight-seeing). Navigation is also important from an environmental dimension because approvals under the Navigable Waters Act can trigger an environmental assessment under the CEAA.

While navigation does not appear to be the most pressing water security concern for Canada, it may be appropriate for the federal government to look to the future to consider possible restrictions to

flows in navigable waters, such as those caused by reduced glacial melt, changes in rainfall and climate change.

### 3.10 Water demand management

The myth that Canada has a nearly endless supply of water appears to be reflected in the high water usage rates by Canadians. Canadians use an average of 329 litres per capita per day, second only to consumption in the United States (383 litres/per capita/day). Other countries demonstrate much more efficient water usage; for instance, Italy uses 250 litres/per capita/day and Israel, 135 litres/per capita/day (Environment Canada 2011).

This complacency is concerning, as the Canadian population is actually quite distant from most of its renewable water supply. Roughly 84 per cent of the population lives in a narrow band near the U.S.–Canada border, while 60 per cent of Canadian water flows northwards to the Arctic (2011). Since our population is not concentrated where our water is (nor should it be), improved water efficiency, as has been demonstrated feasible by other countries, is called for. What is efficient is determined by calculations of cost effectiveness. Costs are determined not by what people pay for water but by the real cost of delivering the water to people.

Fortunately, there are many avenues for water conservation that can be pursued (Vickers, 2001). The residential, business, industrial and agricultural sectors are all water users, and each has specific, though overlapping, means by which conservation can be improved. This discussion will focus mainly on residential uses, which account for more than 50 per cent of municipal water use when the residential portion of the commercial (apartments) and institutional (dormitories) sectors are included. When all areas of

#### Water Security, Water Demand Management and the Federal Government

Federal role stems from:

- The Canada Water Act (allows federal government to “directly, or in cooperation with any provincial government, to undertake public information programs) (Morris et al. 2007)
- The expectation that the federal government will help fund infrastructure renewals; more efficient water usage will reduce the need for infrastructure expansion.
- Federal power over labelling, for instance of water-using appliances and fixtures
- Canada Mortgage and Housing Corporation ability to set the National Building Code

#### Table 3.1: Rate structures

(per cent = Canadians served by this structure in 2001)

*Flat Rate:* Users pay a specific amount regardless of the amount used (43 per cent)

*Declining Block Rate:* users pay less per unit when they use higher volumes (12 per cent)

*Constant Rate:* users pay a fixed amount per unit (36 per cent)

*Increasing Block Rate:* users pay more per unit as water usage increases (9 per cent)

Source: Environment Canada 2011



potential efficiency improvements are considered, savings of more than 30 per cent per housing unit are feasible (Gleick *et al.* 2003).

While responsibility for water use is primarily a provincial responsibility, federal government involvement is possible—and would likely be welcomed by provincial governments—in areas such as co-funding for water infrastructure efficiency improvements. Canada's water and wastewater infrastructure is deteriorating, with much of it between 50 and 100 years old. Currently, as much as 30 per cent of the water is lost to leaking pipes. This situation can be improved by significant investment in efficiency improvements and upgrades. Cost-sharing between the governments is perhaps the most logical way for improved efficiency across Canada, as no single level of government can reasonably be expected to afford the upgrades, which can amount to billions of dollars for some cities. Water efficiency has a double benefit in the cases of new infrastructure. The cost of municipal water systems is mainly a function of the diameter of the piping and the length of the pipe. Improved urban planning can limit the length of pipe, and more efficient water use can reduce the need for large diameter pipes.

There are other areas where federal activity is clearly warranted, including better labelling of water using household appliances, and management of the CMHC building code, which is adopted wholly or partially by many provincial governments. A useful example is the common toilet, which often uses 20 litres with each flush. Modern toilets only require six, and the best models only one or two litres. Many have dual flush capabilities with a small flush for liquids and a larger one for solids. Even more water can be saved (as much as 30 per cent) through safe ways of recycling grey water (for example, from washing clothes) in the house and using it to flush toilets.

Communications and public education is another area where federal government involvement may be welcomed. As has already been mentioned, Canadians tend to believe they have an endless supply of water, a belief that is reflected in their water usage behaviour, as well as in municipal policies. On a very broad scale, the federal government could help correct this myth by conducting public education activities—not to alarm Canadians about water security, but to provide them with a realistic understanding of Canada's water availability. There are multiple ways in which such education can be carried out, and it is outside the scope of this paper to determine the ideal vehicle. However, the creation of a communications campaign to emphasize the real value and availability of water would be a reasonable beginning.

Another area of concern is that of water pricing. Canadians have some of the lowest water rates in the world—an average of C\$0.31 per cubic metre, compared to C\$2.16 in Germany, C\$1.35 in France, C\$1.28 in the United Kingdom and C\$0.40-C\$0.80 in the United States. While this low pricing allows for affordable water for low-income individuals, the typical approach to Canadian



pricing does not encourage water conservation. Environment Canada reports that “About 55% of Canadians served municipal water pay in ways that do not promote conservation.” The various pricing structures are outlined in Table 3.1; only the “increasing block rate” truly encourages conservation. In many cases, water is not even priced to recover the cost of infrastructure and delivery. For example, “irrigation water charges only recover about 10 per cent of actual costs of service.” Water pricing is set by municipalities, and some cities have started to implement full-cost pricing—for instance, Victoria considers the need to expand or replace water and wastewater in its pricing (Coad 2011). Higher prices lead to higher water efficiency. The metering of households also results in lower water use (Environment Canada 2011; Energy News and Efficiency, 2009). The United Kingdom Environment Agency has called for “near universal” metering in anticipation of future water shortages, in part due to climate change and population growth (U.K. Environment Agency). In Canada, only 56 per cent of urban households were metered in 1999 (Environment Canada 2011). An effective, if politically difficult, measure is for the federal government to limit grants or loans for infrastructure to communities that have constant rate or increasing block rate tariff structures.

Conservation-oriented pricing can provide significant improvements in water efficiency. The residential sector, which accounts for more than half of municipal water use, has the potential to reduce consumption by as much as 40 per cent through demand management (Environment Canada, 2011). However, such initiatives must be “accompanied by a well-articulated public education program that informs the consumer what to expect” (Environment Canada, 2011).

### ***Synthesis and relevance to water security***

Most Canadians do not realize that their country’s citizens are amongst the most profligate users of water in the world. A 2011 Ipsos Reid survey found that only four per cent of respondents could identify that Canadians use an average of 329 litres per day; given five choices (55, 132, 226, 329 and 408 litres), more than half believed Canadians use either 55 or 132 litres per day (i.e. 17 per cent and 40 per cent of actual usage). Once they learned about this high water usage, most (89 per cent) of respondents became concerned. Once informed, they realized that Canadian overuse of water is a risk to water security.

Canada is lagging behind the rest of the world in controlling water demand and implementing water use efficiency. On average, Canadian pricing structures are artificially low and do not reflect real costs, and our water usage is unreasonably high. Not only does this fact reflect badly on how we live up to our environmental values, but it also ultimately costs society more. Our high water usage requires us to build larger and more expensive water infrastructure. Given that it is essential for Canada to upgrade its ageing water infrastructure, now is the appropriate time for all of Canada to 1)

implement water pricing that encourages water conservation and 2) encourage water efficiency by other means (e.g. education, labelling). By doing so, we can ensure our usage does not outstrip demand in any location and that the real costs for building and maintaining infrastructure are recouped.

### 3.11 Water on federal lands, territories

The federal government also has responsibility for water on federal lands, which includes national parks, federal buildings (office buildings, labs, penitentiaries, military bases), First Nations reserves and the territories, except for Yukon, which was transferred control over water in 2003 (Government of Yukon, 2011). On provincial lands, the provinces have primary control over such areas as water supply, pollution control, hydroelectric power and water licensing, while the federal government controls these areas on Crown lands.

#### Water Security, Federal Lands and the Federal Government

Federal role stems from:

- Constitutional responsibility for federal lands
- Federal government's duty to First Nations people to act in their best interests

(Source: Morris et al. 2007)

This situation provides the federal government with a valuable opportunity: to lead by example through its water management on its own lands and, in doing so, provide a model for provinces. In the area of water quality and quantity monitoring (see section 3.2), it can ensure both that it knows the status of its surface and groundwater supplies and is able to plan for their sustainable usage. In the area of drinking and wastewater (see sections 3.11 and 3.3, respectively), it can pursue high levels of treatment. The pursuit of high-quality drinking water is particularly important on First Nations reserves (see section 3.11), an issue for which the federal government has received criticism (Phare, 2009). In the area of water costs and efficiency (see section 3.9), it can install water-saving technology and use policy tools (e.g. education, incentives) to encourage efficient use.

The topics of water and wastewater infrastructure, as well as water demand management are discussed elsewhere in this report and so will not be developed further here.

#### Synthesis and relevance to water security

Water on many federal lands is not “secure” when considered in terms of pollution, monitoring and its use drinking water. Drinking water quality on First Nations reserves has been widely criticized (see section 3.11) and it is imperative that this state of affairs be remedied. Many First Nations also do not have access to running water or wastewater treatment, a condition that many find unacceptable (insert sources). Due to gaps in monitoring, the Canadian government also does not

have the data to detect problems on federal lands, First Nations reserve or otherwise (see section 3.2). Action on federal lands is one area in which the federal government will encounter little resistance. Unlike for other topics discussed in this report, the provinces and territories will not assert that they have authority for decisions in this area.

Therefore, it is first incumbent upon the federal government to remedy the circumstances that are objectionable, such as drinking water and wastewater treatment on First Nations reserves. Second, the federal government has the opportunity to surpass expectations and ensure that management on all federal lands supports water security—that buildings use water efficiently, that wastewater on federal lands has secondary treatment or better, that rivers and lakes support aquatic ecosystems, and that proof exists through water monitoring that high water security is being achieved. Through leading by example on its own lands, the federal government can influence water security in the provinces and territories, even in areas of constitutional responsibility that are outside of direct federal control.

### 3.12 Drinking Water

Clean drinking water is water that can be consumed with low risk of harm to short and long-term health. A report published by the David Suzuki Foundation uses the following definition of safe drinking water for practical purposes, “[where a] level of risk is so small that a reasonable, well-informed individual need not be concerned about it, nor find any rational basis to change his/her behaviour to avoid a negligible but non-zero risk” (Hrudey & Hrudey, 2004).

While most Canadians have access to safe and adequate drinking water, not all communities are this fortunate.

According to a report provided to the Canadian Senate by Health Canada, there were 1,174 boil water advisories in place in December 2006 (Grafstein, 2007). The Canadian government estimates that contaminated drinking water causes 90 deaths and 90,000 cases of illness annually, and independent health experts suggest a much higher number of Canadians suffer from gastrointestinal illnesses related to their drinking water (Morris *et al.*, 2007).

Most relevant to water security from an equitable access to clean drinking water perspective, many First Nations communities have not received the support required to ensure their drinking water is the same quality as the rest of the country, and some still do not have access to running water (Swain

#### **Water Security, Drinking Water and the Federal Government**

Federal role stems from:

- The criminal law power of the Constitution enables the federal government to legislate to protect the health of Canadians
- CEPA, 1999
- The *Food and Drug Act*
- Federal responsibility to provide safe drinking water to First Nations people on federal lands

(Source: Morris *et al.* 2007)

and Hrudey, 2006; Office of the Auditor General, 2005). The 2005 Report of the Commissioner of the Environment and Sustainable Development evaluated the federal government's performance on ensuring safe drinking water for First Nations communities and reported that three-quarters of First Nations communities face a "significant risk to the quality or the safety of drinking water" (Auditor General of Canada, 2005). The report's lead finding stated that,

When it comes to the safety of drinking water, residents of First Nations communities do not benefit from a level of protection comparable to that of people who live off reserves. This is partly because there are no laws and regulations governing the provision of drinking water in First Nations communities, unlike other communities.

Non-reserve communities in rural or remote areas are also being left behind. As an example, a number of Newfoundland outposts lack access to clean drinking water, a situation one Canadian Senator has described as "scandalous" (Grafstein, 2007).

### ***Jurisdictional responsibilities***

In Canada, the responsibility for making sure drinking water supplies are safe is shared between the federal, provincial, territorial, and municipal governments. The responsibility of providing safe drinking water to the public generally rests with the provinces and territories, while municipalities usually oversee the day-to-day operations of the treatment facilities (Health Canada, 2009).

*Provincial:* Because drinking water is considered a natural resource, the legislative responsibility for providing safe drinking water to the public generally falls under provincial or territorial jurisdiction. Each province and territory has adopted legislation to protect its source waters and to establish requirements to provide clean, safe and reliable drinking water to its citizens.

*Federal:* The federal government is responsible for drinking water under federal jurisdiction, such as on board common carriers (e.g. ships, airplanes), in First Nations communities (shared responsibility), in military and other federal facilities, and in national parks (CCME, 2002).

Health Canada's Water Quality and Health Bureau has a mandate to protect the health of all Canadians by developing the non-binding Guidelines for Canadian Drinking Water Quality in partnership with the provinces and territories (Health Canada, 2009). These guidelines are used by every jurisdiction in Canada and are the basis for establishing drinking water quality requirements for all Canadians.

In addition to these guidelines, the federal government has control over a number of water management issues that play a role in the provision of safe drinking water to Canadians.

Health Canada promotes the multi-barrier approach for clean, safe and reliable drinking water by taking a preventative risk management approach. This involves a clear understanding of water supply from its beginning in nature to its use by the consumer. To understand this, Health Canada breaks down drinking water supply into three parts: the source water, the drinking water treatment system, and the distribution system which carries the treated water to homes, businesses, schools and other buildings. Environment Canada has highlighted the multi-barrier approach to drinking water quality on its website as well, and is a proponent of source water protection. It links to the CCME's Source to Tap: Protecting our Water Quality guidance documents (CCME, 2004).

In addition, a number of policies affecting land use in watersheds and water quality monitoring in general have been adopted and are executed by Environment Canada. Integrated watershed management has been promoted by Environment Canada through its support of place-based approaches in areas such as the Great Lakes initiative, the Lake Winnipeg Basin initiative, Lake Simcoe initiative and others. Strong integrated watershed management frameworks would be complementary to source water protection and play a role in advancing comprehensive drinking water management strategies in Canada.

As the water contamination events in Walkerton, North Battleford, and Kashechewan illustrate, problems are most severe in communities that rely on small drinking water systems and on First Nations reserves (Christensen, 2006). Given that drinking water on First Nations reserves is a federal responsibility, it is a clear shortfall in the federal system that drinking water in these communities is not adequate in quality or quantity.

Although actions are occurring at the local level and some provinces and territories have taken the initiative in encouraging local watershed management, the lack of federal leadership and compliance with drinking water responsibility, such as on First Nations reserves, is undermining the effectiveness and sustainability of freshwater governance in Canada.

**Why the federal government?**

- Under the Constitution, the criminal law power gives the federal government power to legislate to protect the health and safety of all Canadians. Clean and accessible drinking water is essential for health and safety.
- Through Health Canada, the federal government is responsible for enhancing and protecting the health of Canadians.
- The federal government has established legislative standards for food, drugs and bottled water through the Food and Drugs Act (1985).
- The federal government has a clear mandate and fiduciary responsibility to ensure safe drinking water for Aboriginal Canadians (First Nation, Métis and Inuit) whose communities are located on federal land.
- The Canadian Environmental Protection Act (1999) is directed at reducing toxic substances in the environment.
- The Fisheries Act (1985) gives the federal government clear powers to prevent and control pollution releases into water that would affect fish habitat.
- The Canada Water Act (1970) authorizes the federal government to enter into agreements with provinces for water quality management in interjurisdictional waters or waters of national concern.
- The Great Lakes Water Quality Agreement was last amended by the federal governments of Canada and the United States in 1987 and needs reinvigorating.

**Source Water Protection**

Three-quarters of Canadians receive water from municipal systems supplied by rivers, lakes and reservoirs, while the remaining 25 per cent rely on groundwater for their domestic needs (Boyd, 2003). The most secure way for a community to control its drinking water source is to own it. A famous example of this approach is provided by the case of New York City, which bought large tracts of land in the Catskills-Delaware watershed to protect its drinking water quality (Bone and Pollara 2007). As a result it spends millions of dollars on land purchase and management instead of spending billions on water treatment. Cities such as Victoria and St. John are also purchasing land to manage their drinking water supply and quality. Currently, Canadian communities that own land in their watershed are the exception rather than the rule, as these lands are predominantly provincially or privately owned.

Source water protection can also be implemented through discretionary laws and regulations that restrict land-use activities within watersheds. For example, New Brunswick's Clean Water Act enables the Minister of Environment to protect lands adjacent to watercourses in community watersheds and lands used as groundwater sources (Government of New Brunswick, 2001). Other such discretionary authorities exist in other provinces but are not mandated by legislation.

In general, while source water protection offers significant drinking water benefits, as well as a range of co-benefits to Canadian communities, it is not a tool that is used often. Federal leadership in using source water protection in areas of federal jurisdiction, as well as resources and information to

improve provincial and municipal understanding of the impacts of land-use decisions on drinking water, would be a big step in the uptake of source water protection policies and legislation by Canadian communities.

### **Water treatment**

Treatment of drinking water gains importance, particularly in the absence of source water protection. Drinking water treatment has two steps: filtration and disinfection. Filtration is important to improve the quality of surface water sources of drinking water. However, only four Canadian provinces currently require filtration by law (Sierra Legal Defence Fund, 2006).

The second step, disinfection, involves adding chemicals to water to destroy the harmful microorganisms. Health experts describe this as the basic necessity of good drinking water management. Laws in most provinces mandate disinfection, except in Prince Edward Island, New Brunswick, Newfoundland and Labrador, and Yukon. Chlorine is the primary disinfectant used for drinking water in Canada, though chloramine and ozone are also used. However, chlorine in water has long-term health implications and has been connected to bladder cancer and developmental abnormalities (Magnus *et al.*, 1999; Mills *et al.*, 1998; Rief *et al.*, 1996). Despite this evidence, the regular use of chlorine continues in water treatment in many parts of the country.

### **Water distribution and maintenance**

A third gap in the provision of safe drinking water to Canadians is in the development and maintenance of safe distribution systems for clean drinking water that prevent contamination of treated water en route to the consumer (Boyd, 2003). To ensure that the materials that the distribution pipes and infrastructure are made of are themselves safe, the Drinking Water Materials Safety Act was introduced in 1996 (Government of Canada, 1997). This legislation would have established legally binding standards for construction and plumbing devices used in water delivery systems and would prevent, for example, the continued use of lead to repair water pipes despite health concerns with lead in drinking water. Unfortunately, this act was not officially passed into law.

Other issues with water distribution and maintenance include the need for trained personnel and well-maintained overall distribution systems, as demonstrated by the Walkerton disaster. Ontario's Safe Drinking Water Act establishes a legal standard of care that municipalities must meet. This provincial act mandates training and accreditation requirements for drinking water operating authorities (Government of Ontario, 2002). Unfortunately no consistent standards for personnel expertise or qualifications exist across the country.



Canada's drinking water supply infrastructure is widely acknowledged to be deteriorating, largely because inadequate resources have been allocated to repairing, upgrading, and replacing treatment and distribution facilities (Boyd, 2003). Estimates of the cost of renovating Canadian water infrastructure range from C\$16.5 billion to C\$100 billion.<sup>5</sup>

### ***Drinking Water Standards, Testing and Monitoring***

Comprehensive water testing is a key element of safe drinking water. Only through regular monitoring can system failures be tracked and remedied. In the absence of legally binding standards for drinking water across the country, the voluntary guidelines for drinking water quality act as the standards for more than 80 microbial, chemical and physical contaminants and 78 natural and artificial radioactive elements contaminants.

While a number of provinces have incorporated the federal guidelines into their provincial, legally binding legislation, the extent of water testing differs significantly from province to province. For example, Alberta, Nova Scotia, Ontario and Saskatchewan have relatively strong water quality testing regulations. Newfoundland and Labrador and Prince Edward Island have no mandatory testing requirements at all. British Columbia requires testing for only 3 of 158 contaminants identified in the guidelines.

Bottled water is also related to water testing. The federal government has outlined regulations for bottled water in the Food and Drug Act. These standards are to be enforced by Health Canada. However the act does not specify the frequency and comprehensiveness of testing, and tests only for coliform counts. Information on these tests is not available to the public and the bottled water companies self-regulate their own industry.

### ***A Need for Federal Leadership***

Numerous reports on Canadian drinking water in the last few decades have stressed the need for legally binding drinking water standards in Canada: "Canada needs a national safe drinking water act that standardizes water quality requirements and provides for an acceptable degree of monitoring and enforcement" (Bakker, 2009).

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<sup>5</sup> The Federation of Canadian Municipalities estimate is C\$16.5 billion. The Canadian Water and Wastewater Association estimate is C\$88 billion. Environment Canada [1990] suggests C\$100 billion

“[Ontario’s drinking water] should have been covered by regulations which, unlike guidelines, are *legally binding*.

...Water quality standards for reserves should be no lower than those that apply elsewhere in the province and ...

...those standards should be made *legally enforceable*.”

— Mr. Justice Dennis O’Connor (O’Connor 2002)

#### **Guidelines for Canadian Drinking Water Quality**

These voluntary guidelines established federally set out the basic parameters that every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible. The most important drinking water quality guidelines deal with microbiological quality, to ensure there is minimal risk of exposure to disease-causing organisms in drinking water. These guidelines include bacteriological parameters (E.coli, total coliforms, HPC, and emerging pathogens), protozoa, and viruses.

Turbidity, while not a microbiological parameter per se, is considered an important surrogate measure of microbiological quality because increased turbidity may be associated with a contamination episode and because turbidity may interfere with disinfection.

Health-based guidelines have also been developed for a number of chemical and radiological substances that are found in drinking water supplies across Canada. Some of these substances may only be found at some locations (i.e. are site-specific), meaning they may not be a concern for every drinking water supply.

Aesthetic and operational guidelines have also been developed. These guidelines address parameters which may affect consumer acceptance of the water even though the substance in question is found at concentrations below which health effects appear. These parameters generally affect characteristics such as taste, odour and colour.

Clearly, voluntary guidelines are not the same as standards mandated by law. According to Health Canada, standards are expected to provide a superior level of protection for human health compared to guidelines because they are legally binding and enforceable and failure to comply results in punishment. Guidelines, on the other hand, are essentially voluntary targets that water providers may strive toward but are not required to achieve (Health Canada, n.d).

The current voluntary guidelines for drinking water are, in some cases, much weaker than comparable standards in the United States. For example, the Canadian guidelines for trichloroethylene, an industrial solvent, is 10 times higher than the legal maximum in the U.S.

There is a strong role for the federal government in leading by example and demonstrating the multi-barrier approach in areas of federal responsibility, such as national parks, and First Nations reserves. Consistency in the quality and provision of safe drinking water throughout the country

should be a major concern of the federal government, and this consistency must be supported by mandatory federal standards, leadership, information and resources for all Canadian jurisdictions.

### **Synthesis and relevance to water security**

Most of Canada’s drinking water is considered safe, but the fact that there are *any* locations in Canada where drinking water is unsafe is objectionable. In some instances, the danger of drinking the water is well known, as evidenced by the more than 1,000 boil water advisories. In other instances, drinking water contamination arrives as a surprise, as with Walkerton, North Battleford and Kaschechewan. Both intermittent and chronic drinking water problems indicate that Canada can improve its drinking water security and must consider this for the improved health of Canadians.

The path to optimal drinking water security requires action by all three levels of government, and much of this action can be accomplished through varying degrees of cooperation. Currently, federal action on drinking water security in areas of federal jurisdiction, such as First Nations communities, lags behind many municipalities and provinces. Some provinces have made significant progress in improving their water security, for instance, through strengthened source water protection. However, if Canada wants to have world-class drinking water security across the entire country, the involvement of the federal government is crucial. Inspiration for such involvement can be drawn from the development of draft national regulations on wastewater effluent (see section 3.3), traditionally considered an area primarily of provincial authority. Through collaboration and work through the CCME, nationwide standards for effluent have been developed. A similar cooperative model could be used to develop national drinking water standards, rather than the current guidelines. Due to the high cost of drinking water improvements (source protection, drinking water infrastructure, distribution systems), monitoring and data gaps, the need for education and public outreach, unsafe drinking water on many federal lands, and hesitation by some provinces and territories to independently protect drinking water, federal involvement is vital in order for Canada to achieve the highest possible drinking water security.

### **3.13 “Peace, order and good government”**

The topic of “peace, order and good government” (POGG), also warrants further discussion here. Section 91 of the Constitution Act (1867) confers responsibility for POGG to the federal government. Since water is not specifically mentioned in the constitution, unlike other resources (e.g. fisheries, forests and “non-renewable natural resources”), POGG has particular relevance over the jurisdiction of water (Bailey, 2008; Government of Canada, 1867).

#### **Water Security, POGG and the Federal Government**

Federal role stems from:

- The Constitution Act

Over the years, four branches have developed in the interpretation of this provision, the simplest of which is that POGG can relate to “residuary” matters that are not already denoted in sections 91 and 92 of the Constitution and and/or matters “of national dimension or importance” (McLellen, n.d.).

POGG has also extended emergency powers to the government. Writes Bélanger (2001): “This power permits the Parliament of Canada to infringe upon provincial subjects of legislation when a sufficiently great threat imperils the existence of the country.” Thus far, war, famine and economic emergencies have been matters that have invoked this usage of POGG.

A notion of “federal paramountcy” also exists when overlapping jurisdictions and conflicts exist between federal and provincial/territorial laws.

That is, when federal and provincial laws cover the same or similar subject matters, and there is a conflict between those laws, the central law is operative and the provincial law (to the extent of the conflict) is rendered inoperative. In other words, the provincial law remains valid but cannot operate so long as the central or federal law occupies the field” (Centre for Constitutional Studies, n.d.).

However, this interpretation of the law with regards to water has not been greatly tested. As Bailey (2008) observes: “Where ambiguities over jurisdiction remain, governments have often negotiated agreements with one another, rather than test the constitutional or legal scope of their power to act unilaterally. Historically, whether or not the federal government has taken enough control over the regulation and care of Canada’s water has been a controversial topic.”

Finally, POGG can bestow powers to the federal government when a matter is of national importance, even if that matter is normally under provincial jurisdiction. Bailey (2008) suggests that this is the branch of POGG that is “used most readily” in relation to natural resources. This interpretation may apply, for example, “when a topic is defined by a singleness or indivisibility across jurisdictional lines ... If the failure of one province to accept uniform procedures or legislation would negate the entire objective of the legislation instituted in other provinces, then POGG may be used to justify federal legislation on the matter” (Bailey, 2008).

For example, POGG was referenced in the 1975 Supreme Court of Canada (S.C.C.) case *Interprovincial Co-Operatives v. Manitoba*, which considered pollution from chlor-alkali plants in Ontario and Saskatchewan, which released mercury into interprovincial waterways that flowed into Manitoba, effecting Manitoba’s fish stocks. The S.C.C. considered the liability of the plants, which were operating within the regulations in their home provinces. Bailey explains the conundrum as

follows: “To impose liability ... would also negate the Ontario and Saskatchewan regulatory licences that gave a lawful excuse for the contamination. The constitutional question for the Court was whether or not pollution in interprovincial waters can be dealt with under provincial heads of power or whether it must fall under federal authority.” Three out of seven justices said that the issue fell under POGG power due to its interprovincial nature. While four of the justices did not view the matter as falling under POGG jurisdiction, it is generally accepted that this decision stands for the principle that interprovincial pollution of fisheries is a matter falling under the federal power over POGG (Bailey 2008).

The reach of POGG has not yet been fully tested by the federal government: “The case law surrounding jurisdiction over Canadian water has tended to turn on the facts of each case rather than provide an overarching strategy for ensuring effective management of the resource. Many areas remain unexamined by the courts and, where decisions have been rendered, varying approaches have been used” (Bailey 2008). Section 4 will provide further discussion around its possible applicability to water security.<sup>6</sup>

### ***Synthesis and relevance to water security***

Canadians recognize that water security underpins the well-being of Canada. According to a 2011 Ipsos Reid survey, 90 per cent of Canadians believe that “if nothing is done to improve the management of water resources in Canada, the impact on the national economy and prosperity of Canada will be serious.” In addition, three-quarters of Canadians believe that water is “very important to Canada’s economy, prosperity and quality of life.”

These findings suggest that Canadians view water security as an issue of national importance, an area that falls under the federal power to maintain POGG. In instances where water security is a concern, a largely untested avenue does exist for the federal government to assert authority. Section 4 will further expand on the potential role of POGG.

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<sup>6</sup> It should be noted that the authors are not lawyers and, as such, perspectives offered are based on a review of materials and not on legal expertise.

## 4.0 Discussion of the application of water security in Canada: The case for a strong federal role

### *The bigger picture: Water security implies a need for foresight*

A 2011 snapshot of water security in Canada shows room for improvement in many areas. A number of potential actions to improve water security are risk free, even if the current economy, demographics and climate of Canada and the globe stay the same. However, significant changes are expected in the 21<sup>st</sup> century. This section will argue that the federal role in water security will need to increase in coming years due to the federal responsibility for peace, order and good government—that water security fits under the purview of POGG because it is an issue of national importance. In essence, the Canadian public expects its government to protect it from harm; the uncertainties of the 21<sup>st</sup> century and likely impacts on water resources are a compelling reason for the federal government to take renewed leadership on water security. The main impacts are likely to fall into one or more of the three following categories: aquatic ecosystems, human health and well-being, and agriculture.

### *Aquatic ecosystems*

On the environmental front, climate change poses a definite threat to water quality and quantity. Chapter 3 of the 2007 report from the Intergovernmental Panel on Climate Change (IPCC) outlines the potential implications of climate change on freshwater (Kundzewicz *et al.*, 2007). Of perhaps greatest interest to Environment Canada, effects on aquatic ecosystems could include increased periods of low flow (e.g. due to drought or decreased glacial runoff) that would lower water quality by concentrating pollution, as well as contribute to increased water temperature;<sup>7</sup> salinization of groundwater and wetlands due to rising sea levels and higher rates of evaporation; increased frequency and extremes of droughts and floods; and increased erosion into watercourses from heavy precipitation and floods which could affect fish habitat (e.g. turbidity, nutrients).

### *Human health and well-being*

Many of the effects on aquatic ecosystems listed above would also have fairly direct effects on humans. Increased droughts and higher rates of evaporation would lead to decreased flows through hydro dams, necessitating difficult choices between instream flow needs (e.g. to protect aquatic species) and power generation.<sup>8</sup> Increased nutrients in waterways could lead to further algal blooms,

<sup>7</sup> Increased water temperatures affect the health of salmon on both the east and west coasts (Kundzewicz *et al.*, 2007; Warren, 2004)

<sup>8</sup> Obligations to export energy to the U.S. under NAFTA could further complicate this situation. While NAFTA does allow for environmental protection (Boyd, 2003), challenges could arise.

some of them toxic, already a problem in many areas of Canada with resultant effects on recreation, local economies, and health (e.g. Manitoba's Lake Winnipeg, numerous lakes in Quebec).

There could also be more direct impacts on humans. The functioning (i.e. reliability and operating costs) of water infrastructure could be affected by such factors as increased nutrient levels and sediments in water, as well as the overloading of wastewater treatment plants: these effects will be even greater during periods of heavy precipitation. Upgrades to existing infrastructure, improved purification and increased monitoring could be called for in water infrastructure in order to protect human health. In addition, extreme rainfall events can lead to increased pathogens and viruses in drinking water sources (Kundzewicz *et al.*, 2007; National Water Research Institute, 2004).

The increased threat of drinking water contamination is of particular concern because of an anticipated demographic change in Canada: the ageing of the baby boomers. By 2026, one in five Canadians will be seniors (65 years or older), and by 2050 one in four (Canadian Geographic, n.d.). This older population will be more vulnerable to dehydration caused by such waterborne illnesses such as cryptosporidium, *E. coli*, giardia and coliform bacteria (Ministry of Health and Long-Term Care, 2009; Health Canada, 2009).

Though this study did not look in detail at how flooding relates to water security, a note should be made that protection against natural disasters is also important. With flooding anticipated to increase under climate change, flood protection is all the more critical. A study in the Boston area and the North-Eastern U.S. found that the economics costs of the projected flood damage under climate change in 2100 were "sufficiently high to justify large expenditures on adaptation strategies" (IPCC, 2007). Environment Canada might also want to consider the value of wetlands and natural habitats in not only providing natural protection to mitigate floods (Brody *et al.* 2007), but also providing water storage in times of drought (in addition to other benefits such as water purification, recreation, food provision and habitat) (see, for example, Aylward *et al.*, 2005).

### Agriculture

In addition, food security may be put at risk in the 21<sup>st</sup> century, particularly if Canada does not strive to improve its water security. The sustainability of agriculture in some areas is already at risk due to water insecurity. For instance, the semi-arid Okanagan region of British Columbia uses 76 per cent of its water for irrigation, and may have difficulty meeting increased water demand due to either climate change or population growth (Kundzewicz *et al.*, 2007; Natural Resources Canada, 2007). Similarly, the agricultural areas of the prairies already experience frequent water availability issues.



The region endured at least 40 droughts in the last two decades, with multi-year ones in the 1890s, 1930s, 1980s and 2001-2002<sup>9</sup> (Drought Research Initiative, n.d.).

**Table 4.1: Impacts of the 2001–2002 drought on agriculture**

Region	Impacts
British Columbia	<ul style="list-style-type: none"> <li>• Losses in vegetable crops</li> <li>• Negative effects on forage crops, especially in the northern Okanagan</li> </ul>
Prairies	<ul style="list-style-type: none"> <li>• Wheat and canola production down 43 per cent from 2000</li> <li>• Impact of decreased grain production estimated at \$5 billion</li> <li>• Water for irrigation in spring rationed in Alberta for first time</li> <li>• In Manitoba, increased disease problems in canola, barley and wheat</li> </ul>
Great Lakes-St. Lawrence	<ul style="list-style-type: none"> <li>• Most crops in Ontario impacted by dry weather and heat</li> <li>• Increased stress from disease, insects and hail</li> <li>• Record number of certain insects in Quebec</li> </ul>
Atlantic	<ul style="list-style-type: none"> <li>• Potato harvest in P.E.I. down 35–45 per cent</li> <li>• Fruit (e.g. blueberries, strawberries) and other vegetables (e.g. beans) crops impacted by drought stress</li> </ul>

Source: Natural Resources Canada, 2007

The 2001–2002 drought, now recognized as one of Canada’s most expensive natural disasters (\$5.8 billion) has been cited as a harbinger of things to come (Natural Resources Canada, 2007). Severe, multi-year drought events of a similar magnitude are anticipated to increase in the future as a result of climate change (Kundzewicz *et al.*, 2007; Natural Resources Canada, 2007). It should be noted that considerable uncertainty still exists with climate change predictions, and that both positive (e.g. a longer growing season) and negative effects are projected. There is nearly scientific consensus that severe effects will occur from climate change.

The direct effects of drought will be multiplied by the already-evident change in the timing of runoff of glacial melting, which is the main source of supply for prairie rivers. Earlier melting will mean that more water will flow down in May and June, when there is, in most years, already plenty of soil moisture on the prairies, rather than coming later in July and August, when soil moisture is commonly depleted (National Water Research Institute, 2004)

<sup>9</sup> The Drought Research Initiative suggests that this drought period may have in fact been from 1999–2004, though the more commonly cited period is 2001–2002 (e.g. CBC, 2009; Natural Resources Canada, 2007).

In 2001–2002, impacts on agriculture were felt across Canada, as summarized in Table 4.1. For instance, water shortages in parts of Saskatchewan and Alberta lowered crop yields by as much as 43 per cent, and livestock farmers were forced to sell off parts of their herds due to insufficient feed. This vulnerability has led to increasing realization of the need for agricultural adaptation such as improved irrigation systems, the development of new cultivars, changes in planting dates, changes in tillage methods and snowmelt management. If the moisture availability concerns related to climate change are sufficiently addressed, Canada may even find itself in an enviable economic position; Natural Resources Canada suggests that “successful anticipatory adaptation in the agri-food industry could provide Canadian producers with a competitive advantage.” While the management of agriculture falls mostly to Agriculture and Agri-Food Canada, there are definite areas of overlap and opportunities for various departments to work together to pursue the best adaptation strategies. For instance, Environment Canada could encourage the preservation and restoration of wetlands, which would provide the multiple benefits of water provision during times of drought, flood buffering and habitat provision.

### **Summary of federal responsibilities**

#### *Definite federal responsibility*

In areas that are clearly designated as being federal responsibilities, the federal government can move forward boldly. For example, in the area of fisheries, it can use the powerful and far-reaching Fisheries Act to protect Canada’s fish stocks and aquatic habitats. In matters of boundary and transboundary waters, it can take a leadership position to ensure that water security is sustainably, fairly and diplomatically achieved and that appropriate levels of water quality and quantity are maintained for the benefits of humans and natural ecosystems alike. On federal land, the government can lead by example, demonstrating sustainable water management, such as by ensuring high levels of wastewater treatment, drinking water purification and water use efficiency. One notable area in which the federal government could act is in the provision of exceptional water and wastewater treatment services on First Nations reserves. While the provincial governments have constitutional jurisdiction in these matters on their lands, the federal government has a valuable opportunity to model best water management practices on Crown lands (Phare, 2009).

In areas of clear federal responsibility, Parliament can enact regulations if it so wishes. Sometimes, this may be the appropriate course of action. However, other policy instruments may also be effective. Collaboration has proven to be a successful approach for topics such as transboundary waters; management in the Red River Basin provides one such example (see section 3.5). The various types of policy instruments available to the federal government are outlined in Table 4.2.

Shared responsibility and “grey areas”

Some of the themes discussed in this report are of shared jurisdiction between the federal and provincial governments. Here, too, the federal government may find it possible to enact regulations. For instance, while pollution control is generally a provincial responsibility, the federal government has a plausible role under the Fisheries Act if aquatic habitat is threatened. Regulations such as the proposed wastewater quality regulations, enabled by the Fisheries Act, demonstrate the federal government's regulatory ability in many "grey areas."

The federal government also has a mandate under the Fisheries Act to ensure adequate instream flows, which are sometimes threatened by activities that are designated as provincial responsibilities (e.g. hydro development). While the federal government may wish to tread fairly carefully when such issues arise, protecting this habitat is still a federal responsibility. The federal government does have authority to become involved. Where possible and effective, "softer" approaches such as that demonstrated by negotiations between the DFO and hydro authorities regarding instream flows may be pursued.

### *Implications for "peace, order and good government"*

Uncertainties regarding agriculture and climate in the 21<sup>st</sup> century evoke a powerful reason for the federal government to refresh and strengthen its involvement in water security. While it has a clear path forward in areas of definite federal jurisdiction under the Constitution Act, it should not shy away from becoming involved in areas deemed provincial. Constitutionally, it may find the power through its responsibility for "peace, order and good governance" (POGG).

**Table 4.2: Policy tools for water security**

- **Economic instruments:** measures, including market-based instruments or financial incentives, that directly influence the price that a consumer or producer pays for a product or activity (e.g. tradable permits, deposit refunds, performance bonds, taxes, user fees, subsidies, tax breaks, earmarked taxes and funds and administered prices).
- **Direct expenditure instruments:** involves government expenditure channelled to influence producer or consumer behaviour (e.g. green procurement, research and development, moral suasion).
- **Regulatory instruments:** describe efforts to create change via legal avenues, including legislation, liability, enforcement activity and competition and deregulation policy.
- **Institutional instruments:** affect the workings of government itself in an effort to promote change. Actions can include internal education efforts, internal policies and procedures. Efforts such as the National Round Table on the Environment and the Economy or the Commissioner of the Environment and Sustainable Development are examples of such instruments. Also in this category are multi-government bodies, such as the Prairie Provinces Water Board or the Canadian Council of Ministers for the Environment.
- **Communications and education:** involves measures that engage the general public, as well as specific audiences (e.g. industry). Actions in this category includes such things as information advertising campaigns (print, television, radio, signage etc.), public information sessions and public consultations.

Adapted from *Designing Policies in a world of Uncertainty, Change and Surprise*  
([http://www.iisd.org/pdf/2006/climate\\_designing\\_policies.pdf](http://www.iisd.org/pdf/2006/climate_designing_policies.pdf))

Under the interpretation of POGG that extends federal powers to matters of national importance, water is a clear contender for POGG consideration. It can hardly be argued that water quality and quantity are *not* issues of national importance, given the dependence of every living thing on this resource. For the long-term well-being of the nation, pollution into waterways must be adequately controlled so as not to harm humans or ecosystems. Citizens should be assured that every effort has been made to ensure the water they drink is safe. Water flows must be maintained in order not to offset natural balances. There should be iron-clad barriers to the transport and trade of bulk water beyond small quantities traded by border communities, particularly when the current laws governing any potential trade (i.e. NAFTA) prohibit the cessation of this trade in the future. Even in areas of provincial jurisdiction under the Constitution Act, there may be an entry point for the federal government under POGG.

While a legal paper from the Centre for Constitutional Studies suggests that the argument of “national importance” is the most commonly used application of POGG in water issues, there may be other applications. “Federal paramountcy,” which applies when jurisdictions overlap, as it does for health and agriculture, could serve when provincial and federal laws related to water conflict. Admittedly, having a federal law essentially “override” a provincial one is not ideal, but other countries such as the United States do enact such provisions more frequently.

Finally, a comment can be made on the “emergency powers” interpretation of POGG. The word “emergency” implies immediacy, such as the outbreak of war or famine. However, what of chronic problems which threaten peace, order and good government? What of looming problems, such as the spectre of increased extreme drought due to climate change? What if the federal government observes that the provinces are not bracing for these? For the federal government to assert power over chronic matters would be a new application of POGG. However, it is worth considering. The federal government’s Guidelines for Canadian Drinking Water Quality have existed since 1968, and yet drinking water remains an issue, and the guidelines are far from met in many places in Canada. To paraphrase James Howard Kunstler, there are numerous “long emergencies” that face Canada. The federal government, ideally in cooperation and agreement with provincial and territorial governments, may be best placed to plan Canadian responses to these emergencies.

Another concept related to POGG that should be noted is that of the “public trust doctrine.” Originating in English common law, and having roots that extend to Roman times, this doctrine “obliges governments to manage water in ways that support long-term use for the entire public” (Brooks 2008). This concept has seen increasing usage and acceptance by U.S. courts. For example, in the *National Audubon Society v. Superior Court of Alpine Lake*, which considered a private diversion project near Mono Lake, the California Supreme Court concluded that “the scenic view of the lake and its shore, the purity of the air, and the use of the lake for nesting and feeding of birds

... is among the purposes of the public trust” (as cited in Pentland, 2009). Despite its English origins, the public trust doctrine is not well-known in Canada. However, numerous Canadian water experts, including Ralph Pentland (who helped develop the 1987 Federal Water Policy) and David Brooks, advocate its application in Canada. Writes Pentland (2009) of the doctrine: “It has been used not only to preserve the right of the public to use of water and other resources, but also to challenge the action or inaction of various levels of government.” Similarly, Brooks (2010) explains:

If the public trust doctrine were adopted for water management in Canada, it would make explicit the responsibility of both provincial and federal governments to manage renewable natural resources within their respective areas of authority in such ways as to support the long-term use and enjoyment of them for the whole public. As one example, such a doctrine would [have made] it very difficult to adopt ... amendments to the Navigable Waters Protection Act, which [were] buried inside the Budget Implementation Act of 2009, that ... grant[ed] the federal government authority to identify waterways deemed worthy and unworthy of federal protection [see section 3.8], and therefore to limit the public’s right to use the latter. (See section 3.8 for more on this amendment

*Security* is linked to “peace, order and good government.” Without *security*, peace and order are at risk. Water is an essential resource for all citizens, as well as for the ecosystems on which they depend. Riots happen over food and water. Former United Nations Secretary General Boutros Boutros-Ghali famously predicted wars over water—though he was referring to the Middle East. The argument stands that water security is tied to peace and order. Canada is admittedly in a more fortunate situation than many countries in the world, but it should also not be complacent; these countries are pursuing adaptation, and so too must Canada. The “myth of Canadian water abundance” has been criticized by many water experts and must be dispelled.

## 5.0 Recommendations for federal government action on water security

The federal government can play a far greater role in the water security of Canada than it currently does. Since responsibility for water itself is not specifically delegated in the Canadian Constitution, confusion and disagreements currently hinder water policy at all levels. In order to improve Canadian water security, greater clarity must be found. This report has discussed responsibilities in the Constitution, related them to water, and provided discussion about where federal responsibility lies. We also assert that the POGG power of the Constitution should compel the federal government to increase its water-related activities in order to meet its responsibility to act on issues of national interest. We suggest that water security is one such interest.

In recent years, other specialists in the water field have put forward recommendations to improve water management in Canada. We include many of those recommendations below and endorse them as contributing to water security. We also make additional recommendations, categorized on the constitutional themes of this report. Our prioritized recommendations, those that we believe have the highest urgency or could contribute the most to water security, are provided in the executive summary of this report. However, we emphasize that a suite of new policies in all of this report's thematic areas is necessary to bolster water security in Canada.

Our detailed recommendations to the federal government for each topic are:

### ***Fisheries and fish habitat***

1. Particularly where other measures prove inadequate, increase enforcement of the Fisheries Act in order to protect water quality and quantity in aquatic ecosystems and fish habitat (Morris *et al.*, 2007; Boyd, 2003). The most effective approach to improved enforcement will require further analysis, but improved monitoring to detect water quality pollution/reduction events (see section 3.2) and the hiring of more enforcement officers are part of the solution.
2. Encourage citizen engagement in aquatic habitat monitoring by creating a “report a suspected violation” phone and email service. Include publicity (e.g. communications materials, advertisements) in this endeavour to: a) help citizens identify true violations (to minimize reports that are not offenses) and; b) increase general public awareness of the federal role in the protection of aquatic habitat. Ensure that proper staffing is provided to respond to citizen concerns in a timely manner. Develop a system to prioritize events (e.g. identify which require immediate attention to be verified and which are chronic and need not be investigated immediately).

3. Provide modest financial support for citizen-based monitoring of fish habitat and ecosystems. In recognition that it may not be possible to meet demand, select recipient funding based on 1) risk-based assessments (e.g. presence of threatened/endangered species, known violations, area that lacks data, water bodies of national importance); 2) pre-existing citizen willingness and local champion(s) for citizen-based monitoring, and preferably some internal knowledge of monitoring in the group (in order to improve reliability and reduce training required). Recognize that while the data could provide earlier indicators to problems, it may be less reliable than data collected by “official” means. Significant benefits of this approach are citizen engagement and education, but this type of monitoring cannot replace federal monitoring at this point in time (a high amount of training and standards of citizen-based monitoring networks would be required for this to be the case).

### ***Monitoring of surface water quality and quantity***

4. Convene and adequately fund and staff a federal panel to study the state of surface water quality and quantity monitoring in Canada. Have it produce a preliminary report within one year on immediate and longer-term actions for surface monitoring, followed by a public hearing and consultation. A full program for monitoring should then be established and should produce annual updates every year thereafter, with a full report on progress every three years. Areas to be considered should include:
  - a. the optimum number and location of surface water quality and quantity monitoring stations across Canada, as recommended by Vaughan (2010);
  - b. identification of gaps in existing coverage; the application of “a risk-based approach to establish new monitoring stations, focusing on activities and substances that pose the greatest risk to water quality and quantity.” (Vaughan 2010);
  - c. addressing Vaughan’s (2010) concerns about surface water quality and quantity monitoring on federal lands, as detailed in his report. We recommend the federal government should lead by example by increasing monitoring on federal lands through the two programs highlighted above.

### ***Assessment and Monitoring of Groundwater***

5. Complete mapping of major Canadian groundwater aquifers by 2015 in order to aid decision-making (e.g. re: water withdrawal licensing) to be made based on an understanding of available resources. Leadership and coordination to create a national inventory should be



federal, though provincial collaboration is strongly encouraged. (Morris *et al.*, 2007; Nowlan, 2005<sup>10</sup>)

### **Pollution Control**

6. Lead by example on federal lands by enacting strong pollution control measures.
7. Continue and enhance existing watershed-based management. For non-point source reductions, conduct (or support the conduction of) research, mapping and other technical work (geo-spatial analysis, LIDAR) that will allow for strategic targeting of actions to maximize benefits.
8. Encourage municipalities to pursue full-cost recovery of wastewater treatment via pricing (see section 3.10). (CCME, 1994; CCME, 2006; Boyd, 2003).
9. Pass into law the Wastewater Systems Effluent Regulations, ensuring demanding but feasible timelines for upgrades.
10. Provide federal funding to upgrade municipal wastewater treatment in order to help municipalities achieve new standards under the Wastewater Systems Effluent Regulations.
11. Provide federal funding to improve or replace combined sewage and stormwater systems, which frequently spill raw sewage into waterways during floods and heavy rainfall.
12. Continue and strengthen existing initiatives (e.g. the Lake Simcoe Cleanup Fund) to control pollution in major waterways; ensure monitoring is conducted to detect effectiveness of actions.
13. Identify new opportunities for such pollution control initiatives and expand approach to other threatened waterways, including smaller ones of national importance.
14. Encourage and aid (e.g. through funding, information provision) municipalities to pursue a cutting-edge way to help pay for the needed upgrades (e.g. phosphorous recovery; this nutrient is a scarce and renewable resource which is currently put into landfills by many wastewater treatment processes, but which has strategic importance and monetary value (see Venema, 2010; McCandless and Medeiros, 2010)).

### **Instream flows and hydroelectric power**

15. Create a national program to identify locations of highest instream flow concerns (dam-related and other). Work with relevant parties to proactively address these concerns. Include temporal dimension in analysis (e.g. decreased water flows due to glacial melt).
16. Provide “support to provinces and territories to establish effective instream flow programs” (Morris *et al.*, 2007), and develop risk-based/adaptive management planning for low-flow periods.

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<sup>10</sup> Various timelines are suggested for when aquifer monitoring should be completed. For instance, Morris et al. suggest 2010. We suggest 2015 by extending previous suggested timelines, which were not met).

17. Encourage intergovernmental cooperation on instream flows (Morris *et al.*, 2007).
18. Develop memorandums of understanding between hydro operators and DFO to protect instream flows, using adaptive planning approach.
19. Use *Fisheries Act* to enforce instream flow needs, particularly if other options are not effective (Boyd 2003).
20. Require that cost-benefit analyses for dams include allowance for power loss in years when water levels are low.

### **Boundary and transboundary waters**

21. Strengthen support of watershed-level management across Canada–U.S. boundaries (e.g. Lake Winnipeg Basin) through the International Watershed Initiative and strengthened relationships with existing and potential local agencies.
22. Strengthen the Boundary Waters Treaty and re-establish the IJC as the centrepiece of its implementation to ensure resolution of issues such as the Devil’s Lake controversy (David Brooks, 2010 transcript; Mehan III and Brooks, 2008; Morris *et al.*, 2007)

### **Interprovincial water issues**

23. Strengthen inter-provincial processes through watershed-based management and an adaptive, ecosystem based approach to maximise ecological, economic and social benefits for all stakeholders.
24. Inter-provincial water allocation agreements should be based on both human needs and instream flow needs for ecological functions and aquatic ecosystems. (De Loë *et al.*, 2007)
25. Water allocations should move from being “first in right” systems to being more inclusive, more aligned with cultural and economic priorities and inclusive in their determination. (Pollution Probe, 2007; De Loë, 2007).
26. Strengthen federal authority on resolution of inter-provincial issues using shared responsibility on inter-provincial waters as a basis for increased presence and authority (De Loë, 2007)
27. Develop multilateral bodies for decision-making about shared groundwater management.

### **Bulk water exports**

28. Develop formal federal regulations based on ecosystem sustainability principles that prohibit bulk export of water from all Canadian waters (the International Boundary Waters Treaty applies only to boundary waters) (Canadian Water Issues Council, 2008; Quinn, 2007).
29. Prohibit interbasin diversions on ecosystem health grounds (Canadian Water Issues Council, 2008).

30. “Negotiate a specific exemption to NAFTA for freshwater as was done for raw logs and unprocessed fish” (Morris *et al* 2007, 42).

### **Navigation**

31. Reverse 2009 amendment that excluded “minor works and waters” from triggering an environmental assessment under the Navigable Waters Protection Act.

### **Water Conservation**

32. Guide municipalities and provinces to pursue pricing structures that encourage water conservation (Brandes, Renzetti and Stinchcombe, 2010; Morris *et al.*, 2007; Renzetti, 2009; Boyd, 2003; Environment Canada, 1987), possibly by tying funding for infrastructure upgrades to more realistic pricing. Government agencies should also pay full cost for water and water services. Finally, the federal government should encourage municipalities to consider the value of ecological infrastructure<sup>11</sup> to provide such services at low or no cost.
33. Lead by example on federal lands by improving water conservation measures, including the less obvious options (e.g. water-efficient landscaping).
34. Provide funding to upgrade municipal water infrastructure.
35. Undertake public education and communication actions to correct the myth of water abundance and help water users understand the need for conservation.
36. Establish an ongoing appliance labelling program for water-using appliances and fixtures, and require that the labels be clearly displayed on the outside of all units.
37. Support the development and diffusion of water-efficient technologies for both residential areas and industry, by, for example, mandatory labelling requirements.
38. Ask CMHC to add strong water efficiency measures to the Canadian Building Code.
39. Promote competitions among various federal agencies and federal crown corporations to show improvements in the water efficiency of their operations.
40. Maintain federal support for the municipal water data base, as managed by Environment Canada. Further, on a selective base, perhaps once each fifth year, require a longer form response to gather more detailed data on water use.
41. Undertake research programs to determine the cost effectiveness and health impacts of recycling grey water inside the home.

### **Water on federal lands, territories**

42. Lead by example on federal lands in the area of water quality and quantity monitoring.
43. Lead by example on federal lands in the area of drinking water.

<sup>11</sup> For instance, see Voora *et al.*, 2010.

44. Lead by example on federal lands in the area of wastewater treatment.
45. Prioritize First Nations reserves for these improvements through whatever means necessary (e.g. improved infrastructure, training of locals to operate and maintain this infrastructure<sup>12</sup>)

### **Drinking Water**

46. Upgrade and mandate drinking water standards through a consultative approach similar to how draft wastewater standards were developed (Morris *et al.*, 2007; Bakker, 2009; Justice O'Connor, 2002).
47. Strengthen federal role in drinking water responsibilities and lead by example in areas of federal responsibility, such as First Nations reserves, crown lands and national parks.
48. Lead through resources, tracking overall trends and influencing provincial governments through infrastructure funding (Boyd, 2003; Morris *et al.*, 2007)
49. Improve transparency and accountability (Boyd, 2003).
50. Improve the relevance and application of the multi-barrier approach to drinking water management (CCME, 2004; Morris *et al.*, 2007).

### **Broader recommendations**

51. Establish an inter-departmental panel to review the 1987 Federal Water Policy, and distinguish the status of each specific action and define where the policies need to be adjusted, amended, or augmented, and also where new policies need to be established.
52. Integrate adaptive management into planning, particularly as related to expected 21<sup>st</sup> century trends and anticipated risks in such areas as fish habitat, instream flows in rivers used for hydro, river/lake water quality and quantity, water sharing agreements, transboundary watershed management, navigation and drinking water quantity and quality.
53. Facilitate ecosystem-based management across jurisdictions and sectors towards a systems approach that increases the realization of multiple benefits. We recommend an integrated water resources management<sup>13</sup> (IWRM) approach.
54. Provide assistance to provinces and municipalities to integrate adaptive management into planning
55. Establish a method for valuing natural capital (e.g. provision of services such as flood protection, water storage, water purification, recreation, habitat, food provision) and insist that this method be used in all federal projects. The method could be proposed by an expert panel, and updated with new information about methodology every 5 or 10 years.

<sup>12</sup> Brooks (2008) writes of water quality of First Nation reserves: “The problem is not insufficient federal funding to build the necessary infrastructure but lack of funding to train local staff to operate it and do the monitoring to maintain water quality standards” (11).

<sup>13</sup> For instance, see Roy, Osborne & Venema, 2009.

56. Through improved integrated research and monitoring, increase knowledge and understanding of the current state of Canada's water in order to help plan for the future.

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## Appendix A

### *Selected Enabling Statutes*

- Arctic Waters Pollution Prevention Act (1985)
- Canadian Environmental Assessment Act (1992)
- Canadian Environmental Protection Act (1999)
  - Includes oceans and waterways, dumping, toxic substances
- Canada National Marine Conservation Areas Act (2002)
- Canadian Shipping Act (2001)
  - Includes ballast and pollution
- Canada Water Act (1970)
  - Administered by Environment Canada, “contains provisions for formal consultation and agreements with the provinces”
- Canada Wildlife Act (1985)
- Constitution Act (1867)
- Department of the Environment Act (1985)
  - “Assigns the national leadership for water management to the Minister of the Environment.”
- Dominion Water Power Act (1985)
- Fisheries Act (1985)
  - Includes protection of fish habitat
  - Prohibits the deposit of “deleterious” substances into waters frequented by fish
    - Municipal wastewater effluent frequently violates this section of the Act
- Hazardous Products Act
- International Boundary Waters Treaty Act (1909)
- International Rivers Improvements Act (1985)
  - “provides for licensing of activities that may alter the flow of rivers flowing into the United States”
- Mackenzie Valley Resource Management Act (1998)
- Migratory Birds Convention Act (1994)
- National Roundtable on the Environment and the Economy Act (1993)
- Navigable Waters Protection Act (1985)
- Northwest Territories Waters Act (1992)
- Nunavut Waters and Nunavut Surface Rights Tribunal Act (2002)

- Oceans Act (1996)
- Species At Risk Act (2002)
- Transportation of Dangerous Goods Act
- Transboundary Waters Protection Act (Tabled May 2010)

### ***Selected Transboundary(domestic or international) Agreements and Boards***

- Agreement for Water Supply and Flood Control in the Souris River Basin (1989)
- Boundary Waters Treaty (1909)
- Columbia River Treaty (1961) and Protocol (1964)
- Great Lakes Binational Toxics Strategy (1997)
- Great Lakes Water Quality Agreement (1972, Amended 1978 and 1987)
- International Red River Board (created by IJC in 2000)
- Lake of the Woods Convention and Protocol (1925)
- Mackenzie River Basin Board
- Niagara River Water Diversion Treaty (1950)
- Poplar River Bilateral Monitoring Committee (1980)
- Prairie Provinces Water Board
- Souris River Bilateral Water Quality Monitoring Group

### ***Selected Relevant Policies and Guidelines (no legal authority)***

- Canadian Water Quality Guidelines
- Federal Water Policy (1987)
- Federal Wetlands Policy (1991)
- Guidelines for Canadian Drinking Water Quality
- Guidelines for Canadian Recreational Water Quality
- Guidelines for Domestic Reclaimed Water for Use in Toilet and Urinal Flushing
- Guidelines for Hazardous Waste Landfills
- Guidelines for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents
- Water Quality Guidelines for the Protection of Aquatic Life