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HORIZONS

POLICY RESEARCH INITIATIVE

Freshwater for the Future

From recreation to food and drink, from transportation to electricity generation, water penetrates every aspect of our lives and economy. It was one of the four elements of classical Greek philosophy, and is recognized as the prerequisite for life both on Earth and on other planets. With salt added, it covers two thirds of our planet, and without salt, it covers nine percent of our country. Yet water shortages occur every year somewhere in Canada, to the point that early explorers deemed the southern prairies uninhabitable due to permanent drought.

Water is no stranger to the front pages of Canada's newspapers: from alien invasive species to boil-water advisories and from seasonal beach closures to drought, few Canadians are unaffected by water quality or supply issues. Indeed, Ipsos-Reid polls show that 42 percent of Canadians feel water pollution is the most urgent environmental issue for our leaders

(continued on p. 2)

FRESHWATER

Watch for the next issue of *Horizons* on China: *Engaging the Dragon.*

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Policy Research Initiative
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HORIZONS
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PRI Horizons Team

The Policy Research Initiative produces *Horizons* as a liaison publication for the federal government policy research community. The primary objective of the PRI is to deepen, collect, and integrate research on crosscutting issues that are highly relevant to the Government of Canada's medium-term policy agenda. *Horizons* highlights the work of policy researchers from across federal departments, and from external experts, on issues that relate closely to PRI horizontal research projects and activities. For more information on the PRI or to consult previous issues of *Horizons,* please visit <www.policyresearch.gc.ca>.

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E-mail: horizons@prs-srp.gc.ca
Phone: 613 947.1956
Fax: 613 995.6006

to address, and the environment is Canadians' second greatest concern after health care.

Yet Canada has not had a significant federal freshwater policy review since 1987. Indeed, the 1987 Federal Water Policy is prefaced on Environment Canada's web site with a note:

> "What follows is the text of the 1987 Federal Water Policy. Despite the date of publication, many of the issues and strategies outlined in the 1987 Policy remain valid today. Since no more recent published policy can be offered at this time, the text of the 1987 Policy is offered for information purposes only."

The Policy Research Initiative's Sustainable Development project spent the past two and a half years focused on freshwater issues. In the course of the research, project members investigated pricing and other economic instruments for water demand management, and they examined the potential of water quality trading for controlling water pollution. They contemplated boundary water issues and sought to understand how water resources can be managed in an integrated way.

The articles in this issue of *Horizons* reflect the diversity of views encountered during this work, and raise questions we cannot yet answer. Indeed, one unifying theme of these articles is the lack of information; we just do not know enough about our water resources, or about the effectiveness of various policy tools for managing them. Another unifying theme is the need for integrated management.

"Canada is very far behind, from what I understand, in any sort of a national water strategy" the Honourable Rona Ambrose, Minister of the Environment, recently told the *Calgary Herald*.

In his lead article, Ian Campbell calls for the development of a pan-Canadian freshwater policy framework. He identifies some of the challenges that can only be met by co-ordinated action by all levels of government, and some of the policy instruments that may (or may not) be effective in managing our water resources. This theme is carried forward in a provocative essay by the Honourable Steve Ashton, Manitoba's Minister of Water Stewardship.

Duncan Ellison of the Canadian Water and Wastewater Association seeks to answer the question: Does the rise of bottled water reflect a lack of trust in our municipal water treatment plants, or has bottled water become a matter of convenience, or even of prestige?

Bernard Cantin reviews some of the PRI's work on market-based instruments for water management, concluding that more attention needs to be paid to designing cost-effective

policy mixes, rather than relying on single instruments. Meriem Aït Ouyahia reviews the case for and against public-private partnerships for municipal water services, and suggests that while further investigation is warranted, savings to the public purse are likely illusory. With both market-based instruments and PPPs, there are lessons to be learned from experience in Canada and elsewhere, but that learning will take an effort.

David Brooks of Friends of the Earth and Oliver Brandes of POLIS presents the concept of Soft Paths for water – essentially finding ways of providing the services we seek without – or at least with less – water. Maria Klimas and Alfons Weersink of the University of Guelph explores how the Agricultural Policy Framework addresses water, from promoting less water-intensive irrigation technology to encouraging pollution-reducing beneficial management practices.

The 2004 film "H_2O," starring (and produced and co-written by) Paul Gross, revived – and arguably preyed on – fears of bulk water diversion to the United States. The spectre of this and other boundary waters issues is the backdrop to three papers. Sushma Barewal interviews the Rt. Hon. Herb Gray of the International Joint Commission and Paul Muldoon of the Canadian Environmental Law Association. Dixon Thompson of the University of Calgary discusses bulk water export, and Merrell-Ann Phare of the Centre for Indigenous Environmental Resources addresses boundary waters from the perspective of First Nations and Aboriginal rights.

It was noted above that two leitmotifs in this issue are the lack of information and the need for integrated management. Because watersheds integrate everything done in them or to them, water cannot be effectively and enduringly managed on a one project at a time basis – but data are rarely available at the right scale. Rivers flow from one community to another, and there are innumerable invisible and often unknown connections between surface waters and groundwater. Integrated water resources management (IWRM) has been developed as a means of addressing the cumulative impacts human activity may have on water resources.

Shawn Dalton discusses citizen-based watershed stewardship, as both a prerequisite and a foundation for IWRM. Lack of information, particularly of scientific information, is a key impediment to better water management. Anne Morin describes the PRI's Canadian Water Sustainability Index, a compound measure developed to assess progress toward sustainable water management at a community level.

Many archeologists suggest that control of water may have been one of the driving forces in the development of civilization. Certainly many civilizations, from the Maya and Anasazi to the Mesopotamians, collapsed from mishandling their water supplies. Deciding how we want to manage our water for the future should be a primary concern of government.

Jean-Pierre Voyer
Executive Director
Policy Research Initiative

Toward a National Freshwater Policy Framework

Ian Campbell
Policy Research Initiative
Government of Canada

In 1987, the then Minister of the Environment Tom McMillan signed the Federal Water Policy (see text box below). Based on the 1985 report of the Pearse Inquiry (Pearse et al., 1985), this remarkable forward-looking document laid a course for the federal government's management of water resources.

The 1987 policy identified pricing as a means to manage water demand; it acknowledged the federal government's role in providing science for water management, the need for integrated planning, raising public awareness, and the need for specific pieces of legislation at the federal level. Although the federal government has been criticized for failing to implement some aspects of the policy, most critics acknowledge that the policy itself was, and still is, an excellent document.

A major shortcoming of the Federal Water Policy is signalled by its name: it is federal, not national. As a natural resource, water is managed mainly by the provinces and territories, not the federal government. The federal government's role in freshwater includes navigable waterways, fish habitat, scientific research and advice, and a few other more specific roles, such as ensuring the provision of drinking water on reserves and boundary water issues. For any water policy to be truly effective, it must include all relevant jurisdictions.

Water is a multifaceted issue. It infiltrates every aspect of our lives and economy. From maintaining drinking water quality to maintaining dandelion-free lawns, from ensuring sufficient water for industrial uses to guaranteeing minimum river flows for fish spawning, nearly every possible use of water precludes or at least affects other possible uses. A pan-Canadian freshwater policy framework would need to be correspondingly robust, recognizing the diverse uses and environmental needs, as well as the enormous geographic variability of water issues in Canada.

What Might a Pan-Canadian Freshwater Policy Framework Look Like?

Like politics, all water is local. Unlike politics, however, water does not respect national, provincial or municipal boundaries. Co-ordinating these diverse interests has long been a complex dance, and as our water resources become stretched closer to their limits, and the issues become more critical, the pace will only grow more harrowing. We are already past the time

The 1987 Federal Water Policy (Environment Canada, 1987) had one objective, two goals, and five strategies to achieve them.

The Federal Water Policy encourages the use of freshwater in an efficient and equitable manner consistent with the social, economic, and environmental needs of present and future generations.

The goals are to protect and enhance the quality of the water resource, and promote the wise and efficient management and use of our water. To accomplish this, the Policy sets out five strategies: water pricing, science leadership, integrated planning, legislation, and public awareness.

Ian Campbell,
Senior Project Director,
Policy Research Initiative,
Government of Canada

when we could manage with a simple dance card – telling us who was in charge of what and when. We need a common understanding of the steps of the dance, where we want to go, what we want to achieve, and how we will achieve it.

The Policy Research Initiative has been conducting research for two and a half years on various aspects of water policy. This has brought us in contact with a wide range of individuals and groups in Canada and around the world, with wide-ranging interests and concerns. This has not magically given us a pan-Canadian policy framework waiting to be revealed, but it has pointed out some of the major issues that such a framework would need to address.

Water Demand Management

Canadians are the world's second largest per capita users of water (OECD, nd). This simple statistic is often presented as a matter of shame, begging an immediate and draconian response to correct this miscreant behaviour. The reality, however, is more subtle.

While the basic statistic is true, instead of immediately reacting to reduce our water use, we should perhaps first ask: *Why?* And, perhaps, even at the risk of being taken as heretics: *Who cares?*

The reality is that in much of Canada, water is abundant, and our high use of it is not really a problem. It might be difficult to convince Montréalers that the St. Lawrence River flowing past and around them is at risk from their use of its water. And indeed, if water use is the concern, they would be right: like most Canadian cities, Montréal probably returns about as much water to the river as it removes.

Toronto Weather and National Use Data

What Drives Water Demand?

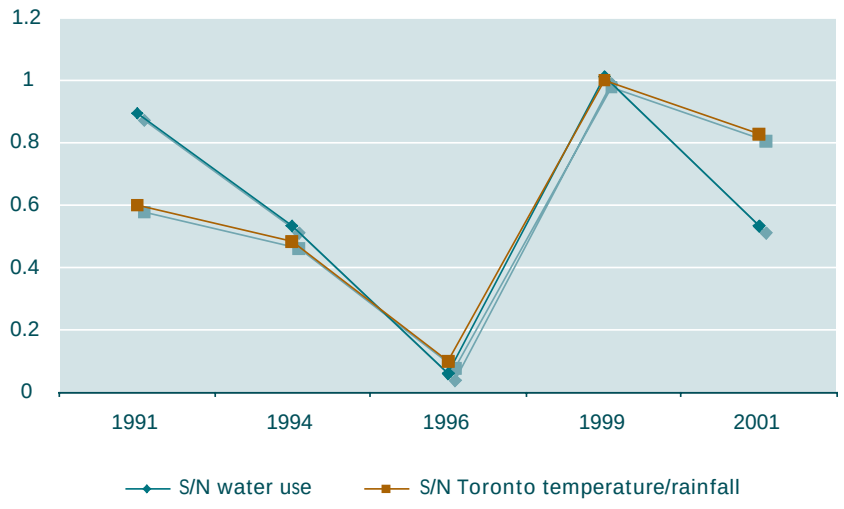
Environment Canada maintains the Municipal Water-Use Database (MUD, recently renamed Municipal Water-Use and Pricing Survey, or MWUPS) (Environment Canada, 2004). With data voluntarily submitted by most municipalities with populations over 5,000 every two to three years, MUD is an invaluable resource.

Using MUD, Environment Canada estimated the per capita municipal water use in Canada for several years over recent decades. This allows us to examine some of the drivers of municipal water demand.

Although the changes in per capita water use have been interpreted as being driven by changes in metering and pricing structures (e.g., the decline from 1999 to 2001 was hailed as a result of increased metering and progressive pricing) (Environment Canada, 2004), we can see that there is also a significant effect from weather. The Toronto temperature/rainfall curve is a very simplistic index of dry weather in southern Ontario, and shows a remarkable correlation with national water use. Nevertheless, there is an apparent overall decline through time. While this decline may be due to weather in other parts of the country (that possibility has not yet been investigated), it may also be due to increased metering, pricing, and the introduction of low-flush toilets and other water-saving technologies.

FIGURE 1

Standardized normalized national per capita residential water use and standardized normalized crude dry weather index for Toronto. With southern Ontario accounting for about one third of Canada's population, the fit of these curves suggests weather is a major driver for changes in water use.



Of course, some cities (like Calgary or Victoria) may have water shortages, but these are the exception rather than the rule.

Municipal water use is largely non-consumptive, that is, the water is used for washing, cooking, flushing toilets, and so on, and is largely returned to the river it came from via the sewer system. It is of course no longer clean, but using less water will not necessarily reduce the pollution load to the rivers; the same amount of shampoo will go down your drain whether or not you have a low-flow shower head. Using less water might simply increase the concentration of pollutants.

Some municipal water use is consumptive. Watering the lawn on a hot summer day may send more water into the air as water vapour than it applies to the roots of the plants. However, our cities also receive rain and snowfall, which are eventually collected by storm sewers; the overall water balance of most cities in Canada is therefore neutral.

The real issue with excess water demand in Canadian cities is the issue of treatment plant and distribution system capacity. Many of our treatment plants are old, many of them built at a time when no one imagined the cities they serve would grow as big as they have, or that the people in those cities would become as water loving as they have. So far, the model in most cities has been to build new treatment capacity to keep up with demand. Managing the demand to keep it within the limits of treatment capacity has only recently become fashionable. Water use in excess of our infrastructure capacity is a real issue – and a money issue – that will be faced sooner or later by all Canadian cities unless water demand management programs are put in place sooner rather than later.

Water pricing for municipal users is one such strategy. While one report suggests the elasticity of municipal water use demand (the rate at which demand declines as prices rise) may be on the order of 0.25 (i.e., doubling the price will result in about 25 percent less use), the same study shows that demand is more responsive to the price structure (whether flat rate or volume based, and if volume based, then whether it increases or decreases as the volume used rises) than to the price itself (Reynaud et al., 2005). Also, that study was unable to take climate and weather into account; it may be that demand follows weather more than it does price.

Pricing municipal water services for cost recovery could help ease that burden at the same time that it may have a minor benefit in reducing water demand.

Perhaps a better argument in favour of municipal water pricing would be cost recovery: the municipal infrastructure deficit is in the tens of billions of dollars and rising; the largest part of the deficit may be for transportation networks, but a substantial portion is also for water and sewerage.[1] Pricing municipal water services for cost recovery could help ease that burden at the same time that it may have a minor benefit in reducing water demand.

The largest water consumers in Canada are found in the agricultural sector, where water is used to irrigate crops and raise livestock. Much of the water used in irrigation may be lost to the watershed it came from, through evapotranspiration and through the selling of harvested water-rich crops like tomatoes. Industry also uses water in various, often consumptive ways, particularly the beverage industry. Would pricing help control agricultural and industrial water demand? Undoubtedly, if the prices are set high enough.

However, in Europe, a recent study indicated that high water prices (generally much higher than in Canada) do not affect the competitiveness of agriculture or industry, because these sectors are often given preferential rates or outright exemptions (Speck, 2005). Here in Canada, one bold experiment in pricing of irrigation water has not had a strong impact on agricultural water use, again presumably because the price is too low to have much effect on decision making.[2] Indeed, a simple thought experiment suggests that for the price to be high enough to affect use significantly, it would have to be high enough to affect a company or householder's bottom line noticeably – and most jurisdictions in Canada would be very unwilling to do that.

So, should a national freshwater policy framework promote the use of pricing for demand management, as the 1987 federal policy did? Perhaps, but it should do so eyes open, knowing that it is only one tool in the kit, and perhaps not even the most effective one in many circumstances. By providing municipalities with revenue to pay

for their systems, pricing may address the fiscal imbalance more than it affects water demand.

Protecting Source Water Quality

Water pollution has been in the news a great deal in recent years. Walkerton, North Battleford, the Sydney Tar Ponds, and Kashechewan are just some of the places that have suffered from polluted water. Protecting drinking water through filtration and treatment is one option, but it is clearly better – and in the long run cheaper – to ensure the source water itself is clean. This is often referred to as a source-to-tap approach.

Water pollution from major industry can be controlled with reasonable effectiveness through end-of-pipe regulation, although there may also be a place for other policy instruments. End-of-pipe regulation in Canada is most often the regulation of pollutant concentrations. Regulations are typically set to limit the concentration of a pollutant at a level that will not endanger aquatic life. Essentially, if a fish can't live in it, you can't dump it in the river. This does not always mean the total load of pollution is reduced; sometimes, it may simply mean more water is used to dilute the pollution before it leaves the pipe. In the United States, a different system has been adopted. Referred to as total maximum daily load (TMDL), it seeks to first identify how much pollutant a system can tolerate, then limit the total pollution from all sources to that quantity or less (EPA, nd). Total maximum daily load differs from end-of-pipe in several important respects. Foremost among them is that individual polluters may dump large quantities of pollution, as long as the total load from all sources is limited. This means that a given polluter may pay to reduce its own loading or someone else's, whichever is more cost effective.

More diffuse sources of pollution, such as agriculture, roads, and golf courses, are difficult to regulate, because there is no convenient pipe to monitor. Nevertheless, such non-point sources must be controlled; they may be the main culprits in a number of water pollution issues in Canada, including the gradual eutrophication of Lake Winnipeg (which is now almost as bad as Lake Erie was when it was dying from phosphate detergent poisoning).[3]

Water quality trading (WQT) may hold some promise for cleaning up these sources of pollution (PRI, 2006). By helping farmers cover the cost of implementing best management practices, such as buffer strips or lined manure ponds, municipalities can ensure the source water they rely on will be cleaner and therefore require less treatment. Going one step further, WQT allows end-of-pipe polluters to exceed their normal permit limitations if they pay for a greater reduction in pollution from other sources. Implemented as part of a policy toolkit in the South Nation River Watershed in Ontario, this may be one of the most innovative policy tools for addressing agricultural pollution, and deserves closer investigation. Like other tools, however, it will probably not be effective in isolation or in all circumstances.

Integrated Water Resources Management

Clearly, managing Canada's water is not just about managing individual projects on a one-at-a-time basis. Integrated water resources management (IWRM) seeks, like sustainable development generally, to ensure that the overall impact of development in a watershed does not threaten future access to water and its services (PRI, 2004). The concept can be extended to integrated landscape management (ILM), which allows the management of all land uses, not just those that significantly affect water resources.

The difficulty with IWRM or ILM is in the trade-offs required. A high level of stakeholder consultation is needed for it to work. To work well, the community must understand and value the resources being managed.

Stakeholders are not only those with an immediate stake in a particular project, but also those whose interests may seem more diffuse: those who live downstream, or where groundwater use or contamination may be an issue in the same aquifer; those whose water uses may be affected by dams or canals; conservation groups that may represent endangered species and rare habitats; and many others. Critically, it includes federal, provincial/territorial, and municipal/regional/local governments as the representatives of these stakeholder groups and broader societal interests.

Integrated water resources management also provides a framework to move beyond piecemeal decision making. While few individual wetland drainage projects that will lead to disaster, the cumulative impact of wetland drainages is to increase the flood hazard and reduce water quality. Similarly, a single well drilled into an aquifer is unlikely to deplete it, but enough wells can cause an aquifer to die the death of a thousand straws. Integrated water resources manage-

ment allows us to view each of these small projects as part of a larger context, and manage the cumulative impacts accordingly.

One way of disentangling the complex relationships between land-use decisions and their environmental consequences is through integrated landscape management modelling. Canada has the capacity to become a world leader in this field, should we choose to make the required investment.

Governance Issues

Many of the policy complexities surrounding water stem from the multiple layers of governance that regulate and manage water in North America. Most Canadians live in watersheds that cross the Canada-US border, and are therefore affected by, or affect, Americans and their use of this shared resource. More Canadians live in watersheds that cross provincial boundaries, and relatively few live in watersheds that do not cross at least a municipal or regional government boundary.

In December 2005, Alberta's former premier, Peter Lougheed, warned of the dangers of opening the taps to the United States. Canadians are concerned that water is not explicitly excluded from the North American Free Trade Agreement, and worry that Americans might be able to force the export of our water. The Devil's Lake diversion went ahead without a full and proper study, and Canadian pollution from Trail, British Columbia, continues to flow into the United States. Despite these irritants, the International Joint Commission, created by the Boundary Waters Treaty of 1909, is routinely held up as a shining example of international co-ordination and collaboration.

Clearly, there is a need to renovate our relationship with the Americans on boundary waters.

There is also a need to get our own house in order. Within the federal government, interdepartmental co-ordination on freshwater issues has improved somewhat over the past few years, but remains weak. The same can undoubtedly be said of some provincial governments, where water issues are typically found in multiple departments, as they are federally. The exception is Manitoba, which appointed its first Minister of Water Stewardship, in recognition of the importance of water issues to Manitobans, and specifically to overcome the balkanization of the issue. Time will tell if this example should be followed by other jurisdictions.

Intergovernmentally, water is discussed by the Canadian Council of Ministers of the Environment (CCME), by the Ministers of Natural Resources, by the Council of Energy Ministers, the Canadian Council of Fisheries and Aquaculture Ministers, and by others. And, of course, much of the on-the-ground management of Canada's water resources is carried out by municipalities. But municipal boundaries rarely follow watershed boundaries, which are the natural management units for water issues.

Some provinces have developed a layer of government specifically for managing water issues, such as Ontario's conservation authorities or Quebec's less empowered *comités de bassins versants*. These sorts of initiatives are notable for their boundaries as well as their inclusiveness; they typically work with all stakeholders in a watershed to ensure the best possible outcomes. They are, in effect, vehicles for IWRM.

The Road Ahead

A pan-Canadian policy framework will not be easy to achieve. All governments agree on a number of issues: it is better to avoid polluting water, it is better to not use more than you have, it is better to preserve natural ecosystem functions. But all governments also agree that human welfare and the economic development required for human welfare matter as much or even more. With all levels of government making policies and engaging in programs that affect Canada's water, we need to ensure that we balance these competing goals in the same way.

In most of Canada, water falls under several government departments (environment, natural resources, health, agriculture, etc.). Only Manitoba has a department dedicated to water issues (Department of Water Stewardship). This reflects the diverse nature of water issues. It is itself a resource, but it is also habitat, transport medium, hazard, energy source, waste disposal, wild and farmed food source, coolant, travel impediment, and tourist attraction. Too much or too little causes problems, often in the same place at different times, and qualities that are often invisible make it suitable or unsuitable for various uses.

Integrated management, and therefore water policy, cannot be the domain of a single government, or even all governments together. A pan-Canadian policy must engage and speak to all stakeholders, including environmental non-governmental organizations, industry associations, and members of civil society.

So what might such a policy framework look like? The POLIS project at the University of Victoria produced one possible outline (Brandes et al., 2005); another is under development by Pollution Probe. The question has also been discussed in other forums, from conferences and workshops to informal water-cooler chats. Some common elements emerge.

First and foremost, a pan-Canadian freshwater policy framework must recognize the diversity of Canada, and of its needs and constraints. It must allow each province, territory, and region to address its own problems in its own way. At the same time, it must provide a coherent approach wherever that is appropriate, and recognize that there are some values all Canadians hold in common.

The framework will need to address drinking water as both distinct from other water issues, and affected by other issues. There are few places in Canada where the basic water supply is so short that drinking water availability is an issue. More commonly, it is the quality of the water that is at issue, and often the capacity of the infrastructure to deliver it to consumers. Clear standards for drinking water are already provided by a federal-provincial committee (Health Canada, 1987). These standards need continued development as we learn more about the various toxins in our source water, but more importantly, we need to provide all Canadians with water that meets these standards.

A pan-Canadian policy must engage and speak to all stakeholders, including environmental non-governmental organizations, industry associations, and members of civil society.

The framework will need to identify roles and responsibilities for the federal government and for the provincial and territorial governments. One clear federal role is scientific research, including meteorology, groundwater, wetlands, ecology, and toxicology. Another is managing international (and to a degree inter-provincial/territorial) boundary waters. At the same time, provincial and territorial governments also have an interest in boundary waters, and may need help with the uptake of some of the science results.

The framework could usefully identify policies that could be found in the toolkits for all levels of government. For example, while volumetric pricing may slightly reduce water demand in some settings, in others, the cost of volumetric pricing (installation of meters, transaction costs) may outweigh the benefit. In such settings, regulation of bathroom fixtures and consumer education may be more useful. From pricing and other market-based instruments to regulations, voluntary guidelines and consumer education, all policy instruments should be available to water managers, and it would be a mistake to prescribe specific tools for all settings. At the same time, repeating past mistakes is wasteful. We need to put better mechanisms in place for evaluating and sharing the results of policy experiments.

The framework could address co-ordination of all governments in Canada. A possible scenario would be the creation of a Canadian freshwater commission, perhaps modelled loosely after the International Joint Commission. Such a commission could receive references from governments to examine and make recommendations on issues of mutual interest to two or more governments in Canada. It could play a vital role in ensuring all stakeholders' needs are considered both in internal Canadian issues and in boundary waters issues.

The framework could include varying degrees of detail, depending on the consensus on each issue. It would provide a guidebook for Canadians. Its development would in itself be a rewarding exercise in dialogue and mutual understanding.

In 1987, in the preface to the Federal Water Policy, then-Minister of the Environment Tom McMillan noted:

> "We must manage water like any other natural resource – with care. The object should be to use it in our own time in a way that leaves it unimpaired for our children and their children after them."

The time has come to bring all governments in Canada together to agree on a blueprint for making this vision a reality.

Notes

1 The estimated investment needed for water and wastewater infrastructure in Canada over this 15-year period is $88.5 billion. CWWA (1997).

2 The Southeast Kelowna Irrigation District instituted metering and volumetric pricing for its users. Water use per irrigated hectare was in decline prior to metering, and continued at much the same rate of decline afterwards (PRI, forthcoming).

3 Dr. David Schindler cited in Climate Change Connection Manitoba (2004).

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Water by the Numbers

Sound policy must be based on evidence. Here are some basic numbers relating to freshwater in Canada.

- 7%: Canadian share of the World's renewable water supply.
- 9%: Area of Canada covered by freshwater.
- 14%: Area of Canada covered by wetlands.
- 60%: Canada's freshwater draining north.
- 90%: population living within 100 km of southern border.
- $322,000,000: Value of water goods and services exports in 2001.
- $7 billion: value of cargo shipped through the St. Lawrence Seaway in 2004.
- 5,000 tonnes: Amount of toxic chemical released into the Great Lakes in 2001 from reporting sources only (mainly major industrial plants).
- 24,000,000: Number of people drawing drinking water from the Great Lakes.
- 100 years mean residence time of water in the Great Lakes.

1996 Canadian Water Withdrawal	Millions of m^3	%	Wastewater Discharge	% of Intake Discharged
Thermal	28,750	64.29	28,242	98.23
Total manufacturing	6,038	13.51	5,487	90.87
Mineral extraction	518	1.16	672	129.7
Agriculture	4,098	9.16		
Municipal	4,334	9.7		

- More than 5,000: Known shipwrecks on the Great Lakes.
- 44 billion m^3: Amount of water withdrawn for use in Canada in 1996.
- 61%: Houses with water meters in 2001.
- $33.13: National average price for 25 m^3/month of municipal water in 2001.
- 335 litres: Canadian average per capita daily water use in 2001.
- 26%: Canadians reliant on groundwater for municipal purposes.
- Less than 3%: Portion of water treated in municipal plants estimated to be used in cooking, washing food, drinking or brushing teeth.
- 163: Number of freshwater alien invasive species known in the Great Lakes–St. Lawrence Basin.
- 3,500: Number of Canadians employed in commercial freshwater fisheries in 1997.
- $6.7 billion: Estimated value of recreational fishing in Canada in 2000.
- 85: Number of chemical, physical, and biological parameters covered by the Canadian drinking water guidelines.
- 90,000 illnesses, 90 deaths: Estimated annual toll of waterborne diseases in Canada.
- $300 million: Estimated health care costs related to water contamination.

Major Watershed	Population % 2001	Water Area (km^2)	Surface Water Taking (million m^3)	Municipal Water Taking (million m^3)	Industrial Water Taking (million m^3)
Pacific Coastal & Yukon	4.67	667,358	869	193	598
Columbia and Okanagan - Similkameen	1.49	102,824	409	72	109
Peace - Athabasca	1.15	485,146	219	28	170
Lower Mackenzie and Arctic Coast - Islands	0.21	3,094,760	12	7	6
North Saskatchewan	4.36	150,151	1,686	142	1,457
South Saskatchewan, Missouri, Assiniboine - Red	10.49	395,425	4,081	436	754
Winnipeg	0.28	107,654	210	11	197
Churchill	0.29	313,572	18	6	3
Keewatin - Southern Baffin	0.04	939,568	0	0	0
Northern Ontario	0.48	691,811	100	12	87
Northern Quebec	0.35	940,194	66	6	60
Great Lakes - St. Lawrence	58.98	582,945	30,587	3,087	27,229
North Shore - Gaspé	1.68	369,094	216	78	134
Saint John - St. Croix	1.34	41,904	210	97	110
Maritime Coastal	5.02	122,056	283	140	132
Newfoundland and Labrador	1.71	380,355	309	114	193
Total	92.54	9,384,817	39,276	4,430	31,239

- More than 50%: Estimated amount of water supply lines in need of repair.
- 14%-30%: Water loss in municipal systems due to leaking pipes.
- $5.9 billion: Estimated 1994 operational costs of water and wastewater services.

Collaboration on Fresh Water Policies for Canada

The Honourable Steve Ashton
Manitoba Water Stewardship

Water links us with one another in ways more profound and immediate than any other element or force on Earth. Water will transmit the effects of our land and water use practices within days or even hours from one part of our country or community to our neighbours. As we continue to develop and use our resources, Canadians have become increasingly aware and alarmed about the state of our water and the lands that sustain it. Incidents of water quality impairment, habitat degradation, floods, and droughts draw renewed attention to the state of water in Canada. Whether we like it or not, water and how we manage it has become an indicator for how well we work together as a community, a province or territory, and as a nation. Ironically, while we struggle to find ways to come together over policy development in Canada, water continues to cross all boundaries. Every drop of rain or snowflake that falls forces us to integrate and to collaborate.

The challenge before us is not whether we should work together on freshwater policies for Canada, but how. This leads us into the arena of policy development. There are, however, five immediate obstacles to developing sound water policies for Canada that need to be removed quickly. By doing so, we will begin the process of collaboration across all regions and sectors to care for our most precious resource: water.

The first obstacle Canada faces concerns the collection and management of information and knowledge about water and the land affecting it. If jurisdictions, agencies, and communities do not trust or agree on the quality and accuracy of the basic information and knowledge on water, we cannot have an intelligent debate about the issues before us. Do our scientists and specialists have the resources necessary to gather and manage water-related information in an adequate manner? Do technical and professional groups have opportunities and forums to collaborate across sectors, nationally and internationally to debate the findings and agree on the standards and the results? For example, we do not have a nationally accepted system of watershed delineation and identification as it exists in some other countries.

Information and knowledge about the trends and states of health of our watersheds cannot be effectively used to make decisions if we are unclear as to whether we are talking about the same areas or clusters of communities. The science of developing freshwater indicators that point to the state of health of our watersheds is evolving in Canada. Yet national standards based on national information data sets need to be defined to help us all speak from a common perspective of the land and water we hope to protect.

We must try to temper situations, such as when the Senate Standing Committee on Energy, the Environment and Natural Resources released its fourth Interim Report, *Water in the West: Under Pressure* in 2005. This report was a catalyst for divisive discussions on the adequacy of ground water information between provincial agencies and professional associations. In such situations, perceptions may be created with the public and elected officials that discredit the existing documentation and technical expertise available,

The Honourable Steve Ashton,
Minister,
Manitoba Water Stewardship

and minimize the serious nature of the issue being addressed. Federal, provincial and territorial governments, local communities and organizations need to create resource mechanisms and forums that allow scientists and specialists to do their jobs, collaborate across multiple agencies and develop a common understanding on the state of our freshwater. Only when this obstacle is removed can policy discussions proceed on the basis of sound information and knowledge.

The second obstacle to working together to develop Canada's freshwater policies is the lack of well-established forums and procedures to discuss and debate the water issues before us. A flurry of activity once every 10 years, based on a crisis or a passing interest does not build good policy discussions. Those organizations and government departments that have taken the initiative to lead the most recent policy discussion forums on water in Canada are to be heartily commended for their efforts. Yet, do we know what happens after this series of discussions? How does one series of policy discussions or conferences relate to the other? Are these efforts linked or separate initiatives with specific and not national agendas? What is an acceptable period of implementation of the decisions that will improve our water security? Do we know who in which agency is to shape these discussions into policy options? What is needed now are mechanisms that foster an ongoing series of discussions and debates within a committed, knowledgeable and connected group of concerned citizens, professionals, and political leaders. It is only through this process of dialogue and collaboration that the necessary understanding and awareness of the issues, values, and policy implications will develop. This isn't easy work, and it does not happen overnight. However, by establishing recognized procedures and forums, Canadians will be given the necessary structures, processes, and understandings of how issues can be moved from policy discussion and development to programs and actions in a predictable manner. This is one of the necessary first steps in establishing new decision-making and governance structures about water issues in Canada.

If we organize ourselves into integrated institutions around water, we will create opportunities to alter our views and collaborate in ways we cannot see from our present day structures and vantage points.

The third obstacle that blocks freshwater policy development in Canada is the lack of clarity of our shared roles and responsibilities. A cursory review of the job ahead reveals that there are a multitude of roles and responsibilities we share related to water. There are roles and responsibilities related to leadership, partnership building, research and development, legislation and regulation, policy development, capacity building and public education, information management, networking, facilitation, planning and management, program design and delivery, and evaluation and monitoring. A crisis surrounding drinking water or flooding generates heated debates and the "blame game" begins. Often, at the root of these issues lies a failure among the partners to have a well-defined set of roles and responsibilities accepted by all. Yes, we all have a shared responsibility to improve and protect our water, yet we can't all be leaders, and we can't all be followers. We can't all be experts in research and development, and we can't all be policy makers or program delivery experts. To make the most of our collective talents and limited time and resources, we have to be smart about what we tackle and what we leave for others to champion. We need to know and agree on who those champions will be, in which fields and when. No doubt these discussions will need to be respectful, providing clarity and transparency, as groups and governments worry about intrusions into their areas of jurisdiction. Yet the more troubling of discussions are those that do not happen. If we had held discussions on our collective roles and responsibilities 10 years ago, it is very likely that the policy work back then would have advanced well beyond the point that it is today. Our different levels of government, non-governmental, private and public institutions, business and community groups need to have constructive dialogues about our roles and responsibilities that respect jurisdictional concerns while acknowledging the varying levels of capacity and expertise that exist in Canada. While these discussions are fundamental to establishing respect and collaboration, they are sadly and often overlooked. Water will, however, always find a way to draw us together.

The fourth obstacle is an absence of structures to support functions. It is well recognized that if society wishes to create a focus on a subject in the collective human consciousness, we create a social or institutional entity to do so. Government departments, faculties at universities, and divisions in corporations are routinely created to focus our awareness, thinking, and activities. Conversely, if we organize ourselves into institutions and structures that divide water into many compartments, the function we most often encourage is divisiveness. If we organize ourselves into integrated institutions around water, we will create opportunities to alter our views and collaborate in ways we cannot see from our present day structures and vantage points. We are organized into federal, provincial, territorial, First Nations, and municipal governments, all with multiple agencies that touch on water-related issues in one way or another. Roughly 20 federal agencies have a role or responsibility for water. We have many more public, private, corporate, and international interests that all have a stake in water, yet approach this most precious resource from their own sector or special-interest perspective. No wonder Canada's water policies, as just one example, have languished on shelves while governments and institutions of all types point accusing fingers at each other. If we as Canadians are unhappy with our approach to water, we need to change it. Unless we reshape our institutions around water, we will never reshape our thinking and actions toward water.

Experiments occur in Canada on new structures in such organizations as the Saskatchewan Water Authority and Manitoba Water Stewardship. In Manitoba, public calls for better integration of water-related agencies led to the creation of Manitoba Water Stewardship. Now, the responsibilities for fisheries, riparian areas and wetlands, water licensing, surface and ground water, water quality and drinking water, watershed planning and management, as well as infrastructure maintenance and development and flood forecasting are all housed in one department. This provides an institutional structure to maximize the opportunity to function in a collaborative and cross-cutting manner that focuses on the integrated stewardship of water. While still in its infancy, this structure has already helped Manitobans focus on water in new ways. It has also generated collaboration across government agencies and Crown corporations in ways that did not exist before.

Adopting water as a basic human right could be, for Canada, the challenge and the cause needed to jump start us to get things right with water.

Taking this idea of new structures a little further, imagine what might happen if a university was so bold as to create a faculty of water. This faculty would integrate hydro-geology, hydrology, limnology, fisheries, riparian and wetlands studies, with studies on human health and water-borne illness, and source water protection planning. All components of this faculty would be well integrated with community studies and watershed planning and management skills. It would specialize in engineering studies that focused on protecting and using ecological and aquatic functions in new and innovative technologies. Water efficiency research and technology would be one speciality as well as basic community infrastructure engineering and design. It is interesting to contemplate the kind of focus and scope students and professors would develop in this faculty. However, it is undeniable that their focus would be on water in all its complexities. While this musing might be fanciful, some faculties across Canada are beginning to experiment with some of these kinds of concepts. There is a growing understanding that water provides a powerful and holistic framework of thinking and a natural integrator for research, study, professional development, service delivery, and program and policy development. Perhaps an institution might emerge in the future called Water Canada to integrate federal efforts, provide national leadership on water related issues, and support other national leadership groups.

Finally, the last and most pervasive obstacle to developing sound water policies for Canada is a lack of direction and the collective courage and a will to pursue it. All the previous obstacles can only be addressed if there is a common direction, will, and courage to tackle the difficult cross-boundary issues that water naturally forces upon us. We need to motivate, galvanize, and energize our thinking and discussions about water. We need to challenge ourselves, and take a risk in a way that we've never

done before. If water is our most precious resource, or the oil of the 21st century, then we must challenge ourselves to overcome the lack of will and courage that blocks productive work on water issues, including policy development. The question then becomes: How should we challenge ourselves as a country?

The challenge we can put before Canadians is both simple in statement and profound in its implications. We challenge ourselves that: In the year 2010, half way through the International Decade of Water, Canada adopts the principle of water as a basic human right as outlined in Article 12 of the Covenant of the UN Committee on Economic, Social and Cultural Rights. Canada will adopt this right and commits fully to the basic obligations to respect, protect, and fulfill this right. It sounds simple and like the right thing to do. Yet the implications are profound and the challenges daunting. Adopting water as a basic human right could be, for Canada, the challenge and the cause needed to jump start us to get things right with water. It would mean understanding and accepting the challenges that this commitment binds us to in the international, national, and local arenas. It would offer a unifying theme, which will drive and compel us to organize our thinking and resources in a collaborative manner. It will require us to get our information systems and data right, our policy forums in order, and our organizations and structures in place to support a commitment that will stretch us in different ways as never before. It will mean agreeing on issues, and discussing new forms of governance, community engagement and empowerment around water and land use decisions. It will generate new discussions on the financing of water supply and treatment systems, demand-side management, and watershed planning and management. It could spawn a range of opportunities for the private sector from new technologies and environmental methods for the treatment of water and wastewater to water efficiency technologies and building standards. In short, this challenge will engage multiple stakeholders, and generate new thought and innovation. Most important of all, it will address the question of water as a basic human right in Canada. It will be the catalyst to address the drinking water issues in First Nations, northern, and rural communities, and secure a brighter future for all Canadians.

Our ability to come together to develop water policies for Canada depends on our ability to overcome the obstacles that separate us. Our lack of a common goal or vision and our lack of will and courage is our biggest obstacle to water policy development in Canada. If we can overcome this roadblock, all else will come into place. Political will and courage are required by all governments and agencies to support financially stable, ongoing freshwater research and water policy development. Will and courage are also required from all parties to tackle issue after issue tenaciously in established forums in an integrated, cross-sector manner and with the necessary determination to bring issue discussions to policy conclusions. It will take courage as well as willpower to work together to define clearly the roles and responsibilities of the many partners. We will all be required to be leaders and followers at different times and on different issues. The mutual respect necessary to protect our collective roles and responsibilities will be the test of our future success. It will take courage and will to take apart existing institutions and agencies, and realign them to facilitate collaboration on water issues.

The following generations will view this time in Canada's history as a moment when we had a choice to do what was required or what was easy. If we do what is easy, we will have not risen to the challenge, leaving a sad legacy and monumental problems for our children to solve. If, instead, we do what is required we will have accepted the challenge: to leave our planet's water, in better shape than we found it for the generations to come.

Whose Water Is It?

Aboriginal Water Rights and International Trade Agreements

Merrell-Ann Phare
Centre for Indigenous Environmental Resources

Introduction

Water, for both human and ecosystem use, is under increasing threat in Canada as the demand for Canadian water resources increases. Water is used as a manufacturing or industrial input; rivers are dammed and diverted to create hydro-electric energy, or allocated to assimilate treatment plant effluents; aquifers are mined to meet agricultural irrigation needs; and water is removed and bottled for domestic consumption. Furthermore, water may be subject to international trade agreements. It is therefore timely to examine the issue of Aboriginal rights with respect to water.

Aboriginal Rights

Aboriginal rights, as defined under the Canadian legal system, consist of a broad spectrum of legal rights possessed by Aboriginal people in Canada. While the rights defined to date are not exhaustive, courts have recognized the right to occupy the land, to fish, hunt, trap, and generally use the "products" of the rivers, forests, and streams. Aboriginal rights have been recognized and affirmed in the Canadian Constitution since 1982, and they have been defined to the current level of understanding through litigation. In *R. v Adams*, the Supreme Court of Canada held that Aboriginal rights, or "use" rights, exist independently of Aboriginal title, and that Aboriginal title is a sub-category of Aboriginal rights that deals with claims to land. This has proven to be a critical clarification. Before this, there was a question as to whether First Nations were able to exercise Aboriginal rights, for example, the right to hunt, without possessing Aboriginal title to an area. Having to prove the validity of an Aboriginal right through a corresponding direct connection to land sufficient to support a claim for Aboriginal title was a great burden on an Aboriginal rights claimant.

Sparrow and *Van der Peet* held that rights asserted must exist as of the date the *Constitution Act*, 1982 came into effect, that is April 17,1982. This is because before this constitutional amendment, these rights were protected only by common law, which is always subject to valid overriding legislation. The Constitution protects those rights that were not previously extinguished, for example, through treaty or legislation.

The presence of Indigenous peoples in North America for many thousands of years before European settlement, and the existence of their distinctive cultures, traditions, and social systems, forms the legal basis for recognition of Aboriginal rights today. This is the basic premise underlying the title possessed by Indigenous peoples to any of their lands within Canada. The Supreme Court of Canada has articulated this thinking as the "Distinctive Culture" test, used for identifying Aboriginal rights that are protected by s. 35(1). This analysis states that the general approach to determining the existence of an Aboriginal right is to demonstrate that the practice, custom, or tradition was, and continues to be, a central and significant part of the First Nation's distinctive culture.

Aboriginal Water Rights

No cases in Canada have directly considered the existence or scope of Aboriginal water rights, although there have been general statements within

Merrell-Ann Phare,
Executive Director and Legal Counsel,
Centre for Indigenous Environmental Resources,
Winnipeg

the discussions of the test for Aboriginal rights that support the assertion that the test applies to determining Aboriginal rights to both lands and waters. In the dissenting judgment in *Van der Peet* (dissenting on another point), the dissenting judge was of the opinion that s. 35(1) protects Aboriginal rights that extend to both land and water.

> This right to use the land and adjacent waters as the people had traditionally done for its sustenance may be seen as a fundamental Aboriginal right. It is supported by the common law and by the history of this country. It may safely be said to be enshrined in s. 35(1) of the *Constitution Act*, 1982.[1]

Regarding treaties, the following passage of the court in *Van der Peet* identifies that the rights to land contemplated in Aboriginal and treaty rights discussions include rights to water, and its resources.

> Thus the treaties recognized that by their own laws and customs, the Aboriginal people had lived off the land and its waters. They sought to preserve this right in so far as possible as well as to supplement it to make up for the territories ceded to settlement.[2]

The Court's reasoning is based on the historic existence of Aboriginal water rights prior to colonization, and it assumes that unless they have been properly extinguished or there is a treaty limiting their implementation, that these rights still exist.[3] In Manitoba, for example, no legislation has ever been enacted purporting to extinguish Aboriginal rights, nor have treaties ever specifically done so.[4]

Manitoba Treaties

In Manitoba, seven treaties have been signed with First Nations: treaties 1 to 6 and 10. These treaties were generally intended to extinguish Aboriginal title to lands in Manitoba and parts of Saskatchewan and Ontario, and to indicate the boundaries of the lands reserved by the First Nations. Sometimes, the treaty guaranteed certain rights.

There are no specific references in any treaty to the reservation, affirmation, or extinguishment of Aboriginal water rights, in either the ceded or reserved territories. The lands are described with equal reference to land-based and water-based points. This uncertainty is further evidence that extinguishment of Aboriginal title to water, or other Aboriginal rights to water, was not discussed. Therefore, it is uncertain whether Aboriginal title to a water body was being ceded, or whether there was an intention by either party to, in essence, share use of, access to, or "ownership" of the river. References made within the treaties to lakes do not consistently specify locations within or on the shores of the lake.

Given that the numbered treaties are inconsistent as to their reference to water-related rights, it could be argued from the wording and approach to describing lands in many of the treaties that Aboriginal title to water continues to exist in both ceded and reserved territories. Clearly, there is no express infringement of extinguishment of any Aboriginal title to water. Certainly, many First Nations assert that their ancestors did not relinquish any of their rights to water. Given this factual and legal situation, it is unlikely that a court would be able to determine that any of the parties to the treaties intended to extinguish Aboriginal water rights.

Existing Aboriginal Water Rights

Numerous water-related activities could meet the test for an Aboriginal right today:

- irrigation rights as a special category of water use rights that are necessarily incidental to the creation of treaty or reserve lands (and therefore a protected activity);
- rights to navigation or travel in water, in particular as a means to get to and from the location of food, but also travel to ceremonies, meetings and exchanges with other Indigenous groups;
- environmental protection rights to protect both water quality and quantity, on behalf of both humans and the ecosystem;
- rights to engage in water use to provide a moderate living to community members; and
- rights to trade water.

Aboriginal title would include the following water-related rights to:

- use or not use water;
- divert or impound water for agricultural and other purposes;
- pollute or prevent the pollution of a water body;

The 1987 Federal Water Policy – Native Water Rights

In recognition of Native people's special interests in water, the federal government will:

- negotiate land claims settlements that define use and management powers for water within claimed areas;
- review and clarify with Native people their water-related issues and interests with respect to their treaty areas as well as to lands subject to land claims;
- improve understanding of Native needs and commitments associated with water;
- determine, in consultation with Native people, how they will participate in resource management programs affecting water resources of interest to them; and
- encourage greater Native participation in water allocation and management decisions involving in-stream traditional uses.

- remove or take fish and other resources;
- travel in or on the water or prohibit the travel of others;
- regulate all uses of the water, including denying use by others;
- consume, for domestic, manufacturing, industrial, and other purposes;
- protect the quality and quantity of water;
- generate revenue, for example through hydro-electric power; and
- sell or trade water, or limit or prevent the sale of water by others.

Aboriginal fishing and harvesting treaty rights holders could engage in numerous protected, water-related activities that are "reasonably incidental" to existing treaty and Aboriginal rights, including:

- protection of water quality and quantity;
- habitat protection;
- watershed management for the protection of fishing, hunting, and trapping grounds;
- watershed management for the protection of harvesting/gathering grounds (such as wild rice harvesting);
- transportation over waterways (the right to unrestricted waterways to travel to hunting, fishing, and trapping sites); and
- use of water reasonably incidental to the general fulfillment of the purposes of the treaty (that being primarily the economic stability of the Indigenous group) including water use for manufacturing, irrigation, the production of electricity, and for sale.

All Aboriginal and treaty rights may be subject to limitations. The case law after 1982 has focused on defining Aboriginal and treaty rights and then determining, in particular circumstances, whether the right, if it exists, has been infringed by a government's (the Crown's) decisions (such as the creation of legislation), and if so, whether that infringement is allowable (or "justified"). The infringement test was set out in *Sparrow*.[5] The law relating to infringement has been held to be applicable to both treaty and Aboriginal rights infringements; therefore, it is the same test for both.[6] According to the application of this test, it is probable that Aboriginal peoples in Canada have water rights that have not been extinguished by treaty or by "clear and plain" intention of the federal or provincial governments.

Given the likely existence of Aboriginal water rights, these rights have not received the necessary legal and political attention to ensure their long-term protection. A 1987 comprehensive federal government review of water in Canada recognized the need to deal with Aboriginal water rights in a comprehensive, inclusive, and co-operative manner, with the direct involvement of affected Aboriginal peoples. The public record suggests that Canada has done nothing to fulfill this commitment, despite the Supreme Court of Canada's clear pronouncements that Aboriginal and treaty rights are constitutionally protected, and that the federal and provincial Crown must honourably discharge fiduciary, constitutional, and statutory obligations to Indigenous peoples. Despite these prescriptions, the Crown has failed to meet any of these requirements regarding Aboriginal water rights in any demonstrable way; it has even fallen far short of fulfilling the commitments it made regarding Aboriginal water rights almost 20 years ago in the Federal Water Policy.[7]

Daily, these rights are impacted without the required due process and compensation. Numerous Crown activities have very likely infringed water rights, including allowing non-Aboriginal water users to deplete or degrade water sources the community requires for any use, and licensing and approval of all forms of water-dependent development, such as manufacturing and industrial activities, food and animal processing, hydro-electric development, intensive agriculture, and water bottling. Many of these listed activities may have occasioned such extensive impacts that they have, in effect, illegally impacted or extinguished Aboriginal and treaty water rights.

Further, international agreements may be permanently impairing Aboriginal rights, without providing any corresponding mechanism to redress the damage done or adhering to any domestic constitutional requirements regarding protection of those rights. The federal and provincial governments have not engaged in the consultation necessary to justify infringements of this sort, and it is uncertain whether current trade rules would allow them to be able to fulfill their obligations in this regard. Governments have committed to international agreements that may, through their expansive trade and investment provisions, restrict any power the Crown may possess to fulfill s. 35 protections of Aboriginal and treaty rights.

The Implications of International Trade Agreements

Since the federal government committed to and then largely abandoned the Federal Water Policy, particularly regarding Aboriginal water rights issues, it has committed itself to a number of international trade agreements. These agreements govern the trade of goods, services, and investment across Canadian borders. Most notable of these is the North American Free Trade Agreement (NAFTA). Controversial for its expansiveness, and in particular, its inclusion of broad investor and investment rights, the NAFTA application to water is uncertain. However, that water may be subject to NAFTA provisions, given the original intent of NAFTA to apply to all traded items, that the waters of Canada are used directly or indirectly as a traded good, and that NAFTA applies to investments in water.

Canada has not ensured that Aboriginal water rights (or any other Aboriginal or treaty rights) are protected from the broad reach of NAFTA provisions. It is very likely that neither the federal nor provincial governments could fulfill fiduciary and other obligations to Aboriginal peoples if those obligations conflicted with the rights and obligations under NAFTA. A compelling hypothetical illustration arises where Canada may wish to limit the export of bottled water to protect a water source subject to Aboriginal or treaty water-rights claims. This circumstance has not yet come before the courts, but any protective action of this sort, particularly if foreign-owned, water-export contracts were preferentially targeted, would likely violate NAFTA provisions. Because this kind of conflict is potentially imminent, and given Canada's complete neglect in the protection of Aboriginal water rights, these rights are at risk.

Further, no current legislation or policy in Canada could prohibit Aboriginal peoples from engaging in expansive use of their water rights. This issue has not been adjudicated, but current decisions strongly suggest that the use of water by an Indigenous community to engage in economic development of any sort (including hydro-electric development or bulk-water export) would be within the scope of protected Aboriginal or treaty rights, and is clearly within the scope of activities under Aboriginal title. If Indigenous communities choose to exercise these rights, given the "national treatment" provisions of NAFTA and the current level of utilization of water resources in Canada by non-Aboriginal interests, Canada will have no basis upon which to deny non-Canadian investors these same rights.

Recommended Actions

In response to this situation, a number of remedial actions are proposed.

- The existence of Aboriginal water rights must be recognized by all governments in Canada.
- Canada and the provinces must fulfill their constitutional, fiduciary, and statutory obligations to Indigenous peoples regarding the protection of Indigenous water rights.
- All governmental decision-making processes that may limit Indigenous water rights must minimize limitations on these special rights to water.
- Boundaries and criteria to guide the discretionary decisions of government officials (e.g., in regulatory licensing processes) that may limit Indigenous water rights must be clearly delineated.
- An inclusive permanent national forum for discussing options for

the protection of water, including a revisitation and reaffirmation of the commitments made in the Federal Water Policy, must be created.

- Water policy development must focus on defining the most effective ways to protect Indigenous water rights while meeting ecosystem requirements and the needs of other water users.
- The federal government must commit to ensuring (e.g., through amendment or clarification to NAFTA, and through specific exclusions or reservations to this effect in all future trade agreements) that Aboriginal and treaty rights will not be limited by international trade agreements.
- The linkages between trade law and policy, and water law and policy (at the local, regional, national, and international levels) must be explored and clarified through a process that identifies areas of ambiguity, ambivalence, overlap, or concern, and then begins to address these issues.
- A comprehensive and inclusive strategy to include the meaningful participation of Indigenous peoples in both domestic and international water-related and trade-related decisions, discussions, and negotiations, must be developed, maintained, and documented.
- International trade agreements must be developed and negotiated only with the meaningful input and involvement of Indigenous peoples, and only after a clear definition and understanding of the impacts and benefits that may accrue to Indigenous peoples have been determined.

Final Thoughts

The Canadian perception of water is linked to our national identity, cultural and artistic institutions, sense of security, and in many ways, our sovereignty. Maintenance of control over Canadian inland water resources is of fundamental and profound importance, and in all likelihood, this need will only increase in the future. Despite this, our waters are at risk, because NAFTA may prevent Canada from reducing or preventing the already extensive commodification of Canadian waters in their natural state.

At the same time, many Aboriginal peoples rely directly on freshwater sources and their products for their livelihood and sustenance. As well, Aboriginal peoples have constitutionally protected water rights, which Canada and the provinces have done little to protect, despite their fiduciary duties to do so. Aboriginal peoples may choose to exploit this resource, based on their Aboriginal or treaty rights entitlements. There are few limitations on the uses to which they may put their water rights.

Certainly, there is a challenge associated with protecting Aboriginal water rights in the context of international trade. The converse of this perspective, however, is that long-term protection of Canada's freshwater resources may depend on the thorough, consistent, documented, and transparent discharge of governmental fiduciary obligations to Aboriginal peoples regarding their water rights. Although still uncertain, this may be one of the few actions governments in Canada can assert to prevent further water commodification and export. This may be the only legally justifiable way to restrict the trade in, and export of, Canadian water, without violating numerous NAFTA protections. By respecting their relationship with Aboriginal peoples, while seeking to protect water resources in Canada, governments could control further commodification of freshwater while upholding the honour of the Crown. This question remains to be resolved fully; it is mostly dependent on the willingness of Aboriginal and non-Aboriginal governments, the courts, and the citizens of Canada to assert forcefully the need to protect all rights associated with our common heritage, the freshwater of Canada.

Notes

1 *R.* v. *Van der Peet* [1996] 2 S.C.R. 507 at para. 275.

2 Ibid. at para. 271.

3 Ibid. at para. 269.

4 The treaties refer specifically and only to land in the sections that articulate the rights that the Indigenous peoples were relinquishing.

5 *R.* v. *Sparrow* [1990] 1 S.C.R. 1075.

6 See *R.* v. *Badger* [1996] 1 S.C.R 771 at paras. 96 and 97, and more recently *Marshall (#2)* [1999] 3 S.C.R. 533, wherein the court affirmed that the *Sparrow* justification analysis is applicable to treaty rights cases.

7 Environment Canada, Federal Water Policy, is available as of January 31, 2004 at <www.ec.gc.ca/water/en/info/pubs/fedpol/e_fedpol.htm#7.15>.

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Reinvigorating the International Joint Commission

Ian Campbell and Sushma Barewal
Policy Research Initiative
Government of Canada

Approximately 40 percent of the 8,000 km boundary between Canada and the United States is freshwater. Therefore, it is not surprising that Canada and the United States have a long history of binational and international governance of boundary waters.

The International Joint Commission (IJC), created by the 1909 Boundary Waters Treaty (BWT), has played a key role in boundary waters governance for nearly 100 years. The IJC's responsibilities were expanded with the 1972 Great Lakes Water Quality Agreement (GLWQA) and the 1991 Air Quality Agreement between Canada and the United States.

For about the first seven decades after the IJC was created, governments almost exclusively relied on it to help manage boundary water issues. More recently, it is seen as playing a smaller, albeit still influential, role. How well

The Boundary Waters Treaty

The Boundary Waters Treaty (BWT) was signed in 1909 by Great Britain, on behalf of Canada and the United States. It came about because both Canada and the United States were becoming concerned about boundary water diversions or intentions to divert by the other country. For example, the United States was concerned when Canada announced plans to divert the Niagara's water, which the United States had been using for hydro-electricity production. Canada became concerned when Chicago diverted water from Lake Michigan to dilute the city's sewage and link Lake Michigan to the Mississippi River.

The BWT provided the principles and mechanisms to help prevent and resolve disputes concerning water quantity and quality between Canada and the United States.

The Treaty created the International Joint Commission to help carry out its purpose. The Commission is operated on the basis of equality between the two countries. The Commission is composed of six members: three American and three Canadian. One of the three American members is the US chair and one of the three Canadian members is the Canadian chair. The US Commissioners are appointed by the President with the concurrence of the Senate. The Canadian Commissioners are appointed by the Governor in Council.

The BWT defines boundary waters as 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 United States and the Dominion of 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 rivers flowing across the boundary.

(continued on page 22)

Ian Campbell,
Senior Project Director,
Policy Research Initiative,
Government of Canada

Sushma Barewal,
Senior Policy Research Officer,
Policy Research Initiative,
Government of Canada

The Boundary Waters Treaty

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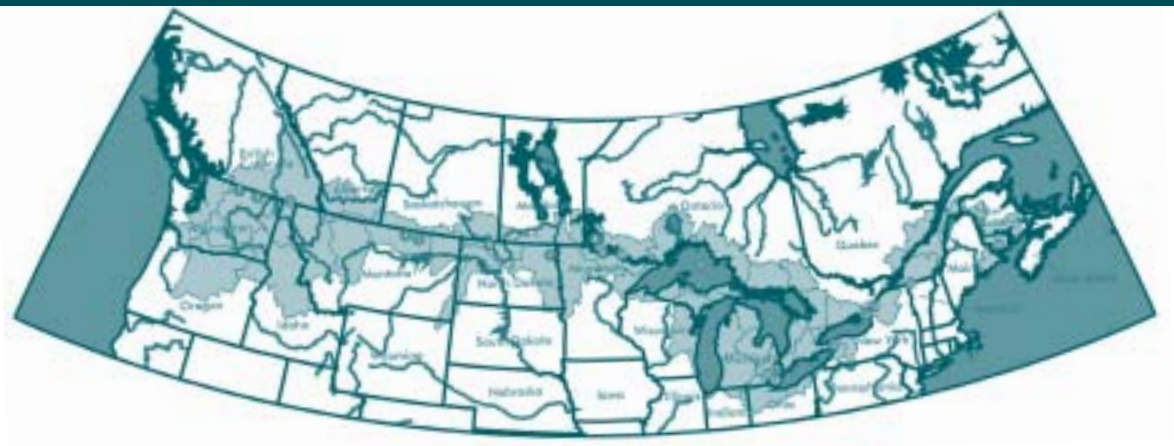
Over time, the principles of the Treaty have proven to be flexible enough to allow the two countries to use it to address diverse border issues, primarily by expanding the mandate of the IJC by giving it references. As such, there has not been a need to open up the Treaty or dissolve it.

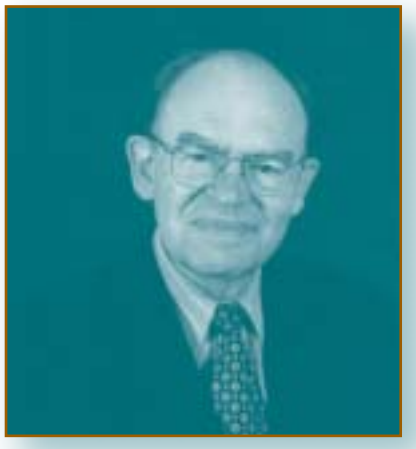
TRANSBOUNDARY BASINS



is the IJC performing in the current environment and what, if anything, needs to change to increase its effectiveness? Is there a need for new institutional structures to help address the boundary water challenges of the 21st century?

In February 2006, the Policy Research Initiative's Sustainable Development research team met with two experts: the Right Honourable Herb Gray, Canadian Co-Chair of the International Joint Commission, and Paul Muldoon, Vice-Chair of the Ontario Environmental Review Tribunal. At the time of the interview, Mr. Muldoon was the Executive Director of the Canadian Environmental Law Association. This article presents excerpts from these two interviews.

Interview with the Right Honourable Herb Gray



PRI: *The International Joint Commission is often cited as a model of success for other countries seeking to regulate and manage their international boundary waters. How did the IJC come into existence?*

HERB GRAY: The Boundary Waters Treaty was signed in 1909 between the United States and Great Britain acting for Canada. The purpose of the Treaty was to avoid or resolve disputes between Canada and the United States connected with boundary waters. One interesting thing about the Treaty is that it committed both countries not to pollute the waters of the other country. And, in those days, who cared about pollution? The Commission was created by the Treaty and from the beginning, the Commission has been concerned with matters of water quality and water quantity.

The Great Lakes Water Quality Agreement and the International Air Quality Agreement

In the 1960s, the IJC found that excessive levels of phosphorus were present at several locations in the Great Lakes and that municipal and industrial pollution was occurring on both sides of the Canada-US boundary to the injury of health and property on the other side. These findings were the basis for the 1972 Great Lakes Water Quality Agreement (GLWQA) that was later replaced by the 1978 Great Lakes Water Quality Agreement. The 1978 Agreement was amended in 1983 and revised by a protocol in 1987.

The GLWQA initially focused on specific chemicals of concern, but has been evolving with each revision to take an increasingly holistic, ecosystem-based approach to ensuring water quality. The Agreement is being reviewed by the Canadian and American governments for possible further revision, as required under the Agreement after every third IJC biennial report.

An agreement on air quality was signed in March 1991. The general objective of the parties was to control transboundary air pollution between the two countries. The purpose of the agreement was to establish a practical and effective instrument to address shared concerns regarding transboundary air pollution.

Under the terms of the Agreement, the governments established a bilateral air quality committee. This committee is responsible for reviewing progress made in the implementation of the Agreement, preparing and submitting periodic progress reports to the governments, referring each progress report to the IJC, and releasing those reports to the public. The governments assigned the IJC the responsibility of inviting comments on each progress report of the air quality committee and for synthesizing these comments for the governments.

Columbia River Treaty

The Columbia River Treaty is an agreement between the United States and Canada under which the US funded three Canadian dams (Mica, Keeleyside, and Duncan) and Montana's Libby Dam, whose reservoir extends into Canada. The United States gained flood control and power benefits from these storage dams. US President Dwight Eisenhower and Canadian Prime Minister John Diefenbaker signed the Treaty on January 17, 1961. The US Senate quickly ratified the Treaty, but the Canadian Parliament feared that the United States had more to gain than did Canadians. Parliament refused to ratify the Treaty until the United States agreed to purchase excess power generated in British Columbia, power for which the province had no use. At the time, the US Northwest treated the power as surplus and sold it to the American Southwest.

PRI: *What special roles did the Treaty assign to the Commission?*

HERB GRAY: The Commission has three specific roles. One is to respond to formal requests from governments (known as references) to look into issues and report on how to resolve the issues. By custom, these references come from both governments even though the Treaty does not require that. Because both governments actively seek the IJC's advice and the IJC involves the public in its work, the Commission's reports are taken seriously by both countries. These references are on specific topics but the Commission can receive another type of reference, a "permanent reference" written into an agreement between the two countries.

For example, in the Great Lakes Water Quality Agreement, the Commission has a permanent reference to monitor how the governments carry out their obligations to restore and maintain the physical, chemical, and biological state of the Great Lakes. They are also written, in a more limited way, into the International Air Quality Agreement.

It is important to note that the Article used to authorize references does not restrict them to matters of water or air. The governments could give the

Control Orders

The IJC issues control orders that are binding on both countries. When the IJC is asked to approve a particular project which may impact boundary waters, it usually issues a control order detailing the conditions under which the project may be carried out, and under which a structure such as a dam may operate. Control orders are managed by permanent committees called control boards.

Commission references on anything, even softwood lumber. On more than one occasion they have done so. For example, at the governments' request, the Commission looked into the feasibility of harnessing the tidal power in Passamaquoddy and Cobscook bays.

The Commission's third role is quasi-judicial. Under the Treaty, if anybody wants to build a structure on, over, or under a boundary water, they first have to go to the two governments and submit an application. If the governments agree, the application is sent to the Commission, which holds hearings and has complete authority to approve the application for the structure, disapprove it, or approve it with conditions. If the Commission approves the structure by way of a control order with attached conditions, it sets up a permanent control body to oversee the carrying out of the conditions.

If, however, both countries sign a binational management agreement, the Commission does not have to be called on to approve a structure. An example of that is the Columbia River Treaty. The Commission is in the Treaty but only to solve disputes.

PRI: *What, in your view, are the IJC's significant contributions? Where has it made a difference?*

HERB GRAY: The Commission covers 8,000 km of the boundary, because it not only covers the international boundary from east to west but also the boundary in the North.

While there has not been a major control order issued by the Commission since the one in 1952 for the St. Lawrence hydro-power structure, it continues to have administrative responsibilities for 15 existing control bodies along the border. The Commission is, over time, systematically reviewing the control orders. Five years ago, the governments agreed to give the Commission $30 million to review the order dealing with the international section of the St. Lawrence River and Lake Ontario. It is just finishing up that major review.

We have also established local watershed boards in boundary watersheds and we have merged some of the existing boards, on a trial basis. For example, the water quality and the water quantity boards that used to be on the St. Croix have been merged.

Under the Great Lake Water Quality Agreement (GLWQA), three scientific/expert boards report to the Commission: the Great Lakes Water Quality Board, the Great Lakes Science Advisory Board, and the Council of Great Lakes Research Managers.

The GLWQA requires the Commission to prepare biennial reports on the state of the Great Lakes. In 2004, the IJC released its 12th biennial report.

After every third biennial report, the GLWQA requires the two governments to carry out a review of the Agreement. The 12th biennial report triggered one such review. The Commission was given a special reference to get public input for the review. In addition to submitting a report to the governments on public input, the Commission will write its own report on how the Agreement should be changed. While there have been reviews after every third biennial report, the Agreement has not been updated since 1987.

The Commission has dealt with almost 100 matters since 1911 and there is a very high proportion of acceptance of our recommendations. Why? For one, the requests come from both countries and they come in the same terms. Second, whenever we have a new reference, we set up a specific study board for that topic, a study board that is binational, with Canadian and American chairs. Also, the board members have to sign a declaration that they are working in their personal and professional capacities (not as representatives of their respective governments).

On the Canadian side, at least, it is generally viewed that the Commission makes an important contribution to Canada-US relations, maybe a bit below the radarscope, but it just helps create the right atmosphere.

PRI: *With regards to the Devil's Lake conflict, we understand the IJC could not step in to help resolve the issue, because it did not get a formal reference from the two governments. If there is another issue like Devil's Lake where the two countries don't agree to give the IJC a reference, could there be an alternative conflict-free way of handling it that would be acceptable to both parties?*

HERB GRAY: The answer is, in part, in what was done. The two governments negotiated an understanding that an effective filter would be put at the outlet that the state of North Dakota built. Then, they had a binational team of scientists do a quick study, although there is some dispute over what the findings mean. So, the governments have announced they would give the IJC a reference to have its Red River Control Board study what is coming out of Devil's Lake into the Cheyenne River and then into the Red River. We are waiting for that reference.

The Treaty had anticipated that there would be cases where the governments would work out bilateral agreements, but what is not reflected in the Treaty is the degree to which national governments show deference to state and provincial governments. The state of North Dakota did not want a reference and this position was strongly supported by its congressional delegation.

Devil's Lake

Devil's Lake is a saline lake in South Dakota that has had no natural outlet in several thousand years. Rising water levels (due in part to regional land-use practices and in part to climatic variation) threaten towns and farmland around the lake. To solve this problem, South Dakota built a diversion to carry excess water away from the lake into rivers that eventually drain into Lake Winnipeg. Canada asked the United States to join it in sending a reference to the IJC, which would likely have stalled the project and might have killed it, had the IJC found it to pose an unacceptable risk to Canadian waters because of the potential harm of introducing alien invasive species into Lake Winnipeg. The United States declined, so the IJC has not had the opportunity to investigate fully the matter or make a recommendation on the diversion.

PRI: *Is the IJC going to be sufficient to the task for issues of the future? Will it need to have an increased mandate? Will we need another body in addition to the IJC?*

HERB GRAY: I don't think there is need to change anything in the Treaty. Governments may need to give the IJC a larger budget so it could have more staff. They have to have a continued commitment to use the IJC.

With respect to another binational body, we have to ask realistically, will the two national governments be willing to yield more sovereignty than they already have in the Boundary Waters Treaty? If governments submitted a treaty like the BWT to the US Senate today, would they approve it?

The Commission's budget is voted by Congress and Parliament. It basically covers costs for accommodations, salaries, travel, administration, and so on. It does not have a program budget. So, when there has to be a major study the two governments have to give us money or the work won't get done.

There are problems with alien species and the IJC could play a greater role. What is missing is co-ordination of effort; the US is making some tentative steps and Canada is making some tentative steps. Give us a reference to co-ordinate the laws and regulations of the 11 states/provinces and two federal governments to create a common workable standard rather than a patchwork quilt.

I should point out that the role of the Commission has changed over the years. When the Agreement was first signed, the IJC had to do a lot more hands-on monitoring and reporting of the data. And that role gradually shifted to the two governments, and they set up a joint group called the Binational Executive Committee (BEC). With regards to whether the Commission's role should be changed in the Great Lakes Water Quality Agreement, the Commission is going to submit its own study report for the review.

Interview with Paul Muldoon

Canadian Environmental Law Association

The Canadian Environmental Law Association (CELA) is a non-profit, public interest organization established in 1970 to use existing laws to protect the environment and to advocate for environmental law reforms. It is also a free legal advisory clinic for the public, and will act at hearings and in courts on behalf of citizens or citizens' groups who are otherwise unable to afford legal assistance.

Since this interview, Paul Muldoon has left CELA for the Ontario's Environmental Review Tribunal.

PRI: *We wanted to interview you to get an outside perspective on boundary water issues in general, and the IJC, in particular. So, we could start with what you see as the current pressing boundary water issues.*

PAUL MULDOON: There is a whole range of boundary water issues along the entire common frontier. In general, the pressure to get water, both in quantity and quality, will be much higher in the upcoming years. I see this to be a renaissance of a new era of water conflict. Contrary to what some people believe, pollution is still alive. There is a lot of that still going on in the Great Lakes.

The effectiveness of the IJC depends on its own actions but more so, on the governments' actions. The governments have a toolbox that includes a whole range of tools, including diplomacy and the IJC. The IJC is like a power tool that governments might decide to use. Now a tool should not be blamed for non-performance if one does not plug it in. Similarly, the IJC's performance should not be questioned if governments have not given it the necessary resources and the mandate to do the job.

According to the Boundary Waters Treaty, the IJC is a dispute settlement and conflict avoidance mechanism. Conflict avoidance means that when governments see an issue that may lead to a conflict, they employ the IJC to find out what the facts are, identify the issues, and make recommendations as to how to avoid or solve them. The tendency has been not to do that but to find a political solution that may or may not be the right solution.

PRI: *Former Premier Lougheed recently wrote an editorial about how diversions for bulk water export are soon coming to a watershed near you. Do you think projects like GRAND are going to be back sometime soon?*

PAUL MULDOON: There is no indication of that right now but we do anticipate enormous pressure for small diversions – pipelines, greater consumptive uses, including uses of groundwater for bottled water export.

PRI: *You have mentioned that there will only be increasing boundary water issues in the future, as the demand for water, particularly quality water, increases. Where do you think the next flash points will be?*

PAUL MULDOON: I think air will be a flash point. The Great Lakes Water Quality Agreement takes an ecosystem perspective, which means everything from climate change to loss of biodiversity to air pollution, technically, is in there. Also, invasive species is an issue, because of the number of invasives that are expected to enter the Great Lakes. What is even more important are the "surprise issues." We don't, as yet, have a robust enough regime to deal with those.

PRI: *Given that in the future, issues will likely arise where one of the parties feels it is an issue, but the other party does not want it looked at by the IJC, do we need some kind of mechanism or third party, in addition to the IJC, that could be invoked unilaterally?*

PAUL MULDOON: What is first needed is some kind of an international summit where one would try to get an understanding as to why the governments have become reluctant to give the IJC references. We need to find out what would give them confidence for these kinds of references.

Under the Great Lakes Water Quality Agreement, the IJC is required to report on progress toward the fulfillment of the objectives of the GLWQA. Governments, however, are not giving the IJC sufficient information to enable it to do that. It would be useful for governments to sit down with the IJC and create a protocol as to what information would be required by the Commission and what kind of information could be provided. This would ensure predictability in the information requirements and comfort for the IJC that the information is reliable.

Let's not change the Treaty but let's try to understand the institutional, governance, political, and sociological reasons for the IJC not being used enough.

GRAND Diversions

Over time, many large water diversion projects have been proposed that would move water from Canada to the United States. The two largest such proposals (both currently moribund) were GRAND and NAWAPA.

The North American Water and Power Alliance (NAWAPA) plan involved a series of dams, canals, and pumping stations that would divert water from Alaska and Yukon into a large reservoir in southern British Columbia (flooding much of the Okanagan Valley), whence it would be pumped to existing canals and divered to the United States to supply water to California and the Southwest. Substantial hydro-electric generating capacity would be built at each dam along the route.

The Great Recycling and Northern Development (GRAND) canal project would dam the southern end of James Bay to create a freshwater reservoir, which would be diverted through a series of canals and pumping stations to the Great Lakes, from whence it could be channeled to the American Southwest.

The GRAND project was estimated in 1994 to cost about $100 billion; the NAWAPA project was estimated at $300 billion.

North American Watersheds

"Three Countries Working Together to Map Their Shared Environment"

During the past year, three National Atlas programs in Canada, the United States, and Mexico co-operated to compile the North American Watersheds map. This map depicts a hierarchy of watershed sub-basins that can, in turn, be aggregated into major basins draining directly into salt water (e.g., Arctic Ocean, Pacific Ocean, Atlantic Ocean, the Caribbean, Gulf of Mexico).

Perhaps the most striking pattern on the map is the interdependency of our watershed geography. Every major watershed is shared by two countries. For example, Canadians may be surprised to learn that a portion of the southern prairies forms part of the Mississippi River watershed which ultimately flows into the Gulf of Mexico.

In 2003, the Atlas programs in Canada (Natural Resources Canada), the United States (United States Geological Survey), and Mexico (Instituto Nacional de Estadística Geográfia e Informática) partnered to release a harmonized set of 1:10M-scale North American framework data (elevation, bathymetry, hydrology, transportation, populated places, boundaries) and an accompanying paper map. These North American frameworks have been accepted as the geographic foundation for environmental reporting by the North American Commission for Environmental Cooperation (CEC), an organization funded by the environment ministries in the three countries to monitor the environmental impacts of the North American Free Trade Agreement.

Work is ongoing at the continental scale (1:10M) as well as at the Canada/US scale (1:1M). The product of this collaboration – the North American Watersheds map – is expected to be printed in June 2006.

Water for Sale?
A Look at the Complex Issue of Bulk Water Export

Dixon Thompson
University of Calgary

Introduction

Canada's natural resource sectors including energy, minerals and metals, forestry, agriculture, and fisheries have been important staples of the Canadian economy and continue to support our standard of living today. As a trading nation, Canada offers many marketable skills, services, and product. However, we continue to rely heavily on the export of our natural resources to maintain a positive trade balance and employment.

The profile of the water export issue has increased due to recent attention in the media: Peter Lougheed's *Globe and Mail* editorial predicting that the United States will demand access to our water within five to ten years (November 11, 2005), a five-page cover story in *Maclean's* arguing "Let's sell them our water before they take it" (Steve Maich, December 28, 2005: 26-30) and the CBC drama "H_2O," in which a prime minister is assassinated and American troops occupy Canada over water exports.

Proposals have been made for the export of Canadian water for half a century. There is an emotional, often strident, debate between strong proponents and opponents over this controversial issue. For those who have not taken a position, the subject can be very confusing. There is no consensus, and strong, conflicting, professional opinions make the establishment of clear, sound policy a critical element in maintaining Canadian control.

The issue of Canadian water exports is complicated and touches on legislation, policy, jurisdiction, economics, politics, the environment, and personal values, both domestically and at the international level. Many of the complexities lie in the fact that water is unlike any other natural resource,

Bottled Water

Canada has a booming trade in bottled water and other beverages, even from Ontario where export from the Great Lakes basin is prohibited. There is a sound business case for export of bottled water at the corporate level. The difficulty is that the owners of the resource, the provincial governments, receive little or no direct economic benefit. Further, they bear the cost and responsibility of regulating the industry. British Columbia has a complicated rent structure for water, which identifies specific uses of water, but the rates are so low ($0.85/ 1,000 cubic metres for bottling water) as to be almost meaningless and there is no rate increase in British Columbia until 2009. Other provinces (Alberta and Quebec) are contemplating water pricing. Therefore, one criterion for approval of water export should be financial benefit to the exporting basin or province, which is not possible at present. It must also be noted that a royalty, rent, or export tax on water destined for export is forbidden by the WTO and NAFTA, because all parties to the agreements must be treated equally: if Canadians don't pay rents or royalties for water, we can't charge others for it.

Dixon Thompson,
Professor of Environmental Science,
Faculty of Environmental Design,
University of Calgary

as it is essential to life and has no functional substitute. It is, therefore, difficult for many to conceive of water as a commodity. On the other hand, the reliance on water for industrial processing, irrigation, electricity generation, and other economic uses suggests that a monetary value could be established for water (as opposed to being free of charge as it is in Canada) allowing for the possibility of profitable exports.

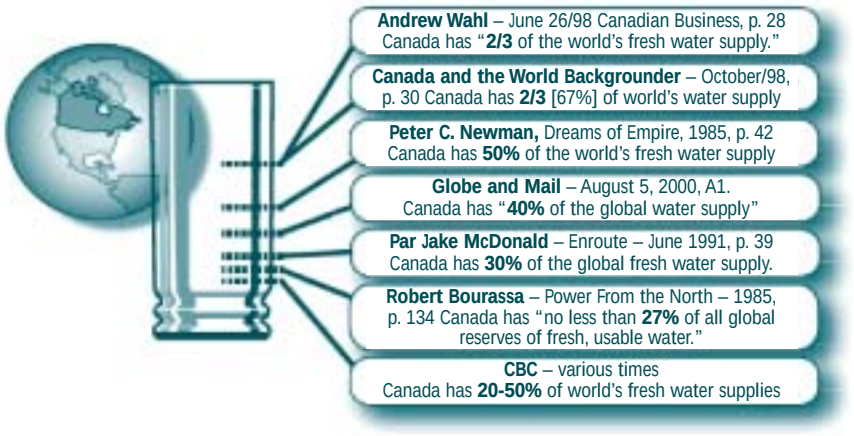
Although proposals to transfer bulk quantities of Canadian water to the United States began to surface in the 1950s, it was the implementation of international agreements, such as the North American Free Trade Agreement (NAFTA) or the General Agreements on Tariffs and Trade (GATT), that caused concern, as such agreements may force Canada to allow the sale of water to the United States. Both agreements apply only to the trade of commodities, and the question of whether water falls into this category has yet to be resolved. In the meantime, work has been done to assess the economic feasibility of bulk freshwater exports to assess if the prospect is worth pursuing.

For the purpose of this discussion, bulk water export refers to the physical transfer of water in its natural state from Canada to another country. Such transfers can occur on either a large or small scale. Whether a transfer is large or small is a function of the cost of the diversion, the technology used, and the amount of water being transferred. Water export derivatives[1] are not included in this discussion on bulk water export.

Why is There an Interest in Canadian Water?

The initial driver for interests in bulk water exports is the perceived surpluses of water within Canada's borders. Over the years, the media and others have reported false information regarding Canada's global share of freshwater quoting ranges between 20 and 67 percent as seen in the figure below. In reality, Canada has roughly 20 percent of the world's freshwater but only 7 percent of the renewable-supply.

The myth of Canadian water abundance and misrepresentation of surpluses that are potentially available for export distorts the image of the potential volume that may truly be available. When the environmental needs for water are taken into account in conjunction with Canadian consumer needs, there is not a tremendous water volume left for export. Often, any volume that could be considered surplus is in northern regions, which are farther away from potential markets than over-allocated southern sources.



The Commodification of Water

The debates about whether water is a commodity take place in economics or in trade law, but those debates are independent and cannot be combined. According to economic theory, a commodity is an economic, tradable good, product, or article of commerce, something for which there is an established market where the commodity can be bought and sold in commercial transactions between willing buyers and sellers. In the context of water, the application of this definition is not clear. Market fundamentalists argue that water must be a commodity, because the market is the only mechanism for allocating scarce resources. Other economists

argue that water is a public good and should remain a public sector responsibility to ensure that essential needs and services are provided.

Water pricing is often promoted as an important tool for demand management. However, criticisms arise when pricing systems that might make sense for industries that profit from the use of water are applied to water as an essential service. In Canada, current provincial legislation, particularly in the west, appears to allow for the commodification of water under certain circumstances marking an evolution from riparian rights, to prior allocation, to management of a scarce resource. Some provinces allow access to water in rural areas for domestic use and family agriculture without the need for a licence, which is consistent with the essential services argument. However, licences are required for larger volumes, industry, intensive livestock operations, and irrigation. In British Columbia, an annual fee for water is paid, which is determined by purpose and volume and in Alberta, water licences can be traded giving water the characteristics of a commodity from an economic perspective.

With respect to bulk water export, the issue of commodification has yet to be resolved as a matter of trade, despite a large volume of speculative literature. A commodity under NAFTA and GATT is a legally negotiated position and not in any way connected to the economic definition. To date there has yet to be a ruling by a court or trade panel on whether water is a commodity. Should water be ruled a commodity, then Canada's ability to control its export may be limited.

Given the complex and ubiquitous nature of water, its attributes and uses, a ruling on water as a commodity in trade and commerce would be very difficult. It is hoped that the ruling court or tribunal would understand the potential repercussions of trying to impose a simple yes or no answer on a very complex set of issues. If governments do not want to take the chance of leaving decisions about water exports to courts or tribunals, which are not always predictable, they must set the terms and conditions under which export of water as a commodity would be permitted.

The Bottom Line

Ultimately, bulk water export will only be pursued if it is profitable for the parties involved. To explore the potential for profitability, the estimated costs of a number of large- and small-scale water export proposals can be contrasted to the average cost and marginal cost for water in potential markets. Large-scale water export proposals involve billions of dollars (US) in construction, operation, and management of dams and canals, and the inter-basin transfer of hundreds of thousands of acre-feet of water to areas across North America (Dale, 1992). Small-scale water exports involve water shipments (supertanker and bladder technology towed behind tugboats) or small-volume pipelines that would transfer a smaller volume of water, typically for higher-value municipal use, and have lower infrastructure costs (Gleick, 2001).

It should be noted that the costs for export proposals are open to scepticism, because they were acquired from proponents and are not independently verified. Also, an export proposal would likely have additional costs that were not foreseen during the planning process.

Large-Scale Exports

Large-scale export proposals are designed to supply water for irrigation; however, the costs of water in these systems (ranging from $3,300 - $7,810 per acre foot) are far too high for irrigators. In one economic study conducted in 1999, the value of water for irrigation in the Western United States ranged from $9 to $44 (US) per acre-foot. If some irrigators paid more than $9 to $44 (US) they would lose money on the production of their crops (US, 1999: 121). Therefore, the business case for the large projects cannot be made. Only with massive government subsidies would the large-scale projects be contemplated.

Another factor, which mitigates against a sound business case for the large projects, is the requirement for environmental impact assessments (EIA) for the proposals. Large-scale export schemes, such as the North American Water and Power Alliance (NAWAPA) proposal, would have very large environmental and social impacts requiring the flooding of large areas of British Columbia. The NAWAPA proposal as well as the GRAND Canal scheme would require large canal systems that would disrupt transportation networks and the movement of wildlife.[2] A major concern is the transfer of exotic species with resulting environmental damage. The Garrison Diversion from the United States to Canada was stopped by the International Joint Commission on this issue, but the Devil's Lake

diversion into Canada has taken place in spite of Canadian objections.

Given such massive disruptions to the landscape, it would appear that the only business case that could be made for large-scale export is the profits to be made by consultants to do government-funded feasibility studies and environmental impact assessments.

Small-Scale Exports

In some cases, the marginal costs of the exported water using pipelines, tankers, bags, or bladder technologies (ranging from $1,000 - $6,978 per acre -foot) are close to those for water in certain markets, where the marginal cost ranges from $110 - $27,000 per acre-foot, but is most often from $900 - $6,000 per acre-foot. It is important to note that the financial feasibility of the export proposals must be based on the marginal cost of water – the cost of adding additional supplies – not the average price in the importing basin. Examining marginal costs in potential markets appears to make the business case for small-scale exports more attractive. It is the favourable comparison of small-scale export costs and marginal costs in potential markets that have led politicians and entrepreneurs to think of exports as desirable.

Although some small-scale proposals may have an acceptable cost, several significant factors diminish the strength of a business case. First and foremost, Canadian provinces have legislation or policies forbidding bulk water exports, which would clearly affect the feasibility of export proposals. As indicated by public pronouncements over the years, the federal government has an unwritten policy against exports. Therefore such proposals could not be realized at present. Should there be an international trade ruling in favour of the commodification of water, such legislation would become illegal.

Another consideration is the seasonal shift in the demand for water. Demand for imported water often arises due to temporary shortages caused by emergencies or droughts. Investing in infrastructure costs that would depend on water shortages to be profitable introduces an uncertainty that is perhaps too large to make the project feasible.

There has yet to be a ruling by a court or trade panel on whether water is a commodity.

The competitive alternatives to imported water in the potential market also erode the business case for exports. Among the alternatives are demand management and desalinization. Demand management could include increased water right transfers, increased use of water pricing, education on the value of water, recycling, and the introduction of more efficient technology.

Demand management alternatives are more cost effective for a region than adding supply through the importation of Canadian water. Demand management alternatives also have the advantage of enhancing environmental quality in an aquatic ecosystem. Although demand management theoretically offers the strongest competition to water exports, there is often political, public, and bureaucratic resistance to implementing demand management strategies in potential market areas. It is difficult to find estimates of the costs of demand management; in many cases, the costs are low as the returns on the initial capital investment continue without much operation and maintenance costs.

Desalinization using reverse osmosis or distillation has high capital and energy costs and costs associated with the disposal of the brine produced. This alternative is favoured by communities such as Santa Barbara, because it offers security of supply. The high energy prices might appear to favour imports for meeting marginal demand. However, renewable energy, specifically solar, is becoming increasingly feasible for providing the energy requirements for desalinization.

The fact that there has been no experience with water export markets in North America further weakens the business case for export. A significant amount of work would be necessary to resolve the conditions of any initial prospects. Most notably, the determination of the price at which water would be sold and the negotiation of the preliminary contract would require careful consideration of a number of factors. Until there are several years of experience with a small-scale water export project, uncertainties associated with seasonal and annual variability of demand and the availability of feasible alternatives will significantly increase the financial risk and weaken the business case for export.

Governments and proponents must understand the financial risks of

small-scale exports before putting resources into proposals. Currently, Canadian government policy and legislation prohibit export. However, a court or trade tribunal decision by a challenger could be successful. It is also possible that the United States will demand access to what it thinks of as a continental resource. It would be imprudent for Canadian governments to be unprepared to dictate the requirements that export proposals must meet.

Six mandatory conditions are proposed for water export proposals:

1. an environmental impact assessment that shows that there will be no significant environmental damage in exporting or importing basins;
2. proof that there is a reliable exportable surplus in the exporting basin;
3. evidence that there will be financial benefits to the exporting basin;
4. confirmation that there is a realistic market that wants the water;
5. a business plan from the proponent; and
6. a provision for auditing the project as it proceeds.

Conclusion

There has been a lot of discussion and debate regarding the bulk export of Canadian water and whether it will ever occur. Such questions will not be formally answered unless there is a legal challenge by another country wishing to gain access to our freshwater resources. A court or tribunal ruling will be needed to determine if water is a commodity that falls under international trade agreements.

In general, a hard and fast rule about water as a commodity cannot be made. As a component of the terrestrial, aquatic, or atmospheric environment, it is not a commodity. However, water takes on the characteristics of a commodity when used for larger-scale industrial uses, including industrial agriculture. In moving forward, it will be necessary to resolve different valuations for the different uses and functions of water to ensure that essential services are protected.

In terms of the economic feasibility of bulk water export projects, it was concluded that large-scale proposals, such as the GRAND Canal, would not produce a return on capital invested, would only be feasible with government subsidies, and would likely cause significant environmental damage. Some small-scale proposals could theoretically produce a profit under certain circumstances.

Notes

1 Water export derivatives are those products or services that consume or use water in production processes. Classic examples include steel in exported products or pulp and paper.

2 Please refer to the text box on p. 27 for more information on NAWAPA and the GRAND Canal proposals.

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Bottling Water – One of the Older Professions

T. Duncan Ellison
Canadian Water and Wastewater Association

Much has been written about the commercial phenomenon of the bottled water industry over the last decade and many prominent environmental groups have weighed into the discussion and arguments, mostly on the negative side. According to a report published by the Earth Policy Institute, a Washington-based non-governmental organization, sales of bottled water rose by 57 percent in the past five years and in the past year alone 154 billion litres were consumed around the world. The phenomena is indeed extraordinary with customers literally "drinking up" water from exotic sources – glacier and iceberg water being at one extreme – i.e., centuries old water from preindustrial revolution (contamination) times, to desalinated deep Hawaiian Seawater (an emerging market in Japan worth $17 million at $6 a bottle from 3,000 feet below the surface on the Big Island's Kona Coast).

The increase is a global phenomenon, with sales steadily rising even in those places where tests have shown time and again that tap water is equally safe. There are environmental complaints: unnecessary packaging and the huge amounts of energy used in extracting, bottling, and transporting the water. The Earth Policy Institute argues that one third of the money spent on bottled water would be enough to halve the number of people without ready access to clean, safe drinking water, a point perhaps particularly current given the discussions March 16 to March 22, 2006 at the World Water Forum in Mexico City.

The CWWA's Position

One would think that the Canadian Water and Wastewater Association (CWWA) along with counterpart national water and wastewater associations in other countries might well be on the side of the environmental groups. Does the bottled water industry pose a threat to the water supply services of the municipalities? The CWWA represents nationally the interests of the municipal water supply and wastewater services, but the CWWA does not view the bottled water industry as a threat in itself. In fact the CWWA position, published on its web site <www.cwwa.ca>, states:

> Bottled water should meet the minimum criteria as set out in the *Guidelines for Canadian Drinking Water Quality*, and that labeling be required to advise consumers of the water source, the treatment method used, the shelf-life of the contents, and the contents and standards met by the bottled water.

The CWWA position further states legislation should be enacted to control and monitor the bottled water industry in the same fashion as centralized water supplies, since although bottled water is regulated under Division 12 of the *Food and Drug Act Regulations*, the standards are not as stringent as is typically found in the provinces and territories for municipal drinking water services.

The CWWA recognizes that by and large, the bottled water industry is meeting two social needs:

- a point-of-thirst consumption need (that is competitive with all other beverages); and

T. Duncan Ellison,
Executive Director,
Canadian Water and
Wastewater Association

- a consumption need for the more than two million Canadian homes and eight million cottages that are on private wells and where the owners may not be sure of the quality of the water available to them.

The two consumption patterns are quite different. The former consumers essentially buy water in beverage-sized containers (which in any case are often refilled from a tap), the latter buy water in larger containers and may have a water dispenser to hold the container. These larger containers may also be refilled at specialty water stations found in various commercial outlets, such as grocery stores.

The CWWA opposes any actions of manufacturers, distributors, or retailers of bottled water that through advertising, marketing, or other activities imply that central water supplies are not safe to drink. Of particular concern is the public perception that chlorinated water is harmful. Chlorine is added to municipal water supplies to meet the regulations of the drinking water authorities to ensure that the water is safe to drink. By "safe," health authorities mean free from microbiological hazards that can cause immediate health problems, such as gastrointestinal illness.

The Older Profession

But to get back to the older profession. Humans have been bottling water from prehistoric times, and there is ample archeological evidence of this in all parts of the world. Goat-skin water bags, gourds, and clay pots have been used for millennia to hold and facilitate the transport of water for travellers and hunters or to carry water from a well or river to the village that may have been located in a more secure area. Some containers were user-filled; some were supplier-filled and no doubt were sold or bartered in some primitive market place.

Water carriers still exist in many developing countries where piped water systems are not installed. The water carriers may operate trucks to deliver water in bulk to user-owned containers, or may simply deliver full containers and collect empty ones. This is a common practice in northern and remote parts of Canada as well as in developing countries.

Bottled water (in all its diversity of container options and marketing situations) provides an essential service: the supply of water from a source (place of abundance) to the place of consumption (point of need).

Pricing

In the early years of the current bottled water industry's growth, bottled water typically would retail at anywhere up to 4,000 times the price of tap water. A 500 mL bottle of water selling for $1.95 works out to be the equivalent of $3,900 for a cubic metre of drinking water. A municipality will typically charge from $0.35 to $1.50 for a cubic metre of water (delivered continuously, 24 hours a day, seven days a week into the consumer's house or building) – a real bargain. The $1.95 price remains a typical price for bottled water sold, one bottle at a time, from a variety of retail outlets serving the point-of-thirst market, such as convenience stores. Restaurants, movie theatre snack bars, etc., can and do charge even more and may expect a tip to be added. Currently, bottled water (in beverage-sized bottles of 375 mL) can be purchased in 24 packs at about $0.15 per bottle, 3 L bottles can be purchased for less than $3.00, and 18 L containers typically can be purchased for about $5.00/unit in supermarkets.

The Earth Policy Institute argues that one third of the money spent on bottled water would be enough to halve the number of people without ready access to clean, safe drinking water.

Competition is therefore driving the price of bottled water down, although it still remains more expensive than tap water.

In response to this commercial and social phenomenon, some Canadian municipalities offer their residents re-usable plastic water bottles that are intended to meet the point-of-thirst need, yet would be filled with tap water. The City of Ottawa, for example, produced such a bottle and included information on the label that its tap water fully meets the *Guidelines for Canadian Drinking Water,* and that the bottle can be filled and refilled 54 times from the tap for less than $0.01. Other cities actually contemplated entering the bottled water market by bottling their own water and marketing it in competition with the bottled water companies, although this is not common.

Health Issues

All Canadian municipal water supplies are subject to a similar regulatory regime imposed by the provincial or territorial governments. Water sources

are examined for risks and water treatment plants are built according to government requirements that reflect the risks present. The objective is to ensure that the water produced in the treatment plant is potable and meets the Canadian guidelines for drinking water quality or any standards imposed additionally by the province or territory concerned. Regular water quality tests are required to confirm the production process, and these are often double-checked by inspectors taking their own tests. Laboratories performing the water quality tests have to be accredited under Standards Council of Canada requirements. The Canadian guidelines for drinking water quality take into account human health risks from over 120 likely or known contaminants and often have a safety factor of between 10 and 100 to address the issue of uncertainty.

In Canada, bottled water (prepackaged water) is considered a food and is regulated under Division 12 of the *Food and Drug Regulations*. These regulations classify bottled water as to type and require that bottled water be microbiologically safe. In the United Kingdom, the position is that the bottled water should at the minimum meet the requirements of the international Codex Alimentarius Commission: Codex Stan. 108 B 2001 Codex Standard for Natural Mineral Waters and Codex Stan. 227 B 2001 General Standards for Bottled/Packaged Drinking Waters (Other than Natural Mineral Waters). In Europe, a similar approach has been taken. In the US, regulations under the *Food and Drug Act* (CFR Title 21, Part 165) require that the bottled water meets specific water quality standards and that the materials used in the bottles and caps meet requirements not to leach contaminants into the water. NSF International based in Ann Arbor, MI indicates that it certifies a number of bottled waters to the FDA water quality requirements (both in the US and in Latin America) but no bottles or caps have been certified to the material standards. Canada's regulations do not address the issue of materials used to manufacture bottles and caps.

Under the *Food and Drug Regulations* in Canada, bottled water comes in three essential varieties: spring water, mineral water, and drinking water. Spring water is defined as potable water (i.e., fit for human consumption) that comes from an underground water source. Mineral water is spring water with a larger amount of dissolved mineral salts (usually about 500 mg/L of total dissolved solids). Spring and mineral waters must not have their composition modified through the use of chemicals, but carbon dioxide and ozone can be added during the bottling process to protect the freshness. Drinking water is simply water that has undergone some form of treatment to render it potable. Much of this "drinking water" is simply municipal water (already potable by law) that has been triple filtered (often essentially to remove the chlorine) and re-disinfected with a non-chlorine disinfection process. There are many sub-grades of water depending on source and treatment. Some are considered natural as in natural spring water; others are de-ionized meaning they have gone through some form of electrolysis; distilled water means it has been distilled by a boiling process and has an electrical conductivity of less than 10 µS/cm. Bottled waters may also be carbonated and fluoridated and some add salt (sodium chloride) to provide an "acceptable taste." Some bottled waters have a sodium content that exceeds the guidelines for Canadian drinking water quality. The choice for consumers (and bottlers) is pretty much endless.

Although certain mineral waters may be useful in providing essential micronutrients, such as calcium, the World Health Organization (WHO) is unaware of any convincing evidence to support the beneficial effects of consuming such mineral waters, despite millennia-old European and other customs of going to spas for bathing and drinking spa water for "health" reasons. As a consequence, WHO guidelines for drinking water quality do not make recommendations regarding minimum concentrations of essential compounds. Canadian bottlers, under the *Food and Drug Act* are not allowed to make health claims, unless they can be demonstrated by clinical trials.

A related issue has been raised as to whether the plastic material typically used to manufacture the bottles themselves presents a health risk. Studies have indicated that bottled water can contain "high" levels of substances leached from the polymer of the plastic bottle. None of these levels found exceed maximum daily intake levels established by health authorities, but nevertheless, those who drink bottled water should be aware that they may be contributing to their intake of these substances, and that the "older" the bottled water is, the more likely some leaching could have occurred. (Note: check the "best before date" on the bottle and recall that little apparent certification to the US FDA materials' requirements seems to take place.)

Environmental Issues

Forty percent of bottled waters are actually derived from municipal water supplies and simply subjected to a number of additional filtration processes. Carbon filters are used to remove any chlorine or other flavours. Often, the water is passed through a reverse osmosis process to reduce the presence of fine particles and maybe some chemicals with large molecules or organic material to levels below those allowed in drinking water regulations; and often they are subjected to ozonation or some other form of disinfection to ensure the water is fully disinfected without a taste or odour.

A number of environmental issues have been identified in the literature and press.

Depletion of Water Sources

Where bottled water is produced using municipal water supplies as the source, there generally is not a problem of water source depletion, although the bottled water may add to the demand for water. Competing point-of-thirst beverage manufacturers (e.g., beer, soft drinks, and beverages using fruit concentrates) are located in municipalities and use municipal water supplies as their source. They too may undertake additional treatment on site to assure end-product flavour consistency. Thus, these bottled water activities may not increase the demand for municipal water, just divert its use from one product to another.

Where bottled water is taken directly from springs or wells, contentious situations have arisen with local communities claiming that their springs have run dry or that their aquifer is being depleted. This situation has arisen in a number of communities across Canada and the United States, but the one that has received international attention and is often cited on environmental non-governmental organizations' web sites comes from the bottled water plants of Coca-Cola in the states of Kerela and Tamil Nadu in India where more than 50 communities claim their aquifer has been depleted. Water use regulatory boards in many provinces and states are grappling with abstraction permit applications and the competing use of limited supplies.

According to the US Container Recycling Institute, only 14 percent of plastic water bottles are recycled and a plastic water bottle will take over 1,000 years to biodegrade if land filled.

From a global environmental point of view, bottled water has not led to an increased consumption of water; it has simply resulted in the diversion of consumed water from one source to another (e.g., from tap water to bottled water or from beverages or fruit juices to bottled water). The amount of liquid consumed per person has not varied, just the source of the liquid and its flavouring.

Waste Generation

Most bottled water is sold in non-reusable plastic bottles that may or may not be recycled. It has been estimated that in California, more than 1.6 billion plastic bottles are sent to municipal waste dumps every year. According to the US Container Recycling Institute, only 14 percent of plastic water bottles are recycled and a plastic water bottle will take over 1,000 years to biodegrade if land filled. Forty percent of the US plastic bottles that reach recycling plants are actually shipped to places like China.

Energy Consumption

The mere production of plastic bottles demands huge quantities of petroleum resources, let alone the energy that has to be used to transport the empty and filled bottles and for the collection and recycling of the bottles after use.

Also, much of the bottled water must be transported long distances – and nearly one fourth of it across national borders – by boat, train, airplane, and truck. This involves burning massive quantities of fossil fuels. For example, in 2004 alone, a Helsinki company shipped 1.4 million bottles of Finnish tap water 4,300 kilometres to Saudi Arabia. And although 94 percent of the bottled water sold in the United States is produced domestically, some Americans import water shipped some 9,000 kilometres from Fiji and other faraway places to satisfy demand for what is termed "chic" and "exotic" bottled water. Canada, of course, benefits from this by exporting bottled water to the United States, but Canadians also import bottled water from abroad.

Impact on Sustainable Development

The growth of the bottled water industry in developed countries is being replicated in developing countries, and it is feared that those who

can least afford to buy bottled water are forced to do so, because of a lack of investment in conventional water infrastructure, that would provide safe, clean drinking water in remote and small villages throughout Africa, Asia, and Latin America.

Back to the Positive Side

In emergency conditions, (inspected) bottled water is an essential means of assuring public health and consumption requirements are met. It is wholesome and transportable. It can be where you want it to be. The aftermath of Hurricane Katrina was an example of the immediate need to transport huge quantities of bottled water to displaced persons in the wake of disasters.

In the very few circumstances and instances where municipal supplied water fails temporarily to meet drinking water quality standards, the options available are to boil the tap water or to consume bottled water.

Conclusions

The CWWA recognizes that bottled water is not a competitor to municipally supplied water, that it is wholesome (although not regularly tested to drinking water standards) and priced to meet higher costs of production, transportation, and distribution and to meet a positive market need.

However, governments in Canada may need to address several policy issues:

- What are the resource use implications of an expanding bottled water industry (water, hydrocarbons, energy, etc.)?
- Should the drinking water quality standards imposed on municipalities, be imposed on bottled waters, reducing or eliminating consumer choice on for example, mineral waters?
- Is there a need for standards for the materials used to manufacture the bottles? Do leachates into the water from the bottles cause concern, and could the bottles be made biodegradable?
- How effective are regulations in protecting consumers from advertising misrepresentations?

Governments in other countries, particularly developing nations where bottled water may be or is seen as being the only safe source of drinking water have a similar set of policy issues, although they may be more serious. In addition, there are particular policy issues, for example:

- Are per capita incomes being unreasonably diverted to the purchase of bottled water from other essential domestic purchases and needs?
- Is the lack of safe municipally supplied water limiting the achievement of social and economic development, and environmental goals?

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

RésEau

RésEau is a Government On-Line demonstration initiative that focuses on water information. RésEau supports clean, safe, and secure water for all Canadians and ecosystems. Specifically, RésEau establishes partnerships and projects to demonstrate the sharing, discovery, access, and use of water information over the Internet.

The initiative is led by Environment Canada, in partnership with Natural Resources Canada and Health Canada, and will deliver in March 2006. Its user-driven focus targets information for a wide range of generalists and specialists, from high school-level youth to water resource managers.

Source: <www.environmentandresources.gc.ca/reseau>.

Market-Based Instruments for Water Management

Bernard Cantin
Policy Research Initiative
Government of Canada

Bernard Cantin,
Senior Policy Research Officer,
Policy Research Initiative,
Government of Canada

Canada has thus far made relatively little use of market-based instruments (MBIs) – also known as economic instruments – for water management when compared with other developed countries. This is in spite of the fact that for many years, the OECD and other organizations have urged the Canadian federal and provincial governments to use more MBIs to better achieve environmental objectives at lower cost. More recently (Canada, 2004), the federal government received the *Report on Smart Regulation*, emphasizing the need for cost efficiency and flexibility in achieving desired objectives as well as expanding the appropriate use of economic instruments.

The PRI project on freshwater investigated MBIs for controlling water use and water pollution. We found surprisingly limited efforts put into documenting the experiences of using MBIs and, as a result, it is very difficult to assess their effectiveness and efficiency. In what follows, we present the main results of the PRI's research, including recommendations for policy development and further policy research studies.

What Are Market-Based Instruments? How Do They Compare to Other Instruments?

Market-based instruments can be described as "regulations that encourage behaviour through market signals rather than through explicit directives regarding pollution controls or methods" (Stavins, 2001: 1). This highlights the fact that MBIs are a form of regulation imposed by the state that operate through incentives provided within the institution of the market. More precisely, as Hatton MacDonald et al. (2004: 15) emphasized, using the notion of market-based rather than economic instruments in Australia helped to clarify MBI reliance on a well-defined regulatory framework, which may also include the specification of property rights and entitlements.

Such a clarification is indeed useful, since it is still common in the literature to oppose MBIs and command-and-control regulation, where the latter usually specifies the method used to deal with a specific problem, thus leaving little flexibility to firms. But the opposition may be misleading, as there are other types of regulation, not based on market processes, that may not be very directive in the choice of methods. From this standpoint, MBIs could be more usefully described as a less intrusive form of regulation.

The expected benefits of using MBIs lie mainly in their cost effectiveness, in the fact that they allow more flexibility for compliance, and in their presumed fostering of innovation. While some of these benefits have been empirically verified in some circumstances, they do not necessarily materialize in all cases (Tietenberg and Johnstone, 2004). Implementing MBIs can require time and investment, especially in monitoring capacity, and in modifications to the bureaucratic apparatus and its relation to regulated entities. These factors can make MBIs difficult and costly to implement, without bringing the expected benefits. Market-based instruments can have important social consequences, both positive and negative.

Other large sets or classes of instruments, often distinguished from MBIs or other regulation, can be grouped under the terms "voluntary instruments" and "education initiatives." Voluntary approaches include, for example, eco-labelling, industry codes of practice, or covenants. Education initiatives cover training as well as community-based social marketing. While clearly different, we bring together these two types of approach, as they share fundamental distinctions with market-based and regulatory approaches.

It might be useful to distinguish the main classes of instruments (directive regulation, MBIs, and voluntary instruments/education) by highlighting the main institutions on which they rely for their implementation and operation (recognizing that institutions are not completely independent). Most regulations are the most directly linked to state institutions in that the state sets both the objectives and, to a variable extent and depending on the type of regulation, the methods to achieve them. Market-based instruments, in contrast, while also relying on state-set objectives, leave more room for private actors, in the setting of market institutions, and in determining the method to achieve them. Note that all regulation, whether market-based or not, needs to be backed by enforcement and monitoring. Finally, voluntary/educational instruments, which can also be based on state objectives or state-defined methods, leave the decision to adopt/use them to private actors. These approaches mainly rely on moral suasion in a given social context. From an institutional standpoint, actors are viewed as part of some social network, for example a physical community or a group of enterprises in a given sector, which provides the basic impetus for the adoption of a voluntary instrument.

Data on water availability, water quality, and water use are all generally insufficient in Canada.

With respect to MBIs, two main types can be distinguished: those that are price-based and those that are quantity-based. The first type, such as taxes or charges, affect behaviour by modifying the cost of polluting water or using it. Subsidies used for pollution control would also be a type of price-based incentive to the extent they lower the cost of mitigating actions. Quantity-based instruments, such as pollution markets, involve the determination of standards for mitigation effort through, for example, setting a maximum amount of pollution that can be released in a watershed (Hatton MacDonald et al., 2004).

To better understand the benefits and limits of using MBIs for sustainable water management, the PRI's freshwater project has been running a two-phased study. In what follows we briefly describe the study and highlight its main conclusions. We then explore some of these conclusions in more detail to highlight policy research issues we feel need to be better examined to gain an appropriate understanding of how to use MBIs to promote sustainable development.

Main Conclusions and Recommendations

The first phase of the study examined issues of water demand within different sectors (e.g., urban, industry, agriculture) and allocation of water resources across sectors through a number of instruments, specifically pricing, taxes or charges, and markets. A symposium was organized where Canadian and international experts presented the state of research with respect to these themes. This was supplemented by PRI research with an emphasis on understanding how those instruments have fared in practice.

The second phase focused on water pollution, examining in some detail the feasibility of implementing water quality trading in Canada (i.e., trading in pollution credits) to deal with water pollution from agriculture. While the first phase of the MBIs project ascertained the extent to which existing evidence on instrument effectiveness and cost efficiency could inform policy makers about choices of instrument, the second phase examined in more detail the requirements for successful implementation of a specific MBI. Two expert workshops were organized, and supplemented by PRI-led as well as commissioned research, including on the adequacy of the Canadian regulatory systems to accommodate water quality trading.

Water availability and water pollution issues were examined separately to reflect the usual distinction made in the literature, and for conceptual reasons. However, it should be clear that in practice, both aspects should be examined together as much as possible since water quality is clearly linked to the use one makes of it

(e.g., irrigation water need not be of drinking water quality).

Among the conclusions reached and policy research recommendations made throughout these two phases, we want to highlight the following. (More information on these can be found in the publications associated with this study, listed at the end of this article.)

- There is a lack of data to make informed decisions about water issues. Data on water availability, water quality, and water use are all generally insufficient in Canada. While data are crucial for any environmental policy tools, MBIs often are more information intensive than other policy instruments.
- Efforts to evaluate policy effectiveness, to learn from experience and to share this knowledge when it exists are still too limited. Thus governments need to commit to adaptive management, and to devise controlled experiments, either through the techniques offered by experimental economics, through pilots, or other techniques. As much as possible, when federal involvement is warranted, this work should be done in collaboration with other levels of government.
- The objectives for which MBIs are proposed for water are usually not clearly spelled out. It is also often the case that too many objectives are sought with MBIs. For example, water infrastructure cost recovery and residential water use efficiency may need more instruments than just a better use of pricing structures. In addition, evaluating the effectiveness of MBIs is difficult, if not irrelevant, if the instrument's objectives were not clear from the start.
- Careful attention should be given to the design of instruments to achieve intended benefits. We feel in particular that limited attention has been given to understanding the cost of implementing these instruments and to the methods used to lower these costs. It should be clear that different MBIs, and different instruments more generally, have their own design requirements, which should be carefully considered when making instrument choices. For example, an instrument, such as water quality trading to deal with agricultural sources of pollution, which requires very good biological information as well as the collaboration of municipalities with farmers, may not be appropriate in a number of Canadian watersheds.
- As the preceding point highlights, one size does not fit all, in particular for water issues. Water issues are very different between regions and between watersheds. Claiming water is scarce all over Canada is false, as would be saying that water pollution from agriculture is a problem in every watershed. The nature of the differences between different problems in different watersheds, which has been recognized in many provincial approaches with the adoption of decentralized watershed-based planning, highlights the need to tailor solutions to specific circumstances. The context – biological, institutional, and social – within which instruments are designed, is important in assessing their potential effectiveness and efficiency, and to good instrument design.
- In practice, MBIs are used in combination with other instruments. There is a need to better understand how these combinations have been used, how they have developed, and how effective they have been. Such knowledge is essential not only to develop effective policy, but also to develop efficient and equitable policies, in the spirit of sustainable development.
- Related to the previous point, new instruments should be introduced only with the assurance that other existing policy measures do not work against them. This should not be construed as promoting the status quo, but rather as ensuring that the goals being sought by introducing new instruments can be effectively and efficiently achieved. For example, many have remarked that it may not make much sense to limit agricultural water use through charges or pricing on the one hand, and to subsidize crops that are water intensive on the other.
- Public and stakeholder participation is a crucial aspect of instrument design and, of course, a key aspect of watershed-based management. Experience tends to show that

Claiming water is scarce all over Canada is false, as would be saying that water pollution from agriculture is a problem in every watershed.

participation is not merely used to increase acceptance and public legitimacy of policy proposals, but is also an integral part of successful policy development and implementation. This can both ensure approaches are tailored to the local problems, and promote a spirit of partnership in sharing stewardship of water resources. There is a clear need to better understand the advantages and disadvantages of different forms of citizen and stakeholder involvement.

In what follows, we expand on some of these issues to emphasize what we think are important policy research issues to pursue more effective and efficient use of MBIs – or of any other policy instruments for sustainable water management for that matter.

- How can instruments be implemented in combinations, taking into account the institutional context within which they are implemented?
- If we are right and the successful implementation of MBIs (and probably other instruments) is to a large extent context specific, perhaps the main question to be answered with respect to water management is how policy instruments, including MBIs, can be designed to support the new watershed-based management systems being adopted in most Canadian provinces.
- More research should document the social consequences of using MBIs. By this we mean issues, such as how the rent is distributed between government and private actors or the social consequences of introducing policy instruments, such as markets.

Implementing Instruments in Combination: Taking Advantage of Social Institutions

While debates over the use of instruments to reach environmental goals have often dwelled on the relative advantages of MBIs over command-and-control, it is becoming clearer that MBIs are usually implemented with other instruments, and their success actually hinges on the application of those other instruments. What is unclear, however, is whether the choice of instruments follows a specific logic or if it is the result of ad hoc, incremental decisions. In either case, it follows that in most circumstances, it would be next to impossible to claim that MBIs are solely responsible for the positive or negative results. And this points to more important questions: What are the most appropriate policy mixes to address a given environmental issue? How can one design appropriate mixes?

Limited research has tried to understand how instruments are linked together. The case of nutrient pollution addressed in the Netherlands has recently been studied by a number of experts, including as part of an OECD project (Hubeek, 2005). That example shows that in the context of a long-term plan to address water pollution from intensive livestock operations, a fairly large number of instruments were put in place. This was sometimes done in an ad hoc fashion, sometimes to solve unexpected issues, or at other times for political reasons. These instruments included training, manure trading, excess nutrient charges, and command-and-control regulation. While there were positive results, some instruments were found to be unnecessary and had no significant effects.

In their study of nutrient pollution in the Swan Canning in South Australia, Gunningham and Sinclair (2004a, b) examined approaches to the development of instrument mixes, and proposed what we refer to as ordered incrementalism. As in Canada and, to a lesser extent, the United States, the agricultural sector in Australia is not very regulated. In fact, most agri-environmental policies are of the voluntary type, and not that effective. But they still provide the fundamental basis for implementing more intrusive instruments or regulation. That is, learning how to use different production processes, and adapting them to their context, can be a prerequisite to the adoption of MBIs or regulation that requires the appropriate implementation of new farming methods.

The authors provide some guidance with respect to developing instrument mixes for managing water pollution from agriculture based on the following principles.

- Instruments can either be complementary, neutral, or opposite.
- When building mixes of instruments, ensure complementarity, or at worse neutrality, of instruments.
- Avoid "smorgasbord" approaches. The idea is to build instrument combinations progressively, beginning with the least intrusive ones (voluntary instruments/education/training), then assess the sources of their success and failure, before going on to more forceful instruments.

Another point of view, possibly complementary, in designing instrument

mixes is to ensure they are designed to achieve one and only one objective per instrument. (See Young and McColl, 2005, who base their analysis on Jan Tinbergen's work.) Limiting the issue of instrument choice by ensuring each of them meets a given objective is more pragmatic and makes instrument evaluation easier. Here the problem is to decompose an environmental goal into a number of well specified objectives and then ensure the appropriate instrument is chosen for each. This is probably where careful ex post evaluation of programs would be useful, and where shared learning would bring the most benefits.

The State of Queensland, Australia, for example, developed a planning hierarchy to better assess the conditions under which an offset system would be acceptable. Policy makers thus established a link between different policy instruments and their respective objectives, and clarified in this context the objectives and limitations of using offsets. They also provided guidelines with respect to the mechanisms necessary to have in place to implement offsets.

A recent experience in designing policy mixes showed the benefit of stakeholder involvement in designing instruments to control pollution from the pig farming sector (Santos et al., 2006). Following the one objective instrument precept, stakeholders and regulators developed, in co-operation, an approach based on the use of all three classes of instruments: command-and-control regulation, MBIs, and a voluntary instrument. This approach combines the recognition that behaviour change occurs in different ways through different sets of institutions, as well as the recognition that significant stakeholder and public involvement in the policy-making process can ensure instrument choice and design are appropriate given the context in which they are implemented.

While much remains to be learned about how policy mixes should be developed, lessons learned so far highlight the need to build on the complementarities of instruments, acknowledging the specific institutional context in which they operate. In addition, early involvement of stakeholders, and presumably of the public more generally, may ensure that instrument choices are appropriate to the context of application, that the direction is clear for all, and compliance is maximized. As indicated above, however, attention should also be given to designing the instruments: the devil is always in the details.

Choosing Instruments that Support Watershed-Based Management

Policy research has shown that instrument choice is not independent from the governance arrangements in place (see, for example, Eliadis et al., 2005). But the notion of governance in this literature encompasses a number of different elements, such as an analysis of policy networks, distribution of formal authorities, and others, which, while useful for policy analysis, may not provide much guidance for policy development and design.

Interpreted slightly differently, however, such findings may indicate that not all instruments are compatible with a given institutional set-up. Given that watershed-based management, including some form of local/community involvement, is the direction a number of Canadian jurisdictions are pursuing, the question of designing instrument mixes may then involve determining to what extent different instruments are appropriate in that context.

A possible answer can be given by the example we saw above of participatory policy development. However, to identify and, ideally, augment the number of realistic options available, which is after all the role of policy analysts, it might be useful to ponder these questions analytically.

For example, given the financial difficulties facing the large majority of watershed-based management organizations, one might examine the benefits and disadvantages (and the feasibility) of decentralizing the authority of developing tax/charge or licensing systems at the watershed level to raise revenues. As we indicated earlier, however, the use of an MBI in such a way may limit its availability to address issues of efficient water use.

Similarly, in the PRI water quality trading project, we noticed that pollution trading at the watershed level may require the type of co-operation that only a well-developed watershed-based management organization, such as the conservation authorities in Ontario, can bring.

MBIs and the Political Economy of Instrument Development

By opposing MBIs to command-and-control regulation, a large part of the literature has limited the analysis on the mechanics and relative cost effectiveness of these instruments. While they certainly are important issues, this choice has left other important social consequences of different instruments, both positive and negative, relatively unexplored.

Such analyses could highlight some of the important features that distinguish different MBIs, and help provide more informed assessments of the feasibility of these instruments in particular contexts.

For example, a crucial difference between different MBIs is the extent to which they modify the existing structure of property rights, and the social implications such modifications can have. This includes the utilization and distribution of any resource rent, including between government and private actors.

It has sometimes been found that the introduction of some form of market for resource use rights, such as individual tradeable quotas in the fisheries, tradeable manure rights in agriculture or water rights can lead to the concentration of the resource in fewer hands. While such tools may lead to a more sustainable use of the resource, they can also have negative consequences on communities. Proposing such tools without consideration for these consequences, or for the instruments that might have been used to mitigate (or compensate for) them, limits the capacity of policy makers to evaluate options and make informed decisions.

Water use licences, to take another example, do not suppose the existence of a private right to the water used, but rather a conditional authorization to use a public resource. This authorization can be removed by the state if licence conditions are not met. Markets to allocate water use, however, may be construed as creating such a private right, although this may not necessarily be the case if trading is allowed for licences to use water, which remain the property of the state.

The implications of creating such private rights when none exists should be closely examined and evaluated.

While much remains to be learned about how policy mixes should be developed, lessons learned so far highlight the need to build on the complementarities of instruments, acknowledging the specific institutional context in which they operate.

And the fact that in general (Chile is an important exception) such markets have been implemented in jurisdictions where the legal system was already built around some form of private ownership of water resources, highlights the fact that existing rules may be an important constraint in devising solutions. Besides, between market allocation and state licensing, there may be other community-based approaches to allocate water that have not been fully explored in policy research (Ostrom et al., 2004).

Finally, different MBIs may have different implications on how the rent is shared between the state and other actors. In turn, this may affect the feasibility of adopting different instruments. Students of MBIs have recently remarked that European countries seem to prefer taxes (e.g., Harrington et al., 2004). A possible explanation of this difference may lie in the fact that through taxes the state appropriates the rent (although it is often returned through targeted programming) while markets – like command-and-control regulation – bring an opposite result: owners of pollution rights (and licences) generally keep the rent (Ellerman, 2003).

This difference has implications for the feasibility of programs and for their design and the determination of the respective roles of different actors in implementing them. Indeed, if the rent is privately appropriated, there is then a legitimate argument for demanding that rights owners cover at least part of the costs of programs, which may include information gathering, monitoring, and enforcement. Of course, with increased private participation in the costs of programs, one can also argue for increased participation in decision making, with ensuing consequences for sharing responsibilities of program delivery and accountability.

Conclusion

Further research should concentrate on understanding the efficiency, effectiveness, and equity properties of mixes of instruments, as well as their feasibility in specific contexts. There is a need to move away from theoretical generalizations about the properties of any instrument, be it market or state-based or voluntary, to case studies aiming at a better understanding of the contextual features that make the application of mixes of instruments successful.

There will not be magical solutions to environmental problems. In spite of the fact that it has been recognized for a while that all instruments can in theory provide the results they are meant to achieve (Majone, 1989), in practice a number of factors may either limit choices or impede success. Of course, attention should be given to design considerations in the real world. But analysts should also reflect

the context within which policies are implemented. This includes the social context, the biological context, and administrative institutions and capacity.

Policy research should aim at:

- fostering real multi-disciplinary research in the social sciences;
- better understanding the different means used to achieve participatory policy development and implementation, in a spirit of shared stewardship (to help tailor policies to the specific contexts in which they are applied, ensure directions are understood and shared by all, and that all take part in making them work);
- examining the compatibility between different instrument mixes and watershed-based management initiatives;
- concentrate on case studies examining how policy mixes have evolved in practice, trying to determine if some principles can be of general usefulness in Canadian contexts (helped by commitments to adaptive management by government, allowing transparent evaluation and learning); and
- provide better decision-making capacity by examining more carefully the social consequences of using different policy instruments.

Market-based instruments might well be underutilized in Canada, as the OECD suggested. However, we should use caution in introducing any instrument, to ensure it is appropriate to the specific objectives being pursued, taking into account local circumstances. Being a laggard in the use of instruments such as MBIs may not have been such a bad thing if this brings Canada to develop a better understanding of how they can be used strategically. What really counts, after all, is achieving the sustainable development of water resources, and not so much which instrument is used to get there.

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Is There a Place for Public–Private Partnerships for Municipal Drinking Water Infrastructure in Canada?

Meriem Aït-Ouyahia
Policy Research Initiative
Government of Canada

There is general consensus that the water sector worldwide faces considerable challenges in maintaining and improving its infrastructure. In Ontario, the Ministry of Public Infrastructure Renewals estimates the needs for capital renewal in water and wastewater services to be $25 billion over the next 15 years. This need for huge investments is exacerbated by decentralization policies and a decline in government subsidies, a demand for higher standards of safety, health, and environmental protection, and an increasing – and increasingly urban – population.

The private sector is perceived as a potential solution. Involving the private sector could bring efficient management and innovative approaches, cut the cost of public subsidies and make the sector more responsive to customers. It could also tap into a vast reservoir of private capital. However, private involvement in the water sector remains a challenging and controversial issue. There is no consensus among economists and experts on the institutional arrangements for regulation, how to promote competition and the role of the public and private sectors in the water sector. This article examines the potential roles and required settings for successful public-private partnerships (PPPs) for water in Canada.

Introduction

Usually, only infrastructure construction is competitive; transportation, treatment, and distribution of water are all normally spatial monopolies. Unlike the gas and electricity sectors, competition is very hard to introduce in the water sector, and experience does not show any major successful model of competition. Privatization by itself cannot remove the barriers that impede the public sector's efficiency. Public-private partnerships must be accompanied by strong regulation to safeguard against monopoly abuse. Regulation is also important, because many health and environmental externalities arise from water-related activities.

However, too much regulation can also be an impediment to private sector investments. Investors need credible protection so they can be confident of earning a return on the capital they invest. The high involvement of the government at different levels (national, provincial, municipal) in the water sector for health, environmental, and monopoly concerns increases the political and regulatory risks of private investors. Because investments in water infrastructure are highly specific (large parts of the costs are sunk and have no alternative use), the private sector is vulnerable to shifts in the political and regulatory terrain.

The high level of capital investment, the fact that water services have always been subsidized, and the history of low prices challenge the issue of full-cost pricing, which discourages private investment or makes it dependent on subsidies. Generally, consumers lack trust in multinational companies that are the main investors worldwide. (The international water market is largely dominated by two French multinationals, Veolia and Suez.) This can be a considerable barrier to private investments.

Introducing the private sector in the water sector is a complex task. It is not a simple retreat of the state, but

Meriem Aït-Ouyahia,
Analyst, Policy Research Initiative,
Government of Canada

a redefinition of its role as a regulator in a market-oriented economy. The role of the government is crucial for the development of successful PPPs.

Why Would Government Turn to Public-Private Partnerships?

Governments may be attracted to PPPs for a number of reasons. The most frequent justifications include their design flexibility, the deployment of private sector capital, the potential value for money, and the fact that it is a way to move forward.

Forms of Public-Private Partnerships

Public-private partnerships include a wide variety of strategies involving various combinations of public and private roles (see Table 1). These forms of PPPs differ in the magnitude to which ownership, finance, and accountability are in the hands of the public or the private sector. This can include everything from service contracts to full privatization. Due to the flexibility of the design, hybrids and combinations of these models also occur. In Canada, PPPs are very limited in the water sector mainly taking the form of operating contracts for publicly owned utilities, which does not imply any financial risks for the private contractor or responsibility for investments.

Private Finance

With the increasing infrastructure deficit and the huge amount of money needed to improve water infrastructure, but also with the increasing health and environmental protection standards, governments may seek to use PPPs to attract private finance without adding to levels of public debt. It also allows the government to spread the payment for a project over time, something that is often difficult for governments to do.

Value for Money

Proponents of PPPs often argue that under the right circumstances PPPs allow for a greater value for money. Value for money is supposed to optimize projects and increase overall benefits by integrating design, building, and operation, transferring risk, and minimizing the total cost over the life of a project (Perrot and Chatelus, 2000). However, value for money gains are not guaranteed as they depend on competition, optimal allocation of risk, and private sector efficiency.

A Way to Move Forward

Some argue that waiting only increases the infrastructure "deficit" and governments going forward with PPPs would at least make a move from the status quo and allow for learning by doing. It would also oblige the public sector to articulate its long-term service needs and would bring to the table the politically sensitive issue of raising rates to attain cost recovery, which would reduce the costs of public subsidies.

Role and Responsibilities of the Government

The essential role of the government in all forms of PPPs is to define the scope of business, and specify priorities and outputs. Government also set the tools (through contracts, regulatory agencies, laws, market tools, etc.) to protect consumers from monopoly abuse, to control health and environmental externalities, to ensure the political climate so operators are secure to invest, and to promote competition through performance benchmarks and efficiency through service targets (Rees, 1998).

The form of partnership should depend on local conditions and on its feasibility. Cowen (1997) identified four types of analysis that should be conducted to determine the appropriate form of PPP.

- An analysis of the state of the infrastructure is important, as poor information about the water system usually leads to costly ex-post renegotiations.
- An analysis of the existing regulatory framework is also essential as the regulatory regime affects the private sector activities, and water companies will seek protection within the contract terms when regulations and laws fail to protect them against costly changes in water availability or quality, and against the introduction of new environmental standards.
- It is also important to know who supports and opposes privatization. This allows an assessment of the risk of political interference and helps address the concerns of stakeholders to reduce the likelihood of conflict.
- An analysis of the financial viability of different forms of PPPs will be useful to know if the private sector can realistically increase efficiency without increasing prices and to gauge consumer willingness to pay higher prices, if needed, to make the private company profitable.

It would also be worthwhile to study the advantages and disadvantages of different restructuring options besides PPPs, including an improved status quo (Bakker, 2003). The studies should include transaction costs, as they can be a considerable share of the overall costs of the introduction of a new

TABLE 1

Allocation of Public/Private Responsibilities Across Different Forms of Private Involvement in Water Services

	Setting Performance Standards	Asset Ownership	Capital Investment	Design and Build	Operation	User Fee Collection	Oversight of Performance and Fees
Passive private investment	Public	Public	Public/Private	Public	Public	Public	Public
Design and construct contracts	Public	Public	Public	Private	Public	Public	Public
Service contract	Public	Public	Public	Public	Private	Public	Public
Joint ventures	Public	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Public
Build, operate, transfer	Public	Public	Private	Private	Private	Public	Public
Concession contracts	Public	Public	Private	Private	Private	Private	Public
Passive public investment	Public	Private	Public/Private	Private	Private	Private	Public
Fully private provision	Public	Private	Private	Private	Private	Private	Public

Source: Modified from OECD (2000).

institutional setting. For example, in the health sector, Vining and Globerman (1999) showed that even if contracting out usually reduces production costs, these savings are often more than offset by transaction costs.

Who Wins, Who Loses?

Under the right circumstances, the presence of competition, and optimal allocation of risks, PPPs could potentially be a win-win-win solution for government, investors, and consumers. However, competition is hard to introduce in the water sector and the principle of optimal allocation of risk is difficult to implement. Moreover, connections to dispersed and poorer areas seem to remain a great challenge.

Competition in the Water Sector

Direct competition in the market, because of economies of scale in the water sector, is uncommon. In the United Kingdom, the authorities tried to introduce some form of direct competition through yardstick competition, cross-boundary competition, and common carriage, but with limited success.

With yardstick competition, the performance of a water monopoly is addressed by comparing it with other water companies in different markets or regions. To function, yardstick competition requires that firms face similar environments and similar technological opportunities, which rarely occurs in reality (Kessides, 2004). It also requires a threshold number of comparators, which may become difficult as the water industry's growth strategy is principally based on acquisitions.

In the United Kingdom, cross-boundary competition allows water companies to compete to supply large consumers in each other's territory, while common carriage requires water providers to offer access to their facilities. A competitor can serve its new customers by requesting the assets of the incumbent provider. But the development of cross-boundary competition and common carriage has been limited and is unlikely to develop further (Ballance and Taylor, 2005: 44).

Indirect competition for the market through auctioning for market entry rights is more common, but remains a limited form of competition. With auctioning, the potential producers bid against each other to obtain the contract. The contract is usually awarded to the bidder that offers to supply water at the lowest price. In that way, competition between bidders replaces competition between suppliers in the market. However, competitive tenders require careful design and a minimum number of bidders. Government must also ensure that technical and financial information on the water system is fairly and openly disclosed. An open and transparent competitive process is a time consuming and costly process for both bidders and governments (Haarmeyer and Mody, 1998). This can be a deterrent for smaller firms. It can also lead to a negotiated bid.

Experience shows that a non-competitive process (negotiated and unsolicited bids) usually leads to inefficiencies (higher prices, less information disclosure) and friction between stakeholders (Hodges, 2003). Moreover, competition is restricted when contracts are re-tendered, because the incumbent has information that gives him a higher chance to retain the contracts. In France, the General Accounting Office identified uncompetitive rolling forward of concessions as a problem (Cour des comptes, 1997).

Risk Transfer

The principle of optimal risk allocation is that risk should be handled by the party best able to manage the risk at the least cost. In practice, it is not always clear who should manage the risk and risk allocation is more the result of bargaining and negotiation than the ability of parties to manage risks (Bayliss and Hall, 2002). Moreover, municipalities often lack the necessary expertise to oversee complex contracts, particularly those giving a large degree of autonomy to the contractor, such as a design-build-finance-operate (DBFO) scheme (Bakker, 2003). "As municipalities take on new responsibilities under decentralization programs, they find themselves negotiating multi-million dollar contracts with private companies. For many, this is a new experience. Often, the results are major disparities in bargaining power, particularly when large, international water operating companies are involved" (OECD, 2000: 46). Besides, if the project fails, the government remains responsible for providing water services. "Political pressure for the government to bail out large projects (that are too big to fail), and providers of essential services, may mean that the government in fact bears more risk than the contract suggests" (IMF, 2004: 22).

Equity Considerations

It is increasingly recognized that the private sector has little interest in serving poor or thinly populated areas. The poor cannot afford to pay rates that make serving them profitable, and thinly populated areas require a greater investment in infrastructure per capita than is required in densely populated areas. Further, in many countries, poor neighbourhoods are not connected to the existing service networks and may be located in rocky or hilly terrain at the edge of major cities – which poses challenges to infrastructure development (Johnstone et al., 1999).

Water companies will either practise "cream skimming" (providing only the most profitable services) or try to find ways to reconcile commercial considerations and the objective of serving the poor by expecting compensations through non-market mechanisms, such as voluntary work, collective provision of materials, and cross-subsidy from richer to poorer.

Recent trends show that water multinationals have limited their investment to selected developing countries and exit from underperforming contracts. In 2004, there was no investment by the private sector in new water projects in South Asia and Sub-Saharan Africa, the poorest regions of the world (Izaguirre and Hunt, 2005).

Conclusion

Successfully implementing PPPs in the water sector remains a challenging issue for governments. Moreover, because of the lack of systematic evaluation of experience, there is no evidence that the benefits of introducing the private sector offset the costs (transactions costs, regulation costs, and the costs of introducing and supporting competition).

If PPPs are to go forward, it would be worthwhile to consider the introduction of a central system to collect information on projects and allow for sharing of experience, for there is still much to learn. There is no clear way to identify the winners and losers of PPPs; experience worldwide is mixed and depends on the circumstances. Other options should also be considered, as PPPs are clearly not suited to all circumstances.

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The Canadian Water Sustainability Index

Anne Morin
Policy Research Initiative
Government of Canada

Introduction

Canada relies on freshwater to safeguard the health and well-being of its citizens, sustain healthy aquatic and terrestrial environments, provide a range of ecological services, and support a competitive economy. Canada is fortunate to have an abundance of freshwater resources with 20 percent of the world's freshwater – almost half of which is renewable (Environment Canada, nd). Nevertheless, parts of the country are threatened by poor water quality, water shortages, accessibility issues, and other water-related concerns. Simple policy tools are needed to help decision makers identify those communities in need and perhaps more importantly, identify what their specific needs are with respect to freshwater. Given the complexity and integrated nature of water uses and resources, such a tool would have to be holistic covering a range of freshwater issues.

The Canadian Water Sustainability Index (CWSI) is a composite index that evaluates the well-being of Canadian communities with respect to freshwater. It does so by integrating a range of water-related data and information into a series of indicators. Together the indicators provide a holistic profile of a community's key water issues allowing for intra- and inter-community comparison and analysis. The key water issues that are addressed by the indicators fall into the following broad policy categories:

- freshwater resources;
- ecosystem health;
- water infrastructure;
- human health and well-being; and
- community capacity.

The higher a community's CWSI score, the better positioned it is to enjoy and maintain the ecological, socio-economic, and health benefits associated with freshwater. The CWSI scores are based on a standardized evaluation scheme where the indicators are measured against a benchmark or target. This varies from some other composite index models where scores are determined based on the relative rankings of the administrative units being assessed.

The benchmark/target approach increases the relevancy of the results, as a community's score is not linked to the performance of other communities, but rather its status relative to acceptable conditions and standards for water well-being. This also makes the CWSI results more meaningful from year to year. Although inter-community comparisons will be an important application of the CWSI, the benchmark approach adds to the tool's flexibility as it allows for individual community assessments to be conducted independently of a provincial or national level study.

The development of the CWSI is an ongoing process. Inspired by the Water Poverty Index that was developed in the United Kingdom, the Policy Research Initiative began working on the CWSI project in the summer of 2005. To date, three key stages of the CWSI project have been successfully completed. The first is a study of existing water-related data, prepared by Tri-Star Environmental Consulting (2006). This study presents a compilation of primarily national datasets for a number of potential CWSI variables; it also identifies thematic and geographical data gaps. The second stage was a workshop held

Anne Morin,
Analyst, Policy Research Initiative,
Government of Canada

The Water Poverty Index

The Water Poverty Index (WPI) was developed by the Centre for Ecology and Hydrology (CEH) in the United Kingdom to provide an integrated assessment of water stress and scarcity, linking physical estimates of water availability with socio-economic variables that reflect poverty.[1] The index was partly developed in response to the UN Millennium Development Goals that address poverty and water access, as a means for monitoring progress and prioritizing water needs. Although the WPI has been applied at the international scale for purposes of demonstration, it was developed for use at the community scale, in particular communities in the developing world.

Source: Sullivan (2002).

in November 2005 to discuss the development of the CWSI. Key water policy and indicator experts from Canada and abroad attended the workshop. The third and most recent stage was field testing in six Canadian communities. The results from the case studies and subsequent analysis will likely lead to further refinement of the CWSI.

The CWSI Framework

The CWSI is based on a nested framework of components and indicators whereby 15 indicators are organized into one of five components: freshwater resources, ecosystem health, infrastructure, human health and well-being, and community capacity (see Table 1). The components are used to summarize the indicators into policy-relevant categories and offer a useful and meaningful breakdown of a community's results, where a community is defined as the smallest political entity for a given area, such as a municipality, a rural township, or a reserve.

The 15 water-related indicators form the foundation of the CWSI evaluation framework. A score ranging from 0 to 100 is calculated for each indicator based on how a community performs relative to a benchmark or target. Preliminary benchmarks or targets for the various indicators were determined from a number of sources. Some benchmarks are based on widely used metrics, such as the Falkenmark water stress indicator (Falkenmark et al., 1989), whereas others are based on trends or comparisons to national data sets. In all circumstances, it was attempted to derive an evaluation method that is meaningful and relevant to Canadian communities and Canada's natural circumstances.

Several factors were considered in selecting the 15 indicators including the relevancy to one of the five policy categories and its usefulness to communities. The availability of data from either the community itself or provincial and/or national databases was also considered heavily. Furthermore, the indicators are intended to be generic and broadly applicable to a diverse range of communities. Discussions from the workshop, the CWSI data study, and other sources of information aided in the selection of the existing set of components and indicators. Outcomes and feedback from field tests will allow for the indicators and the scoring methodology to be validated and improved.

The final CWSI score (0 to 100) is equal to the average score of the 15 indicators. Results can also be summarized by the theme-based component where individual component scores (0 to 100) are equal to the average score of the three indicators that fall within the respective policy category (see Table 1). This format implies that each indicator and component will have equal weighting in the final index score. The relative importance of different freshwater issues and concerns is largely subjective, and thus individual communities may consider establishing different weights for different indicators for internal use. For broader applications however, the standardized equal weighting format must be used to permit comparisons.

The Need for a Composite Water Index

With the number of competing uses for water, and the range of factors that impact, or are impacted, by the quality and quantity of water and water services, it is important for stakeholders to have an informed and holistic view when making decisions regarding the resource.

The CWSI offers a composite profile of the freshwater policy issues that are relevant to Canadian communities (see Figure 1). The CWSI approach is an integrated one that allows for specific pieces of information to be assessed in a holistic context inclusive of physical, ecological, human health, and socio-economic considerations.

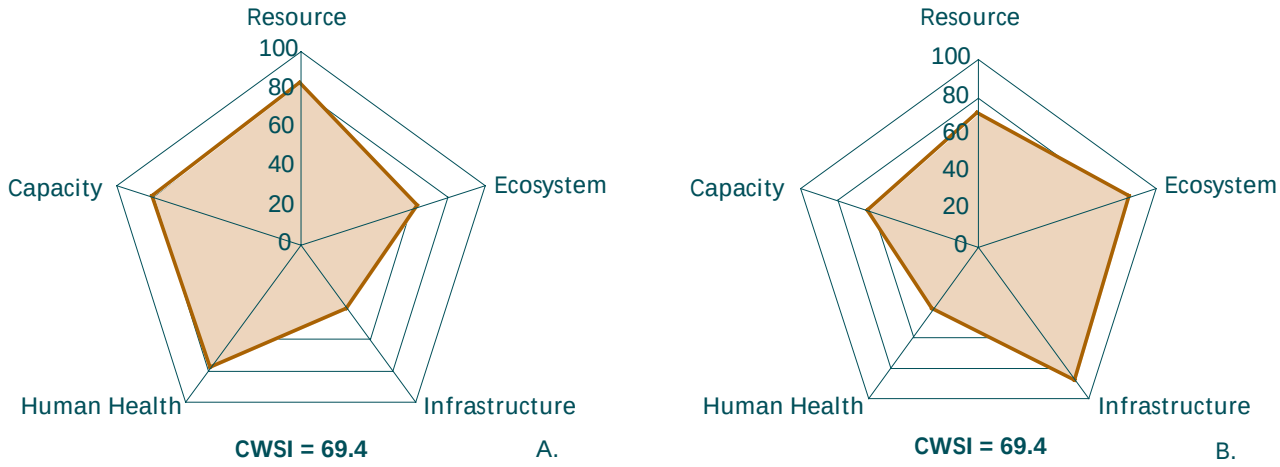
TABLE 1
Canadian Water Sustainability Framework*

	Component	Indicator	What is Measured
Canadian Water Sustainability Index	Freshwater Resources	Freshwater availability	The amount of renewable freshwater (surface and groundwater) available per person.
		Vulnerability of resource	The variability of surface water resources and/or the groundwater level trends.
		Freshwater allocations	The amount of freshwater that is allocated as a percentage of total renewable resources.
	Ecosystem Health	Ecosystem stress	The amount of surface water consumed as a percentage of total flow.
		Ambient water quality	The water quality index score for the protection of aquatic life.
		Native fish population	Population trends for native fish that are economically and/or culturally significant.
	Infrastructure	Demand for water services	The number of years before water or wastewater treatment plants reach 100% operating capacity.
		Condition of infrastructure	The physical condition of water mains or sewers based on the percentage of system losses.
		Wastewater treatment	The level of wastewater treatment as a function of the percentage of people served.
	Human Health and Well-being	Access to potable water	The amount of potable water that each person will normally have access to for domestic purposes.
		Drinking water reliability	The number of loss of service days per capita.
		Water-borne illness	The number of reported cases of water-borne illness and disease.
	Community Capacity	Financial capacity	The per capita surplus of local government.
		Work force education	The percentage of people in the work force that have a high school education.
		Operator training	The level of training for water and wastewater treatment plant operators.

* The index consists of 15 indicators grouped into five components, which represent different policy categories.

FIGURE 1

Radar diagrams showing CWSI results for two hypothetical communities. Example: The CWSI as a Policy Tool



The composite index structure of the CWSI allows for different levels of analysis. As an example, the radar diagrams above show final CWSI and component scores for two hypothetical communities where the size of the shaded area in each diagram is proportional to the value of the CWSI and the shape reflects the relative values of the components. The final CWSI score for both communities are the same (69.4) although the shapes are different. In the first example (A), the most pressing issues regarding water well-being occur in the areas of infrastructure followed by ecosystem health. The second community (B) is experiencing serious shortcomings with respect to human health and well-being and has issues regarding community capacity. The perspective that such results provide can help decision makers set priorities and direct efforts toward resolving the most pressing issues within a community. In this example, both communities have the same overall well-being with respect to freshwater but a different set of needs. Consequently, any resulting policy or program response will need to target different areas of the water system. This brief example demonstrates how different policy concerns can be assessed relative to one another using the CWSI.

The CWSI will have practical uses for different groups, including the general public, community leaders, policy makers, water managers, and other interested stakeholders. The CWSI will contribute toward:

- raising awareness of the overall state of freshwater in Canadian communities;
- establishing a transparent and standardized means of comparing the state of freshwater in different types of communities (e.g., First Nations and non-First Nations communities);
- monitoring progress toward integrated water resources management;
- identifying priority communities whose well-being is compromised by freshwater concerns;
- targeting investments toward specific communities or specific needs within a community; and
- compiling community-based data and information on a range of freshwater issues.

Field Testing the CWSI

The CWSI was recently field tested to evaluate various aspects of the index. The field testing process consisted of five phases, each of which will be informative in advancing the development of this tool.

Phase 1: Community Selection

Several factors were considered when selecting the communities in which to test the CWSI. First, a good range in circumstances was sought in terms of the perceived water challenges,

TABLE 2
Communities Participating in the CWSI Field Testing Exercise

	AGRICULTURAL	RESOURCE-BASED	OTHER
FIRST NATION	**Pelican Lake First Nation, SK** • Rural • Population = ~1,030 • Hay crops, bison, cattle ranching	**Tsuu T'ina Nation, AB** • Rural • Population = ~1,509 • Gas development	**Moose Creek, ON** • Remote • Population = ~1,388 • Tourism (ecotourism)
NON-ABORIGINAL	**Three Hills, AB** • Rural • Population = ~ 3,554 • Agriculture, oil and gas	**Chetwynd, BC** • Rural • Population = 3,100 • Energy and timber	**Gimli, MB** • Rural • Population = ~1,657 • Tourism

primary industries, activities, and geography of the communities to test the broad applicability of the index. Nevertheless, the scope of the field testing exercise was limited to rural and remote communities with populations ranging from 1,000 to 5,000 inhabitants.

Another consideration was the objectives of the CWSI project partners who want to assess the use of the tool to examine the water well-being in First Nations and agricultural communities relative to non-First Nations and non-agricultural communities. Finally, the interest of community officials was necessary for participation.

With these considerations in mind, six communities were selected from across the country.

Phase 2: Data Collection

The second phase of the case study was collecting the data for each community. For some variables, the data were accessible from federal or provincial agencies whereas targeted interviews with community officials were needed for other variables. In addition to providing information, this phase provided insight into data availability, data quality, and data accessibility. This is important as the more difficult it is to obtain reliable data, the less likely the tool will be adopted and used.

Phase 3: Calculation of CWSI Scores

Once the necessary data were collected, the 15 indicator scores were calculated for each community using the standardized methodology provided. The indicator scores were then aggregated to give component scores and the final CWSI composite score. This phase tested how user-friendly the methodology is and how reflective the scores are of each community's situation.

Phase 4: Analysis of Results

The analysis of the CWSI scores was twofold. First, an individual community analysis was conducted for each

FIGURE 2
Geographic Distribution of Case Study Communities

community based on its results in terms of the indicator and component scores. The next step was a broad analysis of all the communities to determine how they compare in general, and along the lines of the matrix provided in Table 2 (e.g., First Nations versus non-First Nations, agricultural versus resource-based). The analysis examined both the context of the results as well as the applicability of the index as a policy tool for setting funding priorities, identifying problem areas/communities, monitoring progress toward integrated water resource management, informing decisions, and focusing efforts and attention.

Phase 5: Follow-Up Interviews

The final phase of the case study project, and perhaps the most important, was to seek feedback from the participating communities on the CWSI process, results, and analysis. To do this, a series of questions were posed to community officials to gather:

- reaction to the results;
- the usefulness and relevancy of the index and the variables that it measures;
- whether the results could be used to inform water management decisions; and
- recommendations for improvements to the CWSI.

The analysis of this feedback is in progress. It will provide insight into whether the CWSI will be a useful policy tool in its current state or if it needs to be modified.

Conclusion

The CWSI is proposed as a simple and transparent policy tool that will provide an objective and holistic profile of the key freshwater issues that are of importance to Canadian communities. The composite index model aggregates a range of water-related indicators into theme-based components and a final score for communities. The development of the CWSI is an iterative process. To date the CWSI has progressed from a concept to a testable methodology. The results from the community case studies will further contribute to index development and will provide an initial test of how the index performs and whether the tool will be beneficial to local officials in assessing priorities and making water-policy decisions. The findings from the CWSI project and the field testing process will be documented in a final report to be released in Summer 2006.

Note

1 CWSI project partners are Health Canada, Indian and Northern Affairs Canada, Agriculture and Agri-food Canada and Environment Canada.

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Public–Private Partnerships for Funding Municipal Drinking Water Infrastructure: What are the Challenges?

The way drinking water is managed is changing worldwide. The current system dominated by public provision is increasingly perceived as inefficient, lacking innovative capacity and corrupt. Both developing and developed countries require huge investment capital to meet the basic needs of their population, and the private sector is seen as a way to bring finance and efficiency to the water sector.

However, private investment is still limited compared to other infrastructure sectors. Some of the barriers to efficiency are inherent to the water sector. Public-private partnership cannot of itself and by itself remove many of these barriers. As a result, regulatory design and enforcement are crucial elements for water sector performance. Privatization is not a simple retreat of the state, but rather a redefinition of its role as a regulator in a market-oriented economy.

The issue of public-private partnership is always complex, and this is even more so in the case of municipal water supply. “Public-Private Partnerships for funding municipal drinking water infrastructure: what are the challenges?” is a discussion paper which provides a critical review of the literature on this topic. This discussion paper is available at <www.policyreseach.gc.ca>.

Freshwater Issues at the United Nations

Sushma Barewal
Policy Research Initiative
Government of Canada

More than 70 percent of the Earth's surface is covered in water. Water also exists in the air as water vapour and in the ground as soil moisture and in aquifers. Yet, two out of every ten people on this planet do not have access to safe drinking water, a basic requirement for human life and health. It is estimated that some 3,900 children die *every day* from water-borne diseases, most of them in Africa and Asia.

International resolve to address this humanitarian crisis has been articulated in many forums. At the World Summit on Sustainable Development (WSSD-2002), governments adopted the Johannesburg Plan of Implementation for the Millennium Development Goals (MDGs), which calls for, among other things, preparation of integrated water resources management and water efficiency plans for all countries by 2005, and a 50 percent reduction in both the number of people in the world without access to safe drinking water (currently over one billion) and the number of people without access to sanitation (over two billion) by 2015.

Recently, the United Nations' Commission for Sustainable Development (CSD) chose to review water, sanitation, and human settlements at its 12th (2004) meeting and to make implementation policy decisions at its 13th (2005) meeting.

Canada took a leadership role in discussions around governance issues at the CSD-13 meeting. Specifically, it circulated a non-positional paper on water governance at the preparatory meetings in February 2005. The paper was well received by other countries and resulted in water governance being put on the CSD-13 meeting agenda.

This article focuses on the role of the United Nations System in the international governance of water.

Water-Related Activities of UN Bodies

More than 20 bodies or processes in the UN system are engaged in water issues. Of these, four have significant governance roles: the Commission for Sustainable Development, UN Water, the Secretary-General's Advisory Board on Water and Sanitation (ABWS), and the Division for Sustainable Development Issues in the United Nations Department for Economic and Social Affairs (UN/DESA).

The Commission for Sustainable Development is a 53-member functional commission of the Economic and Social Council established in December 1992 to:

- review progress in the implementation of recommendations and commitments in Agenda 21 and the Rio Declaration on Environment and Development;
- elaborate policy guidance and promote dialogue; and
- build partnerships.

In 2003, the CSD embarked on a program with two-year implementation cycles devoted to narrow and closely linked issues. The CSD's first cycle (ended April 2005) focused on water, sanitation, and human settlement issues, and resulted in a broad range of decisions, including several on follow-up mechanisms for water and sanitation.[1] The second two-year cycle is focusing on atmosphere/air pollution, climate change, energy, and industrial development.

UN Water is an inter-agency mechanism established in September 2003 by the UN's High Level Committee

Sushma Barewal,
Senior Policy Research Officer,
Policy Research Initiative,
Government of Canada

on Programs (HLCP), to follow up on the WSSD water-related decisions and the MDGs concerning water and sanitation. UN Water's defined responsibilities include "promoting coherence in, and coordination of UN system actions" and "facilitating synergies and joint efforts," indicating that UN Water lacks the authority to organize the water-related activities of UN agencies and programs. UN Water does not have a policy-making role.

The Secretary-General's Advisory Board on Water and Sanitation was established in 2004 to help raise awareness of water and sanitation issues, mobilize funds, and encourage partnerships. Board members are senior officials from the private sector or ex-ministers of national governments.

The Division for Sustainable Development Issues of UN/DESA provides secretariat services to all three of the above organizations.

Gaps in Governance

Various aspects of Integrated Water Resource Management (IWRM)[2] are being addressed by many agencies/programs. Collectively, they cover all implementation areas, including research and technology transfer, information sharing, capacity building, and infrastructure. Since there is no central co-ordinating mechanism, it is difficult to know whether coverage is balanced and focused on the areas of greatest need.

Although many UN agencies do excellent work on water issues, no one lead agency is able to provide guidance and leadership to the other UN agencies, let alone civil society or member governments. As a result, even though individual UN projects may be successful, transferring or building on that success has been difficult, and it may be that still greater impact could be had through improved governance. The following are some of the notable governance shortfalls.

High-Level Political Dialogue

Currently, there is no permanent intergovernmental focus on water and sanitation issues. Such a forum is needed to set the stage for implementation and to remove obstacles as they occur. Its objective should be to bring about consensus on implementation policies, to forge partnerships for implementation, and to keep an international spotlight on water and sanitation issues. While UN Water can advance some of these objectives, its current mandate is too limited to allow for the full effect that is needed.

Although many UN agencies do excellent work on water issues, no one lead agency is able to provide guidance and leadership to the other UN agencies, let alone civil society or member governments.

Bridging the Government – NGO Divide

Typically, non-governmental organizations play a very important role in project implementation and capacity building. Since there is a need to speed up implementation of water and sanitation policies, opportunities for closer interaction on implementation issues are needed between governments and NGOs, especially at regional levels. The tri-annual World Water Forum conference can and does partly address this need, but may not be, by itself, sufficient to the task.

Monitoring and Assessment of Programs

Although the Joint Monitoring Program (JMP), the World Water Assessment Program (WWAP) and United Nations Environment Program – GEMS (Global Environment Monitoring System) all provide valuable reporting, monitoring, and assessment activities, there is a need to strengthen and better co-ordinate these programs. Increased co-ordination and resources to provide national, local, and regional information would help to better inform the international community on both progress and areas where more resources are needed.

Program and Project Co-ordination

Program and project co-ordination within the UN system and between global networks needs to be strengthened. UN Water was established to promote coherence in UN system actions aimed at the MDGs on water and sanitation, but its mandate and authority are limited. Currently, participation in UN Water meetings is from water units in UN programs/agencies that have authority only to redirect resources within water and sanitation envelopes. Effective co-ordination at a higher level will require engagement of agency heads and governing bodies.

Secretariat Support to UN Water Organizations/Mechanisms

UN/DESA provides secretariat support to several UN system bodies. Although there are several freshwater experts in UN/DESA, its resources do not match up with its responsibilities for providing secretariat services. Less than 10 person-years from UN/DESA are dedicated to water issues. This may be insufficient in the face of growing activities and the resultant need for co-ordination.

CSD-13 Decisions Related to Water Governance

The outcome of CSD-13 meetings was an agreement by participating member countries on a package of policy options and practical measures to advance international commitments on water, sanitation, and human settlements.

Countries reaffirmed the CSD's mandate, as stipulated in previous high-level UN decisions, to support, strengthen, and implement monitoring of progress by:

- improving data collection at all levels;
- enhancing comparability of data at the regional and global levels; and
- facilitating the contribution of major groups to national reporting activities.

Countries also agreed to make specific requests to the Division for Sustainable Development in UN/DESA, UN Water, and the UN Secretary-General.

- The Division for Sustainable Development (UN/DESA) was requested to update policy options and practical measures contained in the Chairman's Intergovernmental Preparatory Meeting (Feb 28 – March 4, 2005) Summary on a regular basis, and to develop web-based tools to disseminate information on implementation and best practices.
- UN Water was requested to give equal consideration to issues of sanitation and water in its terms of reference and, to promote system-wide inter-agency co-operation and co-ordination among relevant UN agencies, funds, and programs on such issues.
- The UN Secretary General was requested to include in his report to the CSD:
  - activities of UN Water as they relate to water and sanitation;
  - roles and responsibilities of relevant UN agencies, funds and programs in implementing and monitoring the water and sanitation agenda; and
  - duplication, overlap, and gaps in implementing and monitoring activities.

Countries agreed to devote, in 2008 and 2012, a separate segment at the end of its review sessions, using one to two days to monitor and follow up on the implementation of decisions on water and sanitation and their linkages, taken at CSD-13.

How Well Will CSD-13 Decisions Address the Above Governance Gaps?

High Level Political Dialogue: Ongoing Political Discourse and Support

The CSD's decision to devote two days in 2008 and again in 2012 to water and sanitation issues ensures a forum for countries to discuss the issues and make policies to help address them. However, the decision appears to have been made in consideration only of MDG goals on access to safe drinking water and basic sanitation by 2015; non-MDG water-related issues may not be addressed through this process. Management of water resources is an ongoing issue that would probably be better addressed from a UN "home" for water issues (i.e., a forum that would be identified with water issues globally, and where policies could be made and program implementation co-ordinated). Although such a platform was not supported at CSD-13, it is possible that the requested reports from the Secretary General and UN Water and discussions in the 2008 and 2012 CSD meetings will whet international appetites for further governance changes.

Monitoring and Assessment of Programs

Since implementation involves the participation of UN agencies, programs, and funds, national governments at all levels, and civil society, monitoring implementation is a challenging task. Improvements in monitoring will depend on the capacity of UN organizations to respond to CSD requests. UN Water could play an important facilitative role.

Program and Project Co-ordination

The CSD requested the Secretary-General to report on the roles of UN agencies, programs, and funds in the areas of water and sanitation and it requested that UN Water promote system-wide co-operation and co-ordination. These are the necessary first steps toward better co-ordination. The chair of UN Water has started bilateral discussions with agency heads with a view to facilitating program co-ordination. Whether these efforts will bear fruit will depend on how constrained agency heads are by resources and mandates.

At a minimum, CSD decisions will increase awareness within the UN of the need for better co-ordination and reporting. However, it is unclear if any of the recommendations from CSD-13 will improve government-NGO co-ordination.

Options for Future Consideration

There are several reasons why countries could not agree on a more comprehensive governance package at CSD-13 meetings including the G77's concerns about setting a precedent for the upcoming meetings on energy and the lack of appetite for new UN structures or increased mandatory country contributions.

Should reporting by the Secretary-General and UN Water on water activities and their co-ordination, as requested in CSD-13 decisions and the 2008 and 2012 CSD meetings whet international appetites for further changes to UN water governance, the following options may be considered in developing Canada's position in this regard.

Option 1: Establish an ad hoc panel under the CSD or an independent functional commission under ECOSOC

This option follows the example of the ad hoc intergovernmental Panel on Forests under the CSD or its successor, the current UN Forum on Forests, an independent commission under ECOSOC. The new inter-governmental water organization would develop policies, while working with UN agencies and the civil society to ensure a coherent approach and the co-ordinated implementation of programs. A small secretariat would provide analysis and co-ordination functions and serve as a focal point for the major UN reporting mechanisms as well as other databases developed to better guide donor activities.

A strong mandate with matching resources and good co-operation from all relevant actors (governments, regional bodies, UN agencies, and the civil society) would help address all the gaps described above.

Option 2: Significantly strengthen UN Water

UN Water was established by the High Level Committee on Programs which, in turn, reports to the UN System's Chief Executive Board (CEB) for Co-ordination. Strengthening UN Water with additional resources and a stronger mandate would allow it to co-ordinate water and sanitation policy across the UN. It could also call inter-governmental meetings that could include civil society participation, to allow them to provide input and to better understand what UN agencies are doing. This approach could mean that UN Water would have a commission-like status in the UN and report directly to the CEB rather than to the CEB's two high-level co-ordinating committees for programs and for policy.

A major advantage of this approach is that no new organization would be needed. To be successful, it would require broad government, UN agency, and civil society support and an adequately resourced secretariat.

Option 3: International strategy for water

The Secretary-General's Advisory Board could provide leadership to help UN agencies and governments create a strategy for meeting the water and sanitation targets, modelled after mechanisms, such as the International Strategy for Disaster Reduction. While this approach would not provide for ongoing decision making or a central information window, it could help close the most pressing gaps (analysis and policy integration, international co-ordination, and monitoring and reporting) with a lighter structure than other options and with minimal additional resources.

Option 4: Raising activity levels in existing initiatives

This could mean strengthening UN/DESA's capacity to enable it to provide stronger water and sanitation related secretariat support. Particular attention could be paid to improving the communication and co-ordination role of UN Water. As well, existing monitoring and reporting mechanisms such as the JMP, WWDR, and UNEP GEMS/Water could be strengthened to provide accurate assessments of the world's water resources.

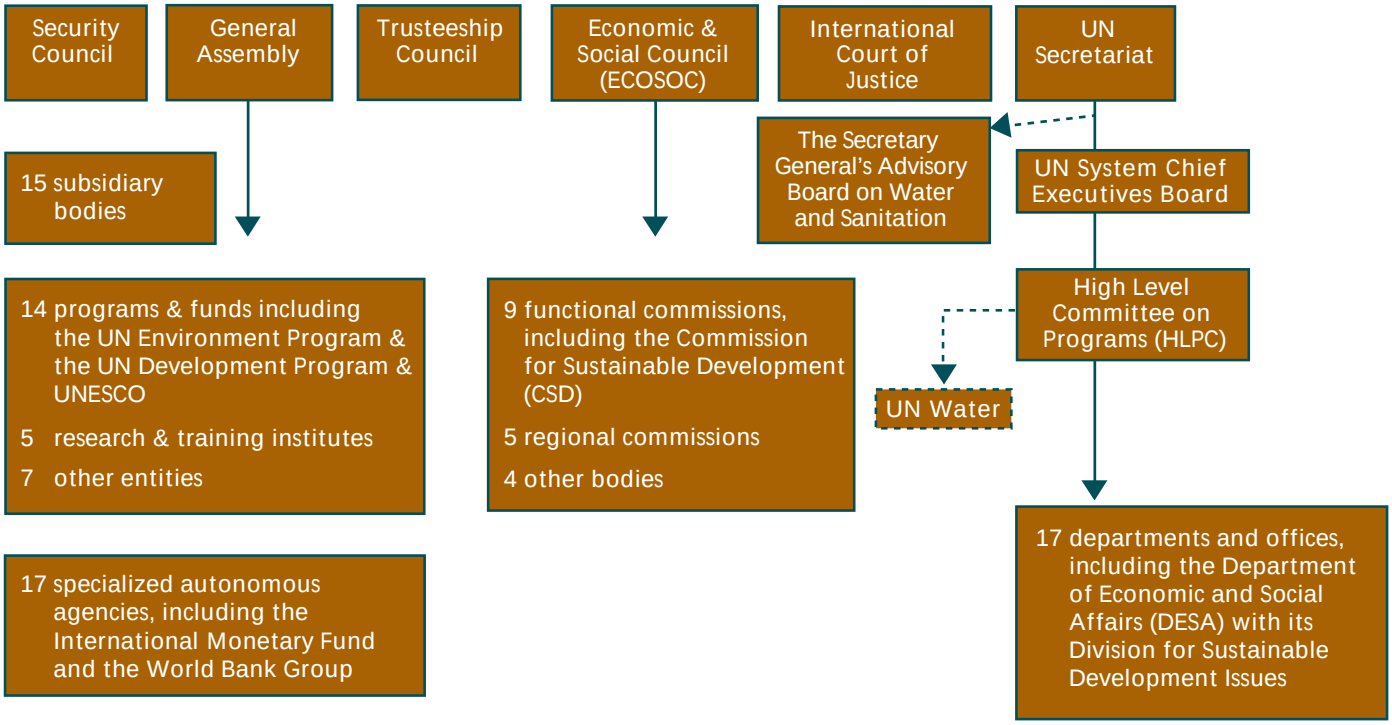
Option 5: High-level intergovernmental meetings

Two days at the end of each of the CSD's intergovernmental meetings in 2008 and 2012 will be devoted to water issues. Beyond 2012, ECOSOC and/or the General Assembly could call high-level intergovernmental meeting as often as needed (e.g., every three or four years) for strengthening implementation by governments and UN agencies. This option could be a forum for higher-level policy discussions and has the potential for addressing implementation, monitoring, and analysis issues. It would, however, lack permanency and stability.

Conclusion

Before CSD-13, several CSD member countries were concerned that international attention on water would wane while the need for it was at an all time high.

FIGURE 1
The United Nations System
Principal Organs



Note: Of the six principal UN organs, only three (the General Assembly, the Economic and Social Council and the UN Secretariat) are directly concerned with freshwater issues. Solid lines indicate a direct reporting relationship; dashes indicate a non-subsidiary relationship.

Canada was successful in advancing its agenda on international governance at the CSD-13 meetings. An important outcome related to governance was the decision to request the Secretary-General to include in his report to the CSD details on the roles and responsibilities of relevant UN agencies, funds, and programs in implementing programs and monitoring progress and to identify duplication and gaps in these functions. Future considerations of new governance structures would benefit from such a review.

Pressures for a stable focal point in the UN for water issues (such as the UN Forum on Forests) could increase if governance gaps continue to hinder progress on international commitments and are not effective enough for addressing emerging water issues.

Should further changes be needed, the options described above could serve as a starting point for stakeholder discussions. In almost all cases, the decision to adopt them will have to be taken by more senior organizations than the CSD, for example the ECOSOC or the General Assembly.

Notes

1 A full report on the CSD-13 decisions can be found at <www.un.org/esa/sustdev/documents/docs_csdi13.htm>.

2 The IWRM promotes the co-ordinated management of land, water, and related resources to optimize economic and social welfare without compromising ecosystem sustainability. For more information, please visit Publications at <www.policyresearch.gc.ca>.

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

The Agricultural Policy Framework
Water Effects

Maria Klimas and Alfons Weersink
University of Guelph

In Canada, water quality and quantity are governed on federal and provincial levels under several statutes. The federal government largely sets suggested standards (i.e., the Federal Water Policy), but the actual implementation of water legislation is administered by provincial governments (AAFC, 2003). Provincial statutes especially play a larger role in regulating water quality and quantity in an agricultural context. For example, the *Ontario Water Resources Act, 1990*, administered by the Ontario Ministry of the Environment, is the most important act governing water quality and quantity in Ontario (CELA, 2004). However, several other provincial statutes affect water including the *Nutrient Management Act* that sets standards for nutrient management on farms.

While water issues stemming from agriculture are largely the domain of the province, federal legislation can have direct and indirect effects. This is particularly true for agriculture, which receives federal assistance in several formats including income support. Federal agricultural policy is now guided by the Agricultural Policy Framework (APF). This article explores how the APF may affect water in Canada.

Overview of the Agricultural Policy Framework

The Government of Canada (under Agriculture and Agri-Food Canada) signed APF agreements and corresponding implementation agreements with each province and territory over the last several years (AAFC, 2005a). The goal of the APF is "to position Canada as the world leader in food safety, innovation and environmentally responsible agricultural production" (AAFC, 2006). Its five components are business risk management, environment, food safety and food quality, science and innovation, renewal and international (AAFC, 2005a). The objective of the programs under the environment component of the APF is "to help the agriculture and agri-food sector achieve environmental sustainability in the areas of soil, water, air and biodiversity" (AAFC, 2005a: 11).

Activities under the environment component of the APF focus on supporting

Beneficial Management Practices

Beneficial management practices, also sometimes referred to as best management practices, are practices, or system of practices, scientifically proven to reduce the impact of agricultural activities on soil and water resources while maintaining the economic viability of farms. They are set forth by farmers, researchers, agribusiness professionals and governments, covering all sectors and include a comprehensive list of topics, such as legal issues and conflict prevention, environmental risks associated with some waste management practices, management and facility options for dealing with manure, and the potential impacts of various options. Beneficial management practices can be specific to regions and operation types.

Source: Statistics Canada (2005: 4).

Maria Klimas,
M.Sc candidate,
Department of Agricultural Economics and Business,
University of Guelph

Alfons Weersink,
Professor,
Department of Agricultural Economics and Business,
University of Guelph

the implementation of beneficial management practices through voluntary measures, sometimes supported by subsidies. These activities include:

- developing policies and strategies to help Canada's agriculture and agri-food sector meet international and national climate change, toxic substance use, and environmental sustainability goals by measuring the effectiveness of environmental awareness programs and beneficial management practices;
- gathering and providing information on agricultural management practices that have a less negative impact on the environment and supporting development of new environmental technologies; and
- supporting the adoption of beneficial management practices by agricultural producers (AAFC, 2005a).

While there are about a dozen federally funded programs under the APF environment component along with a number of related provincial programs, several may have a direct impact on agricultural producers' impact on water quality and quantity, as they support the adoption of water-related management practices. These include the Environmental Farm Planning Program, the National Farm Stewardship Program (supported by the National Water Supply Expansion Program), and the Greencover Canada Program.

An environmental farm plan (EFP) identifies environmental risks and develops an action plan to mitigate those risks for individual farming operations. Its documentation is a voluntary and confidential process. The federal government contributes to the financial support of EFP completions through the Environmental Farm Planning Program under the APF, and the province usually provides technical support in the endeavour. The EFP program establishes principles of environmental action and supports farmers to take actions that reduce the environmental risks (OSCIA, 2005).

Completion of an EFP is required for a farmer to be eligible for funding under the National Farm Stewardship Program (NFSP). The NFSP 2005-2008 is a joint federal and provincial cost-share initiative to support environmental stewardship in agriculture by providing funding for producer adoption of beneficial management practices. Generally, the program will cover 30 to 50 percent of eligible costs of approved BMPs, such as water well management, farmyard runoff control, nutrient recovery from waste water, and irrigation management planning. The funding cap per legal farm entity is $30,000 over the whole life of the program (AAFC, 2005b).

The Greencover Canada program is similar to the NFSP since it provides $110 million of funding to support beneficial management practices, but the focus is on improving grassland-management practices, protecting water quality, reducing greenhouse-gas emissions, and enhancing biodiversity and wildlife habitat (AAFC, 2005a). Beneficial management practices eligible for funding under Greencover Canada include converting environmentally sensitive land to perennial cover and planting shelter belts (AAFC, 2005c).

The National Water Supply Expansion Program (NWSEP), under the APF, provides $60 million to improve the capacity of Canada's agricultural community to address water supply concerns (AAFC, 2005d). The Program began in 2002 with an initial assessment to determine agricultural areas of Canada experiencing or anticipating water shortages. The results determined the focus of federal-provincial agreements under the NWSEP to provide financial and technical assistance for farmers to plan and adopt projects encouraging sustainable water supplies.

Environmental Effectiveness of APF Programs

The beneficial management practices eligible for funding under the NFSP are likely to have a significant impact on water quality and quantity if adopted by agricultural producers. These improvements stem mainly from a decline in pesticide/nutrient runoff into surrounding water sources, either by decreasing nutrient/pesticide use or water quantity use in agricultural production (i.e., nutrient management planning, improved cropping systems) or by protecting surrounding water sources from contaminated on-farm water (i.e., water well management, farmyard runoff control, riparian area management, nutrient recovery from waste water). The Environmental Farm Planning Program ensures that agricultural producers choose beneficial management practices most suitable (feasible and effective) for their farms, and the National Water Supply Expansion Program seeks to gather information on projects that are most likely to help improve Canadian water quality and quantity issues.

Greencover Canada also offers components with significant potential impacts on water quality and quantity. Land conversion and shelter-belt establishment are likely to reduce runoff of contaminated water through decreased soil erosion, for example. Technical assistance for beneficial management practice adoption of water-related projects has similar potential impacts as the NFSP.

The environment is one of the five pillars of the federal government's Agricultural Policy Framework, which seeks to position Canadian agriculture as a world leader.

Adoption of the programs offered under the APF is likely to be high for producers already feeling pressure to adopt beneficial management practices, whether it be for economic reasons or to conform to more environmentally sound production techniques. According to the AAFC (2005e), the NFSP uptake as of September 2005 includes the adoption of approximately 4,260 beneficial management practices. Additionally, since the start of the APF and as of September 2005, 16,000 environmental farm plans have been reviewed. (Before APF implementation, 21,000 environmental farm plans were reviewed, which gives a total of 37,000 plans as of September 2005.) The target for the 2005-06 planning year is 20,000 reviewed plans, which includes 12,500 new plans and 7,500 updates of previous plans, and a projected 57,000 reviewed plans by March 31, 2006.

The *Ontario Water Resources Act*, along with most water regulations, dictates measures to protect water quality and quantity. In contrast, the APF aims to provide incentives for agricultural producers to establish environmentally sustainable practices with the goal of increasing the economic viability of their production. As such, the APF is a more flexible alternative for improving both environmental and economic sustainability in Canada. Agricultural producers use the EFP to identify environmental risks and develop action plans to mitigate risks on their own farming operation. Thus, the APF allows agricultural producers to work with extension services to identify their individual areas of risk through the EFP and to adopt management practices best suited to those specific needs. The involvement of stakeholders in identifying risk and potential solutions is crucial to the success of these programs, as the producers' perceptions of the benefits of implementing new management techniques lies in their understanding of the underlying science. Simultaneously, researchers and policy makers gather direct feedback from stakeholders on the feasibility of their proposals.

Conclusion

The environment is one of the five pillars of the federal government's APF, which seeks to position Canadian agriculture as a world leader. Since the direct regulation of water quantity and quality is generally under the auspices of the provincial government, the focus of the APF is to reduce agriculture's impact on water through the provision of technical and financial incentives that will encourage farmers to adopt environmentally sustainable management practices.

Technical assistance efforts under the APF, such as the NFSP, represent an improvement over many education programs that are the most popular form of agri-environmental policy in OECD countries. Unlike most moral suasion programs that promote environmental objectives by enhancing the farm sector's general awareness of the contribution of their current practices to environmental problems and of best management practices to reduce those problems, these programs work with individual farmers to identify environmental risks on their farms and suggest improvement. However, the same problems confronting most moral suasion efforts remain. A reliance on volunteers and their sense of goodwill is inequitable and insufficient to achieve the environmental objectives unless the environmental

impacts of individual actions can be clearly demonstrated to the producers causing damages (Ribaudo and Horan, 1999). Even if the linkage can be shown through education, the environmental problem will not be addressed through a reliance on the stewardship ethic of farmers unless profitable management alternatives can be observed by farmers in practice.

In addition to technical assistance, financial incentives are provided by other elements of the APF, such as Greencover Canada. The major limitation of the programs that subsidize the adoption of best management practices is their universal availability and the resulting cost ineffectiveness. Under universal cost-share programs, farmers with the greatest contribution to the pollution problem may not apply if they cannot manage the practice or if the financial incentive is insufficient (Weersink et al., 1998). On the other hand, funding may be granted to polluting farms even though they would have adopted the abatement regardless, or to non-polluting farmers, because the subsidy makes the practice profitable for them.

Although the cost efficiency of the incentive programs under the APF may be limited, their use signals the importance the federal government has now placed on the environment within the agricultural policy debate. Further changes may be predicted by the policy shifts in the European Union, which now considers agriculture as multifunctional; in addition to the production of food and fibre, agriculture is seen as a provider of land-linked services that are mainly of a public good character (OECD, 2003). Linking the adoption of beneficial management practices that improve environmental health, including water, to support payments may be an option under the next version of APF and represent a continuation of the growing emphasis on the environment within federal agricultural policy.

AAFC: Agriculture and Agri-Food Canada

CELA: Canadian Environmental Law Association

APF: Agricultural Policy Framework

BMP: Beneficial Management Practices

EFP: Environmental Farm Plan

NWSEP: National Water Supply Expansion Program

NFSP: National Farm Stewardship Program

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Watershed Stewardship in Canada

Shawn E. Dalton
University of New Brunswick

Shawn E. Dalton, Ph.D.,
Research Associate,
Environment and Sustainable
Development Research Centre,
University of New Brunswick

Since the Walkerton tragedy, the need for sustainable, integrated watershed management has been recognized by federal, provincial, and municipal agencies, as well as the scientific community, business and industry, and individual community members and groups. In response to these and other concerns related to water quality and quantity, partnerships among a variety of actors have been established across Canada, and indeed, around the globe, to enhance our ability as a society to manage water and watersheds effectively. Increasingly important in these partnerships are community-based watershed groups.

In Canada, as elsewhere, the activities of non-governmental organizations are on the rise (Salamon, 1995). This trend is likely to continue, and it will be important for policy makers to recognize and explicitly acknowledge the fact that the structure and nature of the relationships among actors within and between the different sectors directly affect the development and implementation of public policy. This is as true of activities related to natural resource management as it is to those related to health care, education, or other fields traditionally in the purview of the public sector.

It is particularly true of integrated watershed management initiatives which, by definition, require the participation and support of a diverse array of stakeholders and are often spearheaded by groups that lack the political authority and accountability, scientific capacity, and technical expertise to implement watershed management plans. Despite these challenges, many community-based watershed management initiatives exist and, indeed, thrive, in Canada. These range from small informal groups that monitor water chemistry and engage local landowners in restoration and enhancement work, to sophisticated efforts to conduct research, influence policy, and develop regional and national communities of practice. The roles of government at all levels in watershed stewardship groups vary widely, and range from acting as informal partners to providing funding, expertise, equipment and supplies, and guidance. In many cases, government representatives act as both voting and non-voting members of decision-making bodies within community-based groups.

Traditionally, watershed groups have monitored biophysical conditions, engaged local communities in stewardship activities through outreach and education and, in some cases, worked to influence public policy in support of their activities and goals. The array and efficacy of these activities vary with the expertise, interest, and enthusiasm of volunteers. Increasingly, however, government agencies seek to work with citizen-based initiatives to develop and implement watershed management plans. This requires a level of sophistication and commitment on the part of watershed groups that is often not available. The findings of a Watershed Groups' Institute, held in New Brunswick in November 2005, demonstrated that community-based initiatives face significant challenges in this regard (Dalton and Prentice, 2006). While these findings are based on the experiences of a particular subset of organizations in New Brunswick, recent conversations with researchers and practitioners from British Columbia to Nova Scotia

confirmed that they are quite representative of the experiences of other such groups across Canada.

Organizational Structure and Longevity

Most groups are formally and legally incorporated non-profit organizations, and their staff people are directly responsible for fundraising, activity reports, and financial reporting, in addition to conceptualizing and executing projects, building partnerships, and developing an enduring organization. It is therefore not surprising that staff burnout is a common problem among watershed groups, and that it is tremendously difficult to establish long-term projects, long-term partnerships, and any sort of ongoing programming initiative. Under their current structure and funding cycles, it is virtually impossible to build a career in most watershed groups in New Brunswick.

Organizational Activities

A recent report on data management among watershed groups in New Brunswick showed that every watershed group responding to the survey collects stream data, including water temperature (100 percent), dissolved oxygen (93 percent), water chemistry (87 percent), pH (87 percent), and E. coli (80 percent) (Dalton and Walsh, 2004). Activities reported at the Institute in New Brunswick were consistent with this finding, but contrary to the findings of the survey, which indicated that while 53 percent of groups collect information about community demographics, very few reported any activity in the socioeconomic realm.

Most focus on collecting biophysical information, delivering hands-on programming both in terms of stewardship activities and educational opportunities, and developing and implementing outreach/education strategies. For example, one group co-ordinator has a regularly scheduled time slot on a local radio station, and delivers interviews herself as well as co-ordinating panels on the show. Other groups host speakers series, issue regular bulletins or newsletters describing their activities, and post their information on a web site. One group recently completed a video documentary on its activities, and posted it on the Internet.

These are traditional activities of community-based watershed associations, and it is truly remarkable what these groups are able to accomplish on a shoestring budget, with the dedicated efforts of staff and volunteers whose time is both stretched and fragmented. Focusing on these traditional activities, however, to the exclusion of engaging in organizational development, policy development, or scientifically rigorous monitoring and integration of biophysical and socio-economic information may diminish the efficacy and strength of these organizations in the long run.

Organizational Challenges

Many groups face ongoing organizational development problems, due to lack of secure funding over the long-term; this results in loss of continuity, institutional memory, and organizational momentum. Most groups expressed a need for visibility and credibility among community, government, and especially major funding bodies.

Many lack the technical capacity or funding (or both) to incorporate sound science into their work and action plans, although some work with government or academic partners to build capacity in this realm. In addition, groups would benefit from training in data collection and management protocols, web site design and maintenance, and other capacity-building activities. Many groups lack high-speed Internet service, and there is a common need for means by which to share literature, data, and other information generated and discovered by watershed groups.

The above challenges speak to two primary needs: ongoing, long-term funding, and capacity building. Long-term funding is a problem inherent to the non-profit sector. Increasingly, this issue is addressed by developing an entrepreneurial component to the organizational structure of non-profit organizations. Admittedly, the opportunities to generate income may be limited among watershed groups in New Brunswick, both because existing staff are already stretched and because the services for which fees might be charged may not be in great demand in the small communities where

It is not surprising that staff burnout is a common problem among watershed groups, and that it is tremendously difficult to establish long-term partnerships, and any sort of ongoing programming initiative.

many of these groups are established. However, it is worth considering that some activities currently delivered free of charge might actually provide income-generating opportunities for the groups.

More to the point is the need for secure funding. From the perspectives of those providing moneys to watershed groups, this may well be worth consideration for several reasons. First, ongoing funding could be tied to data acquisition requirements, spanning several years, of provincial or federal agencies. Second, it would provide a framework for investment in capacity building for staff, under the assumption that secure funding would lead to staff retention, rendering investment in professional development feasible. Third, secure funding over several years could be made contingent upon the development of a plan for organizational security beyond a particular funding date. Finally, this could increase the efficiency and effectiveness of watershed groups, by providing a framework for retention of institutional memory, investment in multi-stakeholder partnerships, and program development and implementation.

Access to high-speed Internet service in remote areas of Canada is spotty, but on the rise. In the short-term, there is little that can be done to address capacity in this regard. However, training required for standardized data collection protocols is available in New Brunswick through the New Brunswick Aquatic Data Warehouse. Online searches of such opportunities in other provinces revealed that they are widely provided by a variety of organizations. In New Brunswick, two groups, the Fredericton Area Watersheds and Canaan-Washademoak Watershed Associations, with technical assistance from the Baltimore Ecosystem Study (a US Long-Term Ecological Research project), have developed and implemented standardized data documentation, management, and reporting protocols based on US National Science Foundation standards. They are now posting all their non-proprietary data and metadata on their web site. Training is also available in this area as, increasingly, government agencies turn to citizen scientists to generate and manage baseline information about watersheds in Canada.

There is also increasing interest in working with community-based watershed groups among scientists in the academic community. Employing a "you have to pay to play" policy, watershed groups could harness this interest to serve their own needs, by requiring academics to work with them in the development of research questions, and allowing citizen scientists to increase their skills and knowledge base by working directly with scientists in the field. This would also increase the visibility and credibility of watershed groups in the province.

There is an Abundance of Community-Based Initiatives

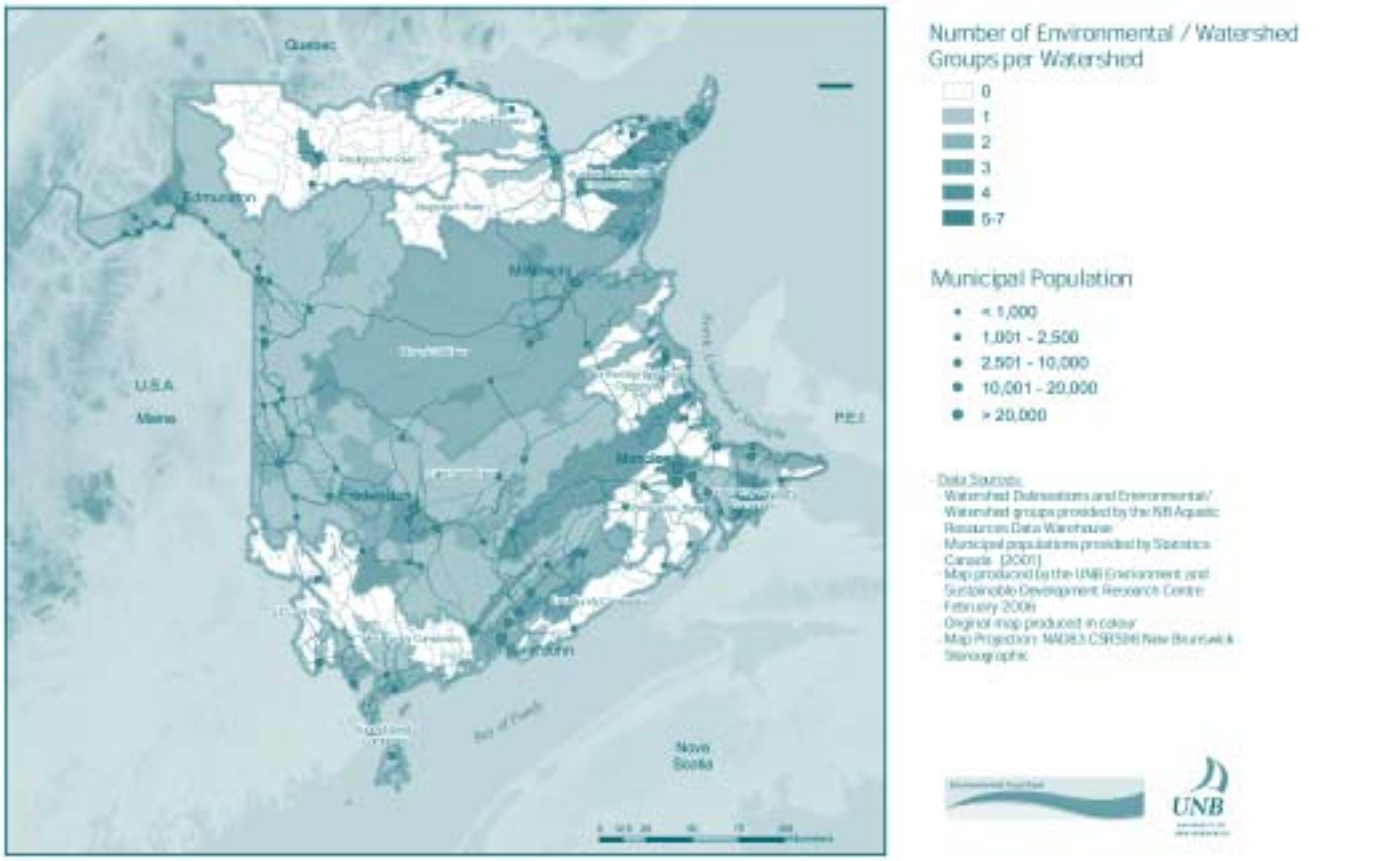
Despite the challenges described above, many community-based groups work across Canada to engage their friends, neighbours, colleagues, and political representatives in integrated watershed planning and management. For example, an effort to identify a potential audience for standardized data collection and documentation protocols revealed over 170 different organizations involved in natural resource or watershed management in New Brunswick. This database, developed by the New Brunswick Aquatic Data Warehouse, was subsequently used to generate a map of groups generated from a subset of approximately 150 organizations (see Figure 1).[1]

The map is a reasonable first approximation of the distribution of stewardship organizations, many of which fall in those watersheds most densely inhabited by human populations. Thus, it is surprising to note that few watershed groups are working to understand the socio-economic dynamics of the human communities with whom they interact, and how those dynamics affect the efficacy of the groups themselves.

At the national level, a recent Internet survey carried out by the Centre for Sustainable Watersheds, generated 125 responses from community-based watershed groups, and their public agency, academic, and non-profit partners. This survey provided an opportunity for respondents to indicate whether they would be interested and willing to participate in a national network of watershed groups, whose goals would be to share data, information regarding successes and failures, and other information about their work, partnerships, funding sources, and so on. One clear message from this initiative is that most respondents believe that a national network of watershed groups is both necessary and possible, and should also provide a means by which this national constituency can be heard. The RésEau project, a joint effort of Environment Canada and the Centre for Sustainable

FIGURE 1

Distribution of Environmental and Watershed Groups in the Province of New Brunswick



Watersheds, represents a first step in bringing this network into being, and is intended to support Canada's water community by building a national water information network and decision support system.

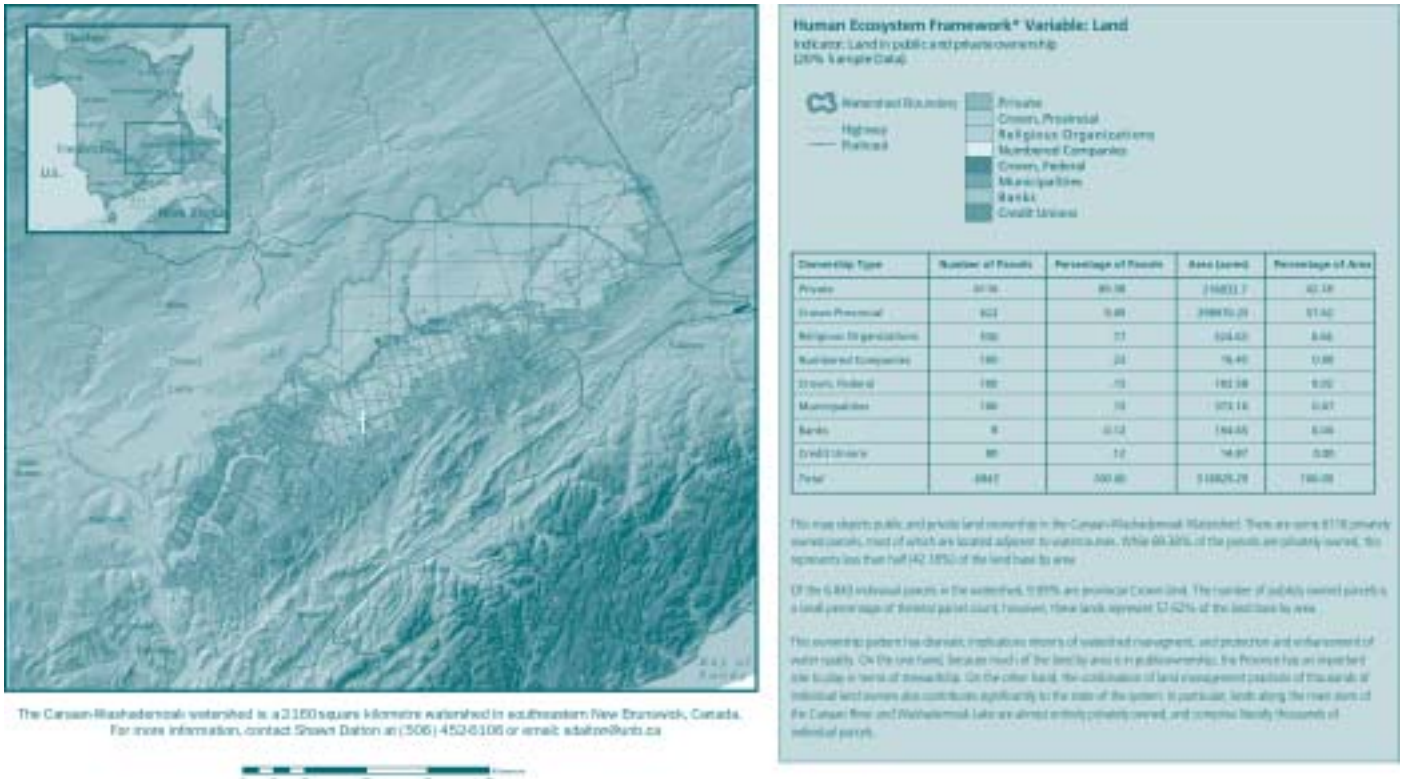
Integrated Watershed Management

According to the Sustainable Planning Branch of the New Brunswick Department of the Environment, integrated watershed planning and management requires integration of activities affecting air, land, and water. Implied in this definition is the need to understand what comprises and governs the behaviour ("activities") of people living, working, and playing in a given watershed. In addition, it implies the need to understand the connections not only among flora, fauna, air, and water, but between these parameters and human activity taking place within a given watershed. Finally, a management regime comprises those arrangements regulating the way demands on the system are settled and decisions put into effect (Swartz et al., 1966). Thus, we must understand the policy framework at all scales of government influencing individual and collective behaviour in regard to air, land, and water.

It is possible, and necessary, to address this need for integrated social ecological information through development of applied research projects related to sustainable watershed management. It is not likely, however, that small poorly funded community-based watershed groups can shoulder this load without the respectful assistance of policy makers, scientists, and resource managers.

Consider the Canaan-Washademoak watershed in southeastern New Brunswick. This is a land base of 2,160 km^2, some 84 percent of which is in forest cover, six percent designated agricultural land, and the

FIGURE 2
Canaan-Washademoak Watershed



balance residential, commercial, or recreational property. As the map (see Figure 2) demonstrates, much of the riparian zone of the main stem is privately owned. In addition, the proportion of shoreline parcels designated recreational increases from headwater to lakeshore, and virtually all residents of the watershed rely on groundwater from their private wells for drinking water.

Recent concerns over declining fish populations (in particular, brook trout) and water quality led a citizen-based group to form in 2002, and to establish a biophysical monitoring program to determine whether and what effects changing land use patterns may be having on water chemistry. Their unexpected (to them) discovery that, in fact, much of the E. coli entering the system stems from poor or non-existent septic systems on recreational camps, as opposed to large livestock farming operations, suggests that a public outreach campaign, coupled with a policy tool to encourage or aid camp owners to upgrade their septic systems, may be a more effective means of improving fish counts over the long term than a stocking program would be. In light of the ownership patterns on the landscape, this could prove time consuming, expensive, and difficult. In the absence of the combined biophysical and socio-economic information gathered by the group, it would be difficult to determine an effective course of action. Biophysical information can tell you what is going on in an aquifer, river system or watershed; socio-economic information can tell you why.

Identifying, acquiring, integrating, and interpreting these complex data, and translating that interpretation into action on the ground is a challenge. Indeed, at a recent workshop at the University of New Brunswick in Fredericton, called Linking Watersheds, hosted by the Canadian Rivers Institute, and sponsored by the Canadian Water Network and the United Nations University, an inventory of core data sets required for integrated watershed management was distributed for discussion, comments, additions, and subtractions. Of

the 113 data sets in the initial list, less than 10 were related to socio-economic parameters. Depending on one's perceptions and definition of integrated watershed management, core data needs clearly vary dramatically.

Still Top Down vs. Bottom Up When We Need Side-to-Side

The Canadian government takes watershed management seriously, and clearly recognizes the need for citizen stewardship in this work. Agriculture and Agri-Food Canada, the Canadian International Development Agency, Fisheries and Oceans Canada, Environment Canada, GeoConnections, Natural Resources Canada, and doubtless many other arms of our federal government are engaged in projects and programs that support integrated watershed management. Likewise, provincial agencies across the country work in this realm, with the potential to act as liaisons between local and federal initiatives. A recent Internet search of federal initiatives related to watershed management indicates that at least three requirements are either not or are under-addressed.

Data Availability at Scales at Which Decisions and Actions are Taken

GeoConnections, in partnership with other federal entities, recently undertook a 1:1 million-scale national watershed framework. This framework integrates topographic, hydrologic, and socio-economic information, and represents a promising indication of interagency co-operation in this area. Given that many watershed groups work in regions as small as 5 km^2 and as large as the 240,000 km^2 Fraser River Basin, the value of GeoConnections for community-based initiatives will vary.

Many watershed groups find even 1:50,000-scale provincial level data of limited use. In urban areas, where watershed areas often are small, particularly relative to population density, higher resolution data are in order. Groups often wind up using less-than-accurate data or generating required databases themselves. So, while the initial effort to generate watershed maps for all of Canada is a good start, groups require data at the scale at which decisions are made and acted upon.

The Canadian government takes watershed management seriously, and clearly recognizes the need for citizen stewardship in this work.

Integration Across Federal Agencies

While many federal agencies and entities clearly have an interest in watershed management, it is not clear that they work effectively across agency boundaries. The GeoConnections example cited above is apparently an exception: according to a scientist at the National Water Research Initiative, agency silos persist. Watersheds are interjurisdictional management units. Not only do they often cross private property, municipal, provincial, and international boundaries, they also generally are composed of a variety of land uses, and therefore subject to a variety of policies and regulations. Understanding and making explicit the rules and roles for enforcement of different federal (and other scales of government) agencies is a critical component of effective watershed management.

Socio-Economic Analyses of Watershed Units

Because watershed sciences have largely fallen under the purview of biophysical scientists in both academic and federal contexts, there is a relative paucity of tools to examine and interpret the socio-economic dimensions of watershed management. Ironically, the data to do so are often readily available. Arguably, Statistics Canada's high resolution census data lend themselves to socio-economic analyses along watershed lines more readily than many biophysical data sets. The Census of Canada is conducted regularly, consistently, and predictably, allowing for comparison and analysis of trends over time. While data at the enumeration area level are not freely available, census subdivision data are, and are valuable and useful in watersheds as small as 2,000 km^2. Data for smaller watersheds may require a licensing agreement or funds for purchase.

A Path Forward

We all live in watersheds. Our daily rounds can contribute to their protection and enhancement or diminish and deplete them. Citizen-based watershed groups understand this fact, and working toward improved stewardship both on individual properties and in the collective context of multijurisdictional and multi-tenure landscapes. They need help. Most importantly, reliable funding, technical assistance, and organizational development are requisite.

In the longer term, there is a need to train a new generation of social ecologists, with fluency and expertise in both the biophysical and social sciences. This is a tall order, but integrated watershed management is an impossible dream in the absence of a commitment within the academic community to develop new theoretical, methodological, and analytical tools to synthesize and interpret contributions from biology, hydrology, engineering, sociology, anthropology, organizational behaviour, political science, economics, and more. Barring this, our institutional and disciplinary boundaries, the silos they generate, and our limited ability to holistically manage watersheds will persist.

Integrated social ecological approaches to watershed management, conducted in mutually respectful partnerships, carried out on a level playing field, have the potential to inform public policy by identifying barriers and bridges to the implementation of policies that protect our natural resource base while facilitating economic development.

Note

1 The goal of creating this map was to represent visually the distribution of these groups, by watershed, in the province. Several caveats are in order. The map was created using the postal code of each organization's mailing address, which may or may not be located in the watershed in which they work; this was fine-tuned with first-hand information regarding the location of some groups' activities. However, the map should not be interpreted as a final representation of watershed or natural resource management activities of organizations. This map will be finalized based on feedback from key informants in the system.

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Innovation Canada

The latest issue of InnovationCanada.ca is now online at <http://www.InnovationCanada.ca>.

This free, bi-monthly publication showcases Canadian excellence in research, and highlights the benefits of this research to Canadians. This month's issue on Water features Guest Columns from Ryan Hreljac and Dr. David Schindler. It also features stories on watersheds, water quality, marshland, and others (including a Young Innovator column).

The **Canada Foundation for Innovation (CFI)** is an independent corporation created by the Government of Canada to fund research infrastructure. Part of its many outreach activities includes the production this online magazine.

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The Soft Path for Water

A Social Approach to the Physical Problem of Achieving Sustainable Water Management

Oliver M. Brandes
University of Victoria

David B. Brooks
Friends of the Earth Canada

Need for a New Paradigm of Water Management

For 2,500 years, perhaps longer, water management has meant constructing dams, digging and drilling wells, and extending canals and pipelines to cities and large irrigation systems. This approach has been spectacularly successful at providing humans in rich nations with vast amounts of clean water wherever and whenever wanted. As well, water was made available to farms, factories, and generating stations so they could supply food, industrial goods, and electricity in huge amounts to people around the globe – generally with enough water left over for gardens, parks, and swimming pools.

Despite past success, the long "day" in which the search for new supply could dominate water planning is now coming to an end. Although many Canadians still believe that our freshwater resources are limitless, the reality is that only a small proportion of our water is truly renewable and located where most of us live. Direct costs to develop additional freshwater are doubling (per cubic metre) every 10 to 15 years (Serageldin, 1995). These costs increase significantly when the environmental impacts of both increasing infrastructure development and high water use are included.

Water management challenges in Canada, as in much of the world, are rapidly increasing. Climate change, population growth, increasing pollution, and rampant development are some of the many stressors to our freshwater resources. Within the past few years, nearly a third of Canadian communities have faced threats to the security of quantity or quality of their water supply (Environment Canada, 2004).

The Potential of a New Approach

The key to a fresh approach for water management lies in shifting the focus from expanding the supply to moderating the demand. But water conservation does not just happen; it will not

FIGURE 1
Spectrum of Water Management Approaches

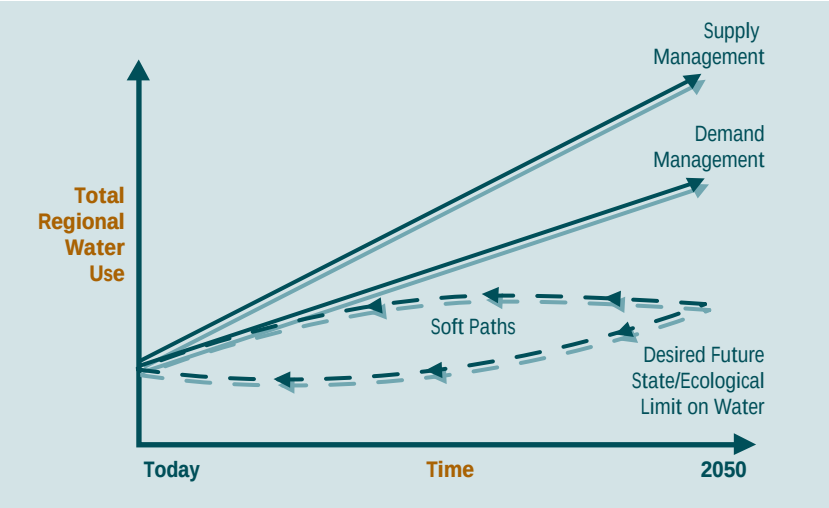
Policy	Dominant Discipline	Range of Policy Choices	Fundamental Questions	Planning Process	Outcome
Supply Management	Engineering	Policies based on presumed need for new infrastructure.	How can we meet projected water needs given current trends in water use and population growth?	Planners extrapolate from current consumption patterns to determine future "requirements" and then locate and develop new sources of supplying to meet this projected demand.	Construction of dams, pipelines, canals, wells, desalination systems, and interbasin transfers, where necessary.
Demand Management	Economics	Policies based on short-term cost-benefit calculations.	How can we reduce needs for water to conserve the resource, save money and reduce environmental impacts?	Planners incorporate efficiency and information programs together with improved pricing patterns to maximize use of existing infrastructure. Increasing capacity is only one option among others in a least-cost approach.	Efficiency gains through technical fixes and consumer education.
Soft Path	Social sciences with recognition of bio-physical limits.	Policies based on stakeholder consultation and political review.	How can we deliver services currently provided by water in ways that recognize the need for economic, social and ecological sustainability?	Planners model a sustainable future state for water use with attention to long-term economic and social prosperity. They then "backcast" to devise a feasible and desirable path to reach that state. Ecological sustainability is fundamental to all economic, political and socio-cultural choices.	Options to reduce use through innovation, conservation, water reallocation and changing patterns of use and re-use. More water is left *In situ*.

Source: Brandes and Brooks (2005: 5).

Oliver M. Brandes,
Water Sustainability Project Leader,
The POLIS Project on Ecological Governance,
University of Victoria

David B. Brooks,
Director of Research,
Friends of the Earth Canada, Ottawa

FIGURE 2
Planning for the Future with a Soft Path Approach



Source: Brandes and Brooks (2005: 13).

Core Principles of Soft Path Analysis

Treat water as a service rather than an end in itself – Beyond a very few services, there is no absolute requirement for water, or at least water beyond that which comes from rain. Rather, water is an input that can be delivered as an alternative to other ways of achieving the same result: air-based cooling, rain-fed agriculture, waterless sanitation.

Make ecological sustainability a fundamental criterion – Soft paths recognize ecosystems as legitimate users of freshwater and as the foundation of our economy. Environmental constraints are built in from the start to limit the amount of water withdrawn from natural sources and to establish conditions on the quality of water returned to nature.

Match the quality of water delivered to that needed by the end use – For both economic and physical reasons, it is almost as important to conserve the quality of water as to conserve its quantity. Soft path policies are designed from the start to match the quality of water supplied to the quality required by cascading water systems, ensuring that wastewater from one use becomes input for another use – from a washing machine to a garden, or from a cooling system to other industrial uses.

Plan from the future back to the present – Traditional planning starts from the present and projects forward to the future. Soft path planning does just the reverse through a technique called "backcasting." First, it defines a sustainable and desirable future state for society, at least as water sources and uses are concerned. It then works backward to identify policies and programs that will connect the future to the present.

take root in the absence of leadership and action by all levels of government. A new paradigm of water management is situated in the approach called demand management (in obvious contrast to supply management), and it extends from simple technical fixes (e.g., low-flow shower heads) and economic incentives (e.g., volume-based prices) to a more long-term and fundamentally holistic approach dubbed the water soft path.

When viewed on a spectrum, all three water management approaches – supply management, demand management, and the soft path – represent incremental steps toward sustainability. However, far from being a simple progression, some key characteristics distinguish them, as shown in Figure 1. The most significant difference is the view of the limits of water available for human use and of the nature of the choices that should determine how we manage water. Figure 2 offers an idealized sketch of the different paths that will result from following each of the three approaches.

Water demand management seeks primarily water efficiency, and often focuses on the implementation of cost-effective ways to achieve the same service with less water. Demand management options have been known for years, but with water prices kept artificially low, little incentive existed for widespread adoption. Recent research at the University of Victoria demonstrates the potential of demand management and discusses action opportunities for government to implement a comprehensive, integrated, long-term approach (Brandes and Ferguson, 2004; Brandes et al., 2005).

Though demand management has always been part of how water systems operate, it is typically treated as a secondary or temporary measure needed until additional supplies are secured. Changing our water management paradigm requires that demand management become the primary focus. With rampant growth and the uncertainty of climate change, reducing the demand for water is our best "source" of "new" water in Canada. A recent California study showed that total urban (residential, commercial, institutional, and much industrial) water use in California could be cut by 30 percent using off-the-shelf technologies. Those savings are available at lower cost and in less time than any new supply project, and they would eliminate the need for California to build any new supply project for at least several decades (Gleick et al., 2003).

The Soft Path

The first steps toward a more sustainable water future are found with conventional demand management, which harnesses the full potential of existing technologies and economic incentives to achieve water efficiency. However, because they begin from an anthropocentric rather than an ecosystem perspective, efficiency-oriented measures alone are not sufficient to achieve sustainable water management. Indeed, we likely already withdraw so much water that we impair the ability of nature to provide ecological services (Postel and Thompson, 2005). Water soft paths accept the importance of greater water efficiency, but go further by searching for those changes in water use habits and water management institutions that will promote long-term ecological and social sustainability (Brooks, 2005a, b).

Efficiency Versus Conservation

In the simplest terms, efficiency is a means and conservation an end. However, a more useful distinction focuses on the nature of the decision. In most cases, the search for more efficiency in using water reflects what any consumer, whether farmer or industrialist or homeowner would mean by water productivity – water as just one more factor of production – and the criterion is short-term cost effectiveness. Conservation in contrast reflects decisions that are taken for reasons other than narrow cost effectiveness, perhaps because of a longer time frame or because of a desire to protect the environment. The simple task of watering lawns can illustrate the difference. Efficiency dictates that one looks at the cost of water and, in response to rising rates, starts using low-flow sprinklers. Unfortunately, with ever more lawns to water, sprinklers become just a better way to keep doing something we should no longer be doing in the first place. In contrast, conservation suggests planting greenery that does not require watering at all. First costs would likely be higher, but the conservation approach effects a permanent, sustainable, not just an interim, solution to the problem.

The soft path approach changes the conception of "water." Instead of being viewed as an end product, water becomes the means to accomplish specific tasks, such as sanitation or agricultural production. Conventional demand management asks the question "how": How can we get more from each drop of water? Water soft paths also ask the question "why": Why should we use water to do this at all?

- Why, for example, do we use water to carry away our waste? Demand management would urge low-flow toilets, but soft paths promote waterless or composting systems – perhaps not for homes (because of the need for regular maintenance), but certainly for larger buildings. On-site methods of waste treatment and reuse are also available, with possible total freshwater savings of 80 to 90 percent.
- Why do we use half the potable water that is piped to a house in the summer for watering lawns and gardens and sidewalks? Demand management would urge more efficient sprinklers with automatic shut-offs. Soft paths go further by recycling water from bathtubs and washing machines or, better yet, planting drought-resistant greenery that requires little or no watering once it is established.

By focusing on why, the soft path greatly increases the number of possible solutions. The approach is broadly applicable, not just to houses and gardens, but also to large buildings, factories, and farms, indeed, across sectors and to entire cities. The textbox on previous page presents the core principles underlying water soft path analysis.

Water soft paths adopt the same service-based approach when dealing with

water quality. Delivery of good quality water is vital for drinking and washing; however, few other uses require high-quality water. We can generally achieve the same result with lower-quality water, which is more abundant and lower cost.

Under a water soft path regime, the role of management shifts from building and maintaining water supply infrastructure to providing water services, such as new forms of sanitation, drought-resistant landscapes, urban redesign for conservation, water reuse and recycling, and new methods for rain-fed agriculture.

Conclusions

Many nations are already shifting from a supply to a demand focus in their management of freshwater. To avoid a water crisis of our own making, Canada must do the same. The focus must be on designing and implementing strategies today that can reduce or even eliminate the need for supply-side developments for the foreseeable future. Embracing the soft path allows communities to obtain the many advantages of greater water efficiency and, in addition, move toward long-term ecological and social prosperity.

The water soft path is both a concept and a method. Many people accept it as an ideal – the freshwater approach to moving toward sustainability. However, only a few recognize that methods exist to transform the soft path from "eco-dreaming" to practical opportunities and policies. True, these methods must be refined, but past studies have demonstrated that a method originally developed for analyzing alternative energy strategies (Lovins, 1977; Brooks et al., 2004) can be adapted to freshwater.

Currently, a study is underway to explore just what water soft path policies would look like in Canada (See text box above). Far from being just an academic exercise, this study is intended to demonstrate that the goal of sustainable development for freshwater is within our grasp. Sometimes "*where there's a way, there's a will*."

Full references are available in the online version of this issue. It can be accessed by visiting the PRI web site at <www.policyresearch.gc.ca>.

Water Soft Path Analysis in Canada

Recently, Friends of the Earth Canada and The POLIS Project on Ecological Governance at the University of Victoria released a brief guide to water soft paths that describes both concept and method, including a detailed step-by-step plan. (*The Soft Path for Water in a Nutshell*, by Oliver M. Brandes and David B. Brooks was jointly published in 2005 by the POLIS Project on Ecological Governance, University of Victoria, and Friends of the Earth Canada.)

This publication is part of a larger experiment that seeks to apply a comprehensive water soft path analysis led by Friends of the Earth Canada for three economically and ecologically different regions of Canada, each at a different scale: the watersheds making up the Annapolis Valley in Nova Scotia, the full Province of Ontario, and selected urban areas in British Columbia. The core research team consists of senior staff from Friends of the Earth Canada, Acadia University, the University of Waterloo, and the University of Victoria's POLIS Project on Ecological Governance.

Beyond analyzing the potential for water soft paths, this study will suggest policies for moving the regions toward sustainable water management. Initial results of the water soft path study for Canada are expected by the end of 2006.

Further details about the project can be found at <www.foecanada.org> or <www.waterdsm.org>.

Maps and Water Issues
Developing a Community of Practice

Workshop
January 20, 2006

Anjela Markova
Policy Research Initiative
Government of Canada

Water issues are diverse and can vary from manure applied upstream of municipal water intakes to institutional arrangements for water governance. What they have in common is that they cut across watersheds, jurisdictions, and water users' interests. They are truly horizontal and integrative. Maps can communicate the findings of the science community to non-scientists, both the policy community and the general public. Presenting water issues on maps can easily convey the magnitude and the complexity of the issues. Maps can show the stakeholders that they are stakeholders, show the issues affecting your home watershed, and show who is implicated by specific issues in a particular watershed.

A workshop, organized by the PRI in co-operation with the GeoConnections Secretariat (Natural Resources Canada), explored the challenges to be addressed when mapping water issues. Held January 20, 2006, this event brought together more than 50 participants, half from federal departments and half from non-governmental organizations and provincial governments. The workshop aimed at improving partnerships toward complementary efforts in spatially referenced water information development, sharing, access, and decision-support tools.

The intensity of the networking at the time of the workshop was the best illustration of the existing willingness to co-operate and join already existing efforts and partnerships in producing water-related maps and sharing water-related information. All participants agreed that a broader and organized community of practice on mapping water issues will be of great value in terms of saving resources, duplication of efforts, and producing better products. A question was raised, however, regarding the need for a common vision of what to do and where to go. A community needs something to motivate the interest of its members and needs to build something together to be a community.

The discussion on what is needed to build together as a community on mapping water issues included different potential outcomes; however, the common understanding about the path forward sought an interface where most people would be served. The interface would have an enabling culture and everybody would be able to contribute. This brought several issues to the fore: content standards, which have to evolve with the development of the community; structures to accommodate different streams – data, policy, knowledge; how to compel funding and how to link it to management; broadening the reference to include coastal water, as well as the initial focus on inland water; the question of who will be interpreting the data, and more importantly, who will ensure that data are not misinterpreted. The nature of the discussion implied that the key is a well-defined scope to what the community wants to accomplish.

All participants acknowledged the importance of identifying who will be using the information, and therefore identifying users' needs. The workshop reinforced the critical requirement to include users in the community of practice.

In response to the emerging need for leadership coming from a group that can provide enabling capacity, RésEau, a federal government demonstration initiative with a focus on water information, volunteered to lead the broader community of practice on mapping water issues. A discussion paper is to be prepared to present a vision and mandate.

Anjela Markova,
Policy Research Officer,
Policy Research Initiative,
Government of Canada

Eau Canada
The Future of Canadian Water Governance

Karen Bakker (editor)
UBC Press, Vancouver,
Scheduled for release in Fall 2006

Reviewed by
Connie Delisle
Policy Research Initiative
Government of Canada

In *Eau Canada: The Future of Canadian Water Governance*, Karen Bakker and colleagues present a rich and compelling case for water as a mounting source of disquiet for Canadians. Public concern focuses on areas such as drinking water safety – highlighted by incidents such as the 2000 disaster in Walkerton, Ontario, environmental degradation from large-scale aquaculture farming, and threats of pollution to recreational water bodies even in national and provincial parks.

The recent case of contaminated drinking water on the Cree First Nation Kashechewan Reserve on the edge of James Bay has led to a flash point with many Canadian water experts feeling that water governance is in a crisis. Although the state of water governance affairs is characterized in a recent report by Canada's Senate as "shocking" and "unacceptable," this book offers hope by pointing to opportunities for innovation and renewal of a better relationship with water.

The intentional focus on water governance and management is justified as the book wrestles with two fundamental questions: What is the state of water governance in Canada? How can we manage our waters more wisely? The volume skillfully brings together the perspective from 28 of Canada's top water experts who debate Canada's most critical water issues and resolutions. The book's objective is to promote an informed debate in all sectors of society about some of the most controversial and pressing water issues facing Canadians. This reality has lent impetus to the decision to pen the book in a way that is comprehensible to the general audience. The public at large, the academic community, water supply managers, environmental and water policy analysts, government officials, community groups, and politicians from across Canada will find this book a high-quality read.

The range of contributors to this volume is as diverse as the issues involved in water management debates. The first three sections of the book provide readers with an essential background on Canadian water uses, conveying arguments about weaknesses at the heart of Canadian water governance. Authors candidly explore and make controversial arguments over contentious issues, such as jurisdiction, transboundary waters, water exports, and water privatization. The final sections focus on ways to bridge the divide between knowing what to do and taking appropriate action to resolve long-standing issues. Some innovative solutions for sustainable water management are also mapped out, including the potential to achieve national consensus on water policy, water conservation, and pricing. Within this context, the implications of new legal frameworks on Aboriginal people's water rights are sure to spawn debate.

Ms. Bakker skillfully unites diverse tributaries of thought streaming from scientists, researchers, experts, constitutional lawyers, policy analysts, and others. The resulting product gives the interested but non-technical reader a straightforward tool for use in understanding the insidious and complex problems plaguing water governance in Canada. The book also implicitly cries out for government, its direct partners, and Canadians at large to create a more strategic approach to addressing nationally significant freshwater issues. Heeding the advice set out in this manuscript may help bring us closer to understanding what we need in a shared Canadian vision and an effective pan-Canadian policy framework for freshwater management in Canada.

Connie Delisle,
Strategic Advisor,
Policy Research Initiative,
Government of Canada

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Note: All web sites were accessed on February 28, 2006 unless indicated otherwise.

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