Good Governance for Water Conservation: A Primer

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PROGRAM ON WATER GOVERNANCE

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UBC Program on Water Governance

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PROJECT DESCRIPTION

This report represents the culmination of the Municipal Water Supply Infrastructure Governance in Canada project. This three-year project was hosted by the UBC Program on Water Governance and funded by Infrastructure Canada, the Canadian Water Network, and the Social Sciences and Humanities Research Council of Canada.

Project Summary

Our research examines the relationship between governance and practices of sustainable water management by municipal water supply utilities. We focus on water conservation because it is a key element of sustainable water management, and is of significant interest to water utilities across Canada (National Research Consortium 2008). In the pilot phase (2005-2007), we examined the relationship between changing governance structures and sustainable water management in Ontario. We documented the results of that work in the report *Water governance in transition: Utility restructuring and demand management in Ontario* (Furlong and Bakker 2007).[1] Following the pilot study, we expanded the research to include a cross-Canada sample of municipal experiences. In this second phase of research, which is the focus of this report, we reversed the arrow of inquiry: we selected municipalities that are leaders in sustainable water management in each region of the country[2] and examined how governance influenced the development of their programs.

Data

Primary data are drawn from:

- Two expert surveys (one national and one in Ontario). The national survey, conducted from September to December 2007, received 119 responses for 421 surveys (28% response rate).
- Interviews conducted in 18 municipalities (11 in this second phase).
- Archival material consisting of municipal and utility annual reports and committee minutes dating back to the mid-1990s.
- Two expert workshops organized by our Program on Water Governance at the University of British Columbia on April 13, 2007 and May 5, 2008. Feedback from these workshops was used to refine the project documents.

EXECUTIVE SUMMARY

A consensus has been developing in municipalities across Canada over the past decade on the need for water conservation, and many municipalities have implemented conservation initiatives. But uptake has been variable and, in general, has been much slower than expected. In response, this research is concerned with (1) how the variation in uptake relates to differences in governance, and (2) how governance can be improved or mobilized to improve municipal water conservation practices in Canada.

Many water experts emphasize the technical aspects of water conservation—certainly an important focus. In contrast, this primer argues that one of the main reasons for the slow implementation of water-conservation initiatives in Canada is poor governance. The arrangements for getting things done, including the assignment of responsibility and the rendering of accountability, are inadequate to the task. Research of the UBC Program on Water Governance indicates that the three most important issues to address are: (1) lack of accountability, (2) neglect of fairness and equity issues, and (3) lack of co-ordination among different levels of government.

This is complicated by the fact that water governance in Canada has been changing rapidly. Since 2000, for example, there has been a proliferation of provincial environmental laws relating to water, especially drinking water protection. Those implementing legal reforms and policy changes have rarely systematically considered the effect of these changes on water conservation.

Accordingly, this primer focuses on governance for two reasons: (1) governance issues are often overlooked in water conservation activities and policies, and (2) poor governance is a major barrier to the successful

implementation of water conservation. Other studies have outlined comprehensive strategies for ecological governance for water management in Canada as well as methods for improving conservation in municipal supply (see Brandes and Ferguson 2004; Brandes et al. 2005). This research differs in its focus on specific good governance strategies and principles that are central to advancing municipal water conservation, connecting them to what utilities are doing on the ground, and giving specific attention to the challenges faced by small municipalities (see the longer policy report, Furlong and Bakker 2008).

The primer is structured in four sections. The first section provides context for a general understanding of key terms, and justifies the need for water conservation. The second section identifies important governance barriers to water conservation. The third section discusses the strategies necessary to overcome these governance barriers, with a focus on developing a vision for sustainable water management and applying three key governance principles: (1) accountability, (2) fairness, and (3) shared governance. The final section summarizes key recommendations.

BOX 1: Key Government Principles

Set a Vision that is long-term and developed cooperatively among stakeholders. This should embed sustainable water management and align it with other water governance goals.

Derive key principles from that vision to guide progress. A variety of principles may be applied in different communities. Our research points to three primary good governance principles that should be included if conservation is to be improved:

1. **Accountability** – Ensures that all levels of government fulfill their roles to guarantee water conservation. We cannot rely on political will.
2. **Fairness** – Ensures that both the needs of citizens and services providers are met. Importantly, it ensures sufficient and equitable access as a central consideration in utility policy.
3. **Shared Governance** – Involves a range of actors in decision making and governance. It requires action from all levels of government, and delegates powers to municipalities and non-governmental actors to facilitate broader programs and minimize conflicts.

1 GOOD GOVERNANCE FOR BETTER WATER CONSERVATION: THE CONCEPTS

WATER EFFICIENCY AND PRODUCTIVITY IN ALBERTA'S WATER FOR LIFE STRATEGY

Water conservation is one of three key directions in Alberta's Water for Life Strategy. The success of water conservation efforts—with the goal of increasing conservation 30% by 2015 compared with 2005 levels—is measured according to "water use efficiency and productivity," which "compares the amount of water used versus the amount of productivity...population and economic growth" (Government of Alberta 2003). This method of measuring success permits sectors to improve how they use water without necessarily reducing the absolute amount of water used.

WHAT IS WATER CONSERVATION?

Water conservation refers to the absolute reduction in the amount of water taken from the environment. Conservation can be encouraged by incentives such as rebates and discounts on high-efficiency appliances, low-flow fixtures, landscaping with regionally appropriate plants, and through behavioural changes (e.g., taking shorter showers) that reduce the amount of water consumed.

EFFICIENCY

Water efficiency means using less water to accomplish given tasks. Increased efficiency in water fixtures or appliances means reduced consumption of water (e.g., front-loading washing machine) or reduced flow rate (e.g., low-flow or high-efficiency toilet). Efficiency does not necessarily mean that less water is used overall. For example, using a low-flow shower head you would

use water more efficiently, but you could take more or longer showers and consume the same amount of water.

DEMAND-SIDE MANAGEMENT (DSM)

Demand-side management, or DSM, focuses on measures and techniques used to reduce water demand. Techniques can be classified into three categories: (1) economic (e.g., pricing), (2) socio-political (e.g., public education and building codes), and (3) structural-operational (e.g., metering and water-efficient retrofit devices) (Tate 1990).

MANAGING WATER ON THE PRODUCTION SIDE

Managing water on the production side is about reducing the amount of water produced at the treatment plant. In general, this refers to leak reduction programs, infrastructure improvement and repair, grey water reuse and incentives to take less water from the environment.

WHY CONSERVE WATER?

The need to conserve water may not always seem compelling, particularly in a country like Canada with seemingly abundant water. Water conservation, however, is essential to all three dimensions of a sustainable water supply (social, environmental, and economic). For example, the most common concern among municipalities in Canada is related to infrastructural capacity. When water conservation is seen as a new source of supply, it enables utilities to delay (or avoid) expensive infrastructural expansions. Meeting demand with less supply also means reduced chemical inputs and treatment costs. And reducing leakage lowers the risk of backflow contamination to the water supply—a public health issue.

ECONOMIC SUSTAINABILITY

Increasingly, public water services and governments are concerned with "better business practice" in service delivery. Although a strictly business-style or for-profit approach is unsuitable for certain public services, the pressure to operate like a business (e.g., reducing costs per unit output) can be met through improvements to water efficiency that also align with other public service goals. Through its water accountability program, for example, Halifax Water saves $600 million per year (Yates 2005). Other utilities, such as Toronto Water, have invested in water conservation that defines water efficiency as a new water source. This has delayed expensive infrastructural expansions, saving two-thirds of the money they would have spent otherwise.

ENVIRONMENTAL SUSTAINABILITY

The abstraction of source water and the disposal of wastewater can have negative environmental impacts. In some parts of Canada, *water quantity* issues are a key concern. This is especially true in regions dependent on groundwater and the dry regions of southern Alberta (Nowlan 2005). In other areas, *water quality* issues are the priority. Water quality and quantity issues interact; a reduction in quantity limits the efficacy of ecosystem services such as water purification, amplifying effects on downstream users. Conservation can help maintain both the quantity and quality of water.

SOCIAL SUSTAINABILITY

Water conservation can help address broader social concerns. Reducing water shortages can help avoid conflicts among users in water-stressed areas. Water conservation can also improve fairness (and equity) in water consumption by curbing subsidies for inefficient and profligate use. Even in areas without pressing water supply concerns, the commitment to conserve water is usually associated with a broader set of policies that support healthy communities, such as improved allocation, transparency, and access to information on water.

WHAT IS GOVERNANCE AND HOW DOES IT RELATE TO CONSERVATION?

Governance refers to the process through which decisions are taken within or among organizations, including: who is involved, the assignment of responsibility, the prioritization of goals, and the rendering of accountability. **Good governance** is about achieving desired results, and about achieving them in the right way. It must engage all stakeholders (including "governments, business and civil society") (Brandes, Brooks and M'Gonigle 2007, 291). Improving governance can help with water conservation in a number of ways:

- Improved access to information allows consumers and water managers to make more effective decisions.
- Participation by stakeholders and users increases buy-in to water conservation initiatives.
- Access to local or community expertise and information can improve the quality of decision making.
- Improved transparency increases political legitimacy (and thus enforceability) of water management planning outcomes.
- Reinforcement of "social trust" between stakeholders reduces conflict over competing uses and controversial policies.
- Removal of political barriers (e.g., short-term political planning) facilitates effective water conservation.

A **governance model** is a formula for achieving the desired principles of governance in decision making (Bakker 2003). In organizations, this typically relates to the roles and relationships of stakeholders, including the board of directors, the senior staff member of an organization (CEO or executive director), and users. In the case of municipal water supply, a governance model would specify the distribution of decision-making authority between the community and operational managers on matters such as water rates.

Table 1 describes a series of generic governance approaches and implications for conservation programming. In practice, a governance model would combine several of these approaches to varying degrees. For example, shared governance (which implies involving a range of actors in decision making and governance) can encompass multi-level, distributed, and delegated governance to varying degrees. Regulatory and voluntary governance can be used strategically to meet particular visions of good governance for water supply and, in the case of voluntary governance, involves decisions by governments and actions by non-governmental actors.

TABLE 1: GOVERNANCE APPROACHES AND IMPLICATIONS FOR CONSERVATION PLANNING

Governance Approach	Implications for Conservation Planning
Multi-level Governance All levels of government are engaged and have distinct and complementary roles in conservation.	• The federal government makes low-flow devices requisite for all new development, bans the sale of high-flow devices, leads the setting of standards and testing of devices. In this way, funds for municipal conservation programs are liberated from expensive tasks related to retrofit incentive programs and research. Water savings are greater than under individual municipal retrofit programs. • Provinces link water allocation to water efficiency and conservation and remove regulatory barriers to water reuse. Municipalities are invigorated knowing that their neighbours will be held to the same standard of water efficiency. Innovation is encouraged in municipalities and regions where water reuse makes sense.
Distributed Governance A range of actors, beyond governments, is included in decision making.	• Distributed governance can encourage and enable a diversity of conservation programs. Experience in the Canadian context has shown that where a broader range of actors are involved in decision making there is support for a broader range of programs. • This can also encourage greater buy-in for programs because they have been negotiated and approved. • In this scenario, more planning may be required to arrive at acceptable economic and regulatory programs. But where this is done the programs will have greater support and robustness. • Co-operative mechanisms involving other agencies and communities in implementation can be particularly fruitful in this scenario.
Delegated Governance Actors beyond government are involved in the implementation of programs	• Municipalities find that delegating implementation to local groups can help gain community credibility for programs and achieve more effective implementation. • Local community and environmental groups can be contracted to roll out a variety of programs. Local retailers can be contracted to run efficient appliance rebate and promotional programs.
Regulatory Governance Provincial, federal and municipal governments take a regulatory approach to promoting conservation where they have jurisdiction.	• Ultimately, regulatory approaches result in action and compliance but preparatory work is required. Education and public engagement are crucial to ensure comprehension and public acceptance. • In municipalities where regulation has been effectively implemented, they often began with voluntary introduction of the strategy, coupled with education; regulation was introduced later once buy-in was more widespread.

Governance Approach	Implications for Conservation Planning
Voluntary Governance Conservation is encouraged through voluntary measures and incentives.	• Where senior governments favour voluntary governance, in some cases municipalities have developed bylaws to fill the void (e.g., plumbing codes in Alberta) or have worked with the provincial government to improve regulation. • Working with neighbouring municipalities can help overcome some of the limitations of voluntary governance by making voluntary standards applicable over a larger geographical area where businesses operate and citizens interact. • Education is a central tool in conservation where voluntary governance is favoured. • Economic and community/group incentives are important to reward and encourage voluntary actions.
Regional Governance Municipalities work together in regions	• Regional governance often means greater funding for programs due to greater economies of scope. • Programs may be funded regionally but targeted locally. For example, programs may be funded from the general regional pool but targeted at specific areas of greater concern. • Rate and regulatory harmonization are important, but can prove illusive because of challenges presented by local politics. The aid of senior governments may be necessary to enable harmonization.

2 GOVERNANCE BARRIERS TO CONSERVATION

Governance issues are generally overlooked in terms of conservation in favour of a purely technical approach. Improving governance, however, is central to the success of conservation programming. Beyond the general neglect of governance issues, the **key governance barriers** to conservation identified through this research include:

1. **Short-term thinking** – Without a long-term vision, decisions taken today can constrain possibilities and choices long into the future.
2. **Lack of co-operation and assistance from senior government** – Programs for sustainable water management require action from different levels of government, directly and indirectly, for their implementation and success.
3. **Limited opportunities for delegation** – Empowering municipalities and engaging non-state actors could improve the uptake and success of conservation programs by engaging communities and bringing their economic and social concerns to the fore.

In practice, **these issues overlap**. For example, overcoming short-term thinking at the municipal level may be resolved through the development of provincial-level requirements or incentives. This means correcting short-term thinking by improving shared governance.

BARRIER 1: SHORT-TERM THINKING

Research has shown that water-supply decisions made today can constrain future possibilities for many decades. This *path dependency* in water supply means that it is much more important to plan and make decisions with a long-term vision of good governance and performance in mind.

Short-term thinking has been a problem at all levels of government as well as within utilities. In Canada, past and recent decisions that have constrained progress on sustainable water management into the future include:

1. Decisions not to meter water use
2. Low-cost recovery
3. High leakage and low infrastructure maintenance
4. Minimal pricing oversight and regulation
5. Choice of business model
6. An appliance market that is flooded with inefficient devices
7. Funding decisions that have rewarded poor performance
8. Lack of engagement with the public and commercial sector on water management issues (including education and participation)

BARRIER 2: LACK OF CO-OPERATION AND ASSISTANCE FROM SENIOR GOVERNMENT

In water governance, the **provincial jurisdiction is dominant** because the provinces have ownership of water (and other natural resources) (Saunders and Wenig 2007). Provinces are "generally responsible for water as a natural resource as well as for water governance" including "licensing, environmental protection for waters under provincial jurisdiction, and ensuring water potability" (Hill et al. 2007).

Still, **all levels of government have important mandates to fill**. Acknowledging and acting on the overlapping and complementary mandates of governments and utilities is central to improving water management in general and municipal water efficiency and conservation in particular. It is imperative that all levels of government act because the issues relevant to municipal water efficiency and conservation are

multi-jurisdictional. Without co-ordination and collaboration, governments can be working at cross purposes at the expense of progress on water conservation and efficiency.

A **variety of strategies for water conservation would benefit from senior government involvement**. Many of these have been documented elsewhere (e.g., Brandes et al. 2005; Morris et al. 2007). Briefly, they include:

1. National standards and testing of water-efficient appliances and fixtures.
2. National ban on the sale of inefficient appliances and fixtures.
3. Revisions to the federal plumbing and building codes to include binding requirements for water-efficient appliances and fixtures in all new development and renovations.
4. Provincial-level price regulation (possibly arm's-length) to ensure full-cost recovery and fairness.
5. Provincial legislation linking water allocation to water efficiency.
6. Removal of legislative barriers to water reuse.
7. Provincial requirements for multi-year water management plans that integrate a utility's performance within the watershed as a whole.
8. A national water strategy led by the provinces.
9. A national water conservation education program.
10. Funding programs that provide incentives to improve conservation.
11. Research, monitoring and data collection; co-ordination and sharing of information and data about watersheds.
12. Leadership!

BARRIER 3: LIMITED OPPORTUNITIES FOR DELEGATION

Delegation includes delegation of authority *and* capacity to municipal governments through increased legislative flexibility or powers, and the inclusion of non-state actors in planning, decision making, and implementation. Such delegation of authority and capacity fall short in Canada. But in many provinces the situation is improving.

Why delegate to municipalities? In Canada, 11.5% of water is used by the municipal and rural sectors (including residential, commercial/institutional, and other non-industrial uses) (Environment Canada 2008). As such, the role of local government in achieving water conservation and efficiency in Canada is significant.

The capacity of most municipalities is governed by provincial legislation (e.g., *Local Government Act or Municipal Government Act*). In some provinces where provincial governments have developed co-operative relationships with municipalities, allowing them more flexibility, municipalities have responded with greater innovation and leadership on water conservation. The most important example is the development of water-efficient fixture and landscaping bylaws in Alberta and British Columbia.

Why delegate to non-state actors? Research of the Municipal Water Supply Infrastructure Governance project has shown that public engagement can:

1. Result in a broader range of techniques implemented at the municipal level to improve conservation.
2. Discourage short-term political decisions about water management.
3. Encourage the consideration of fairness and social protection in conservation related policy.
4. Facilitate implementation and uptake of programs by enabling the utility to identify potentially negative impacts of the program on the community and to work to alleviate them.

Local environmental groups have been instrumental in pushing for innovative conservation programming in many municipalities. They can provide much-needed expertise (especially in small municipalities), and they have often halted decisions that would have resulted in long-term disincentives to conservation.

Where municipalities have successfully implemented innovative and controversial water efficiency bylaws or other conservation measures,

learning and addressing the concerns of the public and ICI sectors has been instrumental.

Not all delegation is equal; some forms facilitate conservation and others do the exact opposite. In particular, certain business models that delegate authority to extra-municipal actors (e.g., public- or private-sector water operators or another municipality) have fewer incentives to engage in conservation programming and therefore can limit progress (Furlong and Bakker 2008). Governance strategies that involve non-state actors in decision making (e.g., public education, participation, and consultation) and shared governance where senior governments assume appropriate roles can counter the negative effects of certain delegated and arm's-length business models on conservation.

These strategies allow municipalities to choose from the full list of business models open to them, without compromising on conservation. This is important because municipalities in Canada have a range of different needs and capacities. In Canada, however, these supportive governance arrangements are not in place.

BARRIERS FOR SMALL MUNICIPALITIES

In addition to the barriers above, small municipalities face particular challenges in terms of advancing conservation programming, often stemming from the difficulty of raising sufficient funds within small population bases. Specific challenges include: financing infrastructure upgrades and maintenance; financing, retaining, and attracting sufficient expertise; and managing the environmental impacts of water and wastewater facilities.

Many of these challenges can be addressed through improvements in governance such that individual municipalities take advantage of economies of scope. The regionalization of water services, for example, gives small communities access to a larger customer base (more funds) and greater levels of expertise in their staff. A conflict arises, however, because some of the business models that most effectively apply economies of scope also present challenges to conservation programming. This can be seen, for example, in delegated management where municipalities contract operations to an external entity (be it public or private) and conservation and demand management are approached strictly as a value-added option rather than as an important element of service delivery. This makes broader improvements in governance (as discussed below) all the more crucial (see Furlong and Bakker 2008).

3 OVERCOMING BARRIERS TO CONSERVATION: STRATEGIES AND PRINCIPLES

Good governance in water management involves the application of governance strategies and principles to overcome the barriers to conservation.

The process of deriving good governance principles and deciding on a governance model begins with the development of a vision for the long-term management of the water supply. Many different principles may be derived from the vision; however, our research has identified three key principles that are particularly important for resolving governance barriers to sustainable water management:

1. **Accountability**
2. **Fairness**
3. **Shared governance**

Each of the key principles is discussed below with a view to how to best mobilize them and to determine which related activities fall to the different levels of government.

The discussions below reveal how the issues addressed by water providers are influenced by more than one of these good governance principles.

SETTING A VISION

Organizations usually craft in-house governance models. The importance of good governance is widely accepted, yet the "best" approach to constructing governance models is hotly debated.

Whether or not a formal governance model is adopted, organizations

will find it useful to define principles of good governance, and to articulate the responsibilities of and relationships between stakeholders. Simply put, good governance is articulated as a "governance model," and the starting point is a vision.

The nature of this vision will vary significantly between organizations, communities and regions, but some generic guidelines for a model of good governance exist (Table 2).

In the context of sustainable water management, good governance requires a watershed-based perspective to be effective (Brandes et al. 2005). In terms of developing a vision, the **visions of various organizations operating within a watershed should be complementary.** Provincial and territorial governments can take a leadership role by developing provincial and territorial visions for water management such that local operators can nest their vision within the broader goals of the community, the watershed, and the province or territory.

A good vision needs **a plan for its implementation.** In the remainder of the primer, we look at some of the key governance considerations in developing and executing that plan.

TABLE 2: SUMMARY OF CHARACTERISTICS OF A GOOD GOVERNANCE MODEL

The model articulates a set of governance principles, or expresses a "vision."
The governance principles are coherent and are ranked in order of priority.
The model builds on the governance principles to create objectives and policies.
The model is responsive; learning and reviewing options will inform restructuring.
The model enables the production and dissemination of high-quality information.
The model includes an open, transparent decision-making process.
The model facilitates the participation of stakeholders.

Source: Bakker, K., 2003. *Good Governance in Restructuring Water Supply: A Handbook.* Report to the Federation of Canadian Municipalities. 2003.

PRINCIPLE 1: ACCOUNTABILITY

To be accountable is to be both responsible for something and liable for the failure to produce agreed upon and expected outcomes. In terms of water supply in Canada, accountability is lacking. Citizens should not be dependent on political will for the protection of their water resources and fair access to municipal water services. Rather, mechanisms of accountability should be in place.

All levels of government and utilities in Canada should be accountable for accomplishing the needed actions on sustainable water management that fall within their respective domains.

ACCOUNTABILITY REQUIRES KNOWLEDGE

Metering is an essential tool for utility managers, environmental planners, governments, and consumers.

For many **utility managers**, the key benefits of universal metering are system knowledge and data collection. This knowledge is considered essential to effective utility management and planning, full-cost accounting, system improvement, and infrastructure management. "Demand-side information" about utility operations can be added to this list (Renzetti 2005). In municipalities with highly successful water accountability (water loss control) programs, metering is likewise seen as essential to the task.

For **environmental and watershed planners and governments**, data on municipal consumption is also essential. At the Sustainable Water Infrastructure Management in Canada workshop, participants noted the crippling effect of the dearth of data for water management in Canada. As one participant stated:

> We are supposed to provide you with water budgets and balances—and we have no data because we do not have meters. Without data there is no credibility. If we don't meter, how can we model?

For consumers, metered consumption provides the opportunity to link consumptive habits with an actual amount of water used. Consump-

tion becomes less abstract and more under the control of the individual consumers who can choose to alter consumption and see the results of those changes. In both Kelowna and the Cape Breton Regional Municipality (CBRM), following the introduction of meters, consumers expressed surprise at how much water they were using. Accountability for water consumption can only come with the knowledge of what is being consumed.

Metering suffers from inertia due to short-term planning

Past decisions not to meter water use make metering now seem financially and politically prohibitive to many utilities in Canada. This inertia can be overcome. A variety of strategies can significantly improve the public perception of metering and the political will to undertake it.

BOX 2: IMPLEMENTING UNIVERSAL METERING, LESSONS FROM KELOWNA, BRITISH COLUMBIA

1. Educate the public and politicians on the need for and benefits of metering.
2. Conduct a pilot study.
3. Introduce metering initially as a measurement tool rather than as a means of pricing.
4. Allow consumers time to adjust to the meters and to understand the connection between their consumption and their metered use.
5. Prior to billing based on metered rates, provide customers with preliminary bills that indicate what they would have been charged for had they been charged according to their consumption.
6. Set the initial prices such that average household water bills will remain consistent with what water users paid under the flat-rate system.
7. Gradually adjust the rates to continue to meet full-cost recovery goals.

ACCOUNTABILITY REQUIRES CHECKS AND BALANCES

Accountability means that different levels of government are held responsible for the aspects of sustainable water management that fall within their domains (and is thus closely linked to shared governance). In practice, however, accountability has proven difficult to achieve. For accountability to exist, there must be mechanisms in place to verify if actors are doing what they are supposed to and to compel them to do so if they are not. Arm's-length regulatory boards with clear mandates to oversee utility performance or government action on water management can help

ensure that politically or technically difficult goals are achieved. Progressive regulation from senior governments is another complementary avenue for multi-level accountability.

Accountability for full-cost recovery, an example

Full-cost recovery suffers from a dearth of accountability in Canada. Pricing is technically and politically difficult and it is rarely regulated in this country. Poor levels of cost recovery have contributed to current infrastructure deficits, traditionally low levels of environmental management, and unnecessarily high water demand.

In Canada, several provinces have measures in place to oversee the financial and pricing decisions of water utilities (Table 3).

Some benefits of arm's-length regulation in addition to cost recovery:

1. Nova Scotia's Utility and Review Board (NSUARB) enables fairness and shared governance by including multiple perspectives. The NSUARB holds open community consultations as part of its review process. Public concerns are factored into decisions. The Board can direct utilities to improve their management practices (e.g., leak detection) or to improve a utility's impacts on nearby water users.
2. Arm's-length regulation relieves the political issues that many utilities face in achieving cost recovery; it ensures that small municipalities also have access to financial expertise, and that consumers are guaranteed quality water services into the future at the lowest price possible.
3. Arm's-length utility regulation may not lead to the highest rates, but to rates that achieve cost recovery.

Strategies for achieving arm's-length regulation:

1. **Use an existing and trusted arm's-length regulator** – A variety of arm's-length regulators exist in most Canadian jurisdictions (e.g., energy or utility boards and municipal boards).
2. **Ensure a reputation for political independence, fairness and skill** – In Nova Scotia, guarantees of the political independence of agencies, boards and commissions include: publicly advertised openings; a filtering system that ensures only qualified applicants are appointed by ministers; a requirement for the approval of all appointments by a standing committee of the House of Assembly (which holds a veto); and a requirement for relative merit-based appointments (i.e., appointing

TABLE 3: PROVINCIAL REGULATORY OVERSIGHT MECHANISMS

Province and Regulatory Body	Mechanism
Provincial-level Board Oversight	
Nova Scotia, Nova Scotia Utility and Review Board (NSUARB)	The NSUARB is an arm's-length provincial-level board. It regulates and oversees the financial planning of all utilities in the province (among other functions), including rates and large infrastructure projects.
Saskatchewan, Saskatchewan Municipal Board	Public utility boards are subject to the oversight of the Saskatchewan Municipal Board, an arm's-length provincial board, which approves the rates, charges, tolls or rents set by a council for the use of water or sewer services.
Prince Edward Island, The Island Regulatory and Appeals Commission (IRAC)	IRAC has general supervision and control over all public utilities except in certain larger towns.[3] IRAC will fix and determine or approve all rates for water supply.
Manitoba, The Public Utilities Board (PUB)	The Public Utilities Board (PUB) oversees all public utilities, whether owned privately, by the municipality. The PUB must approve in writing a public utility owner's rate for any service rendered in Manitoba.
Legislative Oversight	
Ontario, *Sustainable Water and Sewage Systems Act* (SWWSA 2002) and *Sustainable Drinking Water Act* (SDWA 2002)	SWSSA stipulates that all water utilities in Ontario will be required to operate on a cost-recovery basis, whereby full costs include operation, maintenance and capital costs. Under the SDWA, utilities must submit a financial plan to the minister responsible as a condition of approval for their operational permit.
New Brunswick, *Municipalities Act*	The *Municipalities Act* requires that a municipality providing water must construct, operate and maintain such service or utility on a user-charge basis.
Northwest Territories, The *Cities, Towns and Villages Act*	The *Cities, Towns and Villages Act* requires a public utility bylaw that identifies the sources of funding for all costs to be incurred as a result of the bylaw.
Limited Oversight	
Quebec, Ministry of Municipal Affairs and Regions	A provincial ministry that oversees water pricing in municipalities. The minister responsible also reserves the right to compel a municipality to extend or improve services or to charge for water takings.
British Columbia, *Local Government Act*	The minister holds the right of approval for water prices in Improvement Districts.
Alberta, Alberta Utilities Commission (AUC)	The AUC is an arm's-length provincial body. It only regulates water prices for investor-owned utilities. The AUC's approval is also required for transfer of ownership.

the most qualified candidate) (Aucoin and Goodyear-Grant 2002).
3. **Allow time for adjustment** – Municipalities need time to adjust to regulations, and training for submitting business and financial plans to the board.

Other avenues and strategies for increasing accountability:

1. **Direct ministerial oversight** – Where jurisdictions opt for this, it is important that oversight apply to all water service providers at regular intervals.
2. **Approval of business and financial plans** – Require water providers to submit five-year business and financial plans to the minister responsible or to an existing provincial board.
3. **Licence review** – Tie licensing approvals (including for changes to and renewal of existing licences) to the approval of long-term financial and business plans. Require periodic review of licences.
4. **Legislate full-cost recovery** – Such legislation should include enforcement and oversight mechanisms as well as clear definitions of what is included in full costs.
5. **Grant strategies** – These could include tying infrastructure funding to ongoing sound financial utility management.

ACCOUNTABILITY REQUIRES CAPACITY

Funding

Higher levels of government should not simply provide funding, but also work with municipalities and regions to ensure that funding is targeted in appropriate and efficient ways that consider the regional context. Funding should be used to improve water efficiency directly by (1) tying funding to performance on water efficiency, and (2) by providing funding for ICI water auditing and sectoral implementation of the results. Consulting municipalities on funding decisions implies shared governance of funding decisions.

Research and Innovation

The events of Walkerton and North Battleford have stimulated new interest in water science, policy and innovation in Canada after a 40-year decline. Much work remains to be done. For example, senior governments can (1) monitor water quality and quantity through water accounting and common national monitoring protocols; (2) support the development of sectoral efficiency planning; and (3) remove provincial and federal legislative barriers to innovation in water-efficient technologies (e.g., regula-

tions against water reuse (Boyd 2003, 51) and legislation that entrenches the market advantage of inefficient devices).

Co-ordination

The provinces and territories need to co-ordinate the efforts of the various departments and the objectives of the many pieces of legislation concerned with drinking water. Manitoba has created a Ministry of Water Stewardship to bring all water issues under a single ministry. Alberta's Water for Life Strategy is led by the Ministry of Environment which co-ordinates with as many as 14 other departments on water issues.

Water management for sustainability (that includes a source-to-tap approach) requires wide-ranging local partnerships. Since local and regional government mandates can be limited, provincial participation is key. In Ontario, the Conservation Authorities have been assigned the task of building partnerships in the development of watershed management plans under the *Sustainable Drinking Water Act* (SDWA). [4]

Empowerment

Municipal empowerment is critical to shared governance. Municipalities need to be given jurisdiction to raise revenues and pass bylaws for local resource protection. This helps alleviate some of the conflicts over scarce resources within municipal governments that make it difficult to ring-fence revenues for water utilities.

LEGISLATING FULL-COST ACCOUNTING

In Canada, Ontario has pioneered full-cost accounting in the *Sustainable Water and Sewage Systems Act*, 2002, S.O. 2002, c. 29 (the "SWSSA"). Although not yet in force, the SWSSA will require "Ontario water and sewage utilities to adopt full-cost accounting" and prepare: (1) a report on full costs of water services including source protection, operating, financing, renewal and replacement and improvement costs; and (2) a cost-recovery plan for the Minister of Environment's approval. Approved plans are to be implemented within the time frame prescribed by regulation.

The European Water Framework Directive "requires that the true economic value of water is taken into account and that full-cost recovery is applied" (Chave 2001). This expansive definition of full-cost accounting represents a significant change from current practices and risks that water could become a very expensive commodity. Should full-cost accounting impair access to sufficient drinking water, the Directive allows derogation (EUROPA European Commission 2007).

ACCOUNTABILITY MEANS LEADING BY EXAMPLE

"Greening" government buildings

There has been a consistent call for governments to lead by example with respect to water supply policy in Canada (e.g., Brandes et al. 2005; Boyd 2003). Many municipal governments have engaged in projects to "green" government buildings. Calgary Water has taken it even further and is working with the development approvals group of the City of Calgary on a program to reduce development fees for green buildings.

In some cases, however, progress is lacking. In Quebec, for example, provincial institutional buildings (e.g., schools, universities, hospitals, and government buildings) are legally exempt from water charges. This lack of incentive to improve efficiency has meant that in some municipalities institutional buildings are the most profligate and inefficient water users. In cities such as Sherbrooke, which is home to many institutions, this can represent a significant portion of the water demand.

Addressing system leakage

Leakage rates vary across Canada and have been improving in recent years. Leaking pipes can mean significant water loss, lost revenues, and lost credibility to the public. For example, the Ontario Sewer and Watermain Construction Association estimated Ontario's average leakage rate at 20% in 2001, which they corresponded to $150 million in lost revenue annually. In Montreal, leakage is as high as 40% (Bueckert 2004).

Certain municipalities are exemplars. Despite having some of the oldest water infrastructure in Canada, Halifax boasts among the lowest leakages rates. Since implementing a leakage program in 1999, until 2006, Halifax Water reduced its leakage by 34 million liters per day saving $550,000 per year (Yates 2005). The monetary savings have increased significantly with the recent rise in the price of oil.

Some lessons learned

1. **Learn from the best** – Finding limitations to the traditional "unaccounted for water" approach, Halifax Water learned from utilities outside of North America and implemented the International Water Association (IWA)/American Water Works Association (AWWA) "water accountability" approach.
2. **Bring together a diverse team on the program** – Recognizing water accountability as a broad and complex program, Halifax Water brought the different departments of the utility together to get the program off the ground (i.e., system operations, distribution, customer service,

finance, plant operations and engineering) (Yates 2005).

3. **Address leakage beyond the property line** – By monitoring use, Halifax can see if consumption is rising disproportionately and alert the customer to any leakage. For large industrial users, Halifax is implementing software where users can monitor their own water consumption online, spotting potential leakage.
4. **Celebrate your success** – Group motivation was used to engage Halifax Water staff in the common effort. The utility hosted a steak barbeque for its staff when they reached an Infrastructure Leakage Index (ILI) of four. When they reached an ILI of three, they celebrated with lobster.

PRINCIPLE 2: FAIRNESS

The survey and interview data show that despite the fact that sufficient access to water supply is essential to public health, there is little concern among utility representatives and water supply professionals about ensuring access to the resource irrespective of ability to pay. In general, there is a perception that water prices are so low that no income group is overburdened, and that low-income earners generally live in multi-unit housing where they would not receive an individual water bill. Across Canada, social equity is generally considered a matter for governments rather than utilities—addressed through welfare programs rather than rate subsidization.

In the context of Canada's shifting water provision and economic landscape, this perception seems narrow, and a number of current issues point to a different reality:

1. **Rising water prices** in many municipalities to meet infrastructure deficits. There is increasing concern about the expanding definition of full-cost recovery (e.g., that it may include source protection).
2. **Changing demographics** especially in urban and suburban areas. The norm of the single-family home is shifting to more complex housing situations. These include, for example, multiple families liv-

ing in a single suburban housing unit.

3. **Rising costs of food and fuel** have a strong impact on household budgets, especially in rural areas with few transportation options.
4. **Rising water prices** also affect other public institutions and services, which may have restricted budgets. These include municipal parks and recreation sites, which can be particularly important to meeting the recreation needs of the whole community, school and hospitals.

This is not to say that prices should not rise to meet cost recovery, but that the accessibility needs of all users merit consideration for fairness. To achieve cost-recovery goals, prices and programs should be designed to meet the needs of all users irrespective of income.

FAIRNESS REQUIRES A COMPLEX VIEW OF PRICING

Fairness in water pricing means fair prices for those depending on water services and fair prices for those providing the services. Fair pricing does not necessarily mean that everyone pays the same price or that everyone pays exactly according to the costs they impose on the system (e.g., time of use or distance-based pricing). Fair pricing ensures that the needs of users and utilities are met while providing the greatest social and environmental benefit.

In Canada, where municipalities actively pursue cost recovery, the tendency is to focus on full recovery of the technical and operational costs of providing water and sewer services. According to Renzetti, in addition to the recovery of technical and operational costs, fair prices should account for (1) the full social costs, thus assisting users to make efficient consumption decisions; (2) the promotion of water conservation and aquatic ecosystem sustainability (e.g., the cost of sustainability programming); and (3) a socially equitable design such that they do not overburden low-income households (Renzetti 2007).

COST RECOVERY AT CBRM

The Cape Breton Regional Municipality water utility cross-subsidized the building of a new water treatment plant for one community across the entire region's user base. In this way, the utility recovers its costs and all residents have access to the same standard of water at an acceptable (and equal) price, although the costs they impose on the system in a given period can vary widely. It is felt that over the long-term, the costs that communities impose on the system will balance out.

Some municipalities have taken steps to ensure that low-income us-

ers are not overburdened by setting up municipal funds (sometimes in co-operation with partners) to subsidize bills that are in arrears. Other municipalities have taken the approach of helping users reduce their bills as prices increase (e.g., through subsidizing the purchase and installation of efficient devices and home water audits).

In summary, fair prices cannot be defined based on utility needs alone. Oversight mechanisms and political agreement regarding items like "social costs" are needed.

Broad and integrated planning

Appropriate pricing involves knowing the costs of providing the services and the costs imposed by the service on the environment and the community. Financial, sustainability and equity considerations and the interactions among all three are part of broad and integrated planning.

1. **The financial plan** recovers the costs of providing water and sewer services (operations, maintenance, and infrastructure development) into the future. Utilities should look toward future costs as well as present costs to avoid continued infrastructure deficits. This plan will be a complex document that involves adjustments over time as changes in demographics and consumption patterns change future scenarios. Flexibility is a key component.
2. **The sustainability plan** recovers costs imposed on the ecosystem as a result of the delivery of reliable and safe water and the disposal and treatment of wastewater. This plan determines the costs to ensure the delivery of water services is environmentally sound and progressive. This could include, for example, participation in watershed protection and management, as well as a host of programs to reduce the supply of and demand for water.
3. **The equity plan** recovers the costs of socially equitable services. This can mean ensuring that all users in the system have access to the same level of water quality in reliable amounts. It can also mean enabling users to reduce their bills through demand management as prices rise. As such, the equity and sustainability plans are closely linked.

These three plans have distinct but related goals; they are interactive and one influences the other. For example, the sustainability and equity plans each have individual costs, but they also alter the operations and maintenance costs of providing water services. As such, adjustments to the costs stemming from each of the plans are common.

Important considerations for the equity plan

1. **User base** – The number and type of users will have an impact on the fairness and effectiveness of your approach to cost recovery: (1) utilities charge ICI customers different prices depending on the costs they impose on the system; (2) utilities may implement programs to assist institutional users and municipal departments (e.g., hospitals, schools, parks and recreation departments) to reduce their consumption; or (3) where a community's consumption is mainly from outdoor irrigation, inclining-block rates for cost recovery are more fair than in communities where indoor water use is the primary driver of demand.
2. **Rate structure** – Several general rate structures exist. These include flat rates (unmetered), constant-unit charge (CUC), declining-block rates (DBR), and inclining-block rates (IBR). In Canada, price structure has been shown to strongly influence price responsiveness of residential consumers (Reynaud, Renzetti and Villeneuve 2005). Flat-rate billing in Canada is common, but can often result in a cross-subsidy from fixed-income to middle-income households (Dresner and Ekins 2006). The IBR method is considered to encourage conservation and improve fairness. However, in many of Canada's growing cities, households are shifting from single family to multi-family occupancy. As such IBR may be unfairly punitive to larger households.

FAIRNESS MEANS HELPING PEOPLE REDUCE CONSUMPTION AS PRICES RISE

Water utilities in Canada are typically public entities providing a public service. They operate on cost-recovery rather than a for-profit basis. Where water services have been contracted to a public or private operator, it is important that municipalities take on the roles necessary to make water servicing fair. A key role in this regard is assisting residents of their communities to reduce water consumption. This increases community access to the services that rely on water (e.g., washing and cooking) and reduces the environmental impacts of water services thereby ensuring fair provision.

Utilities should roll out demand reduction programs such that utilities benefit from cost savings, and low-income areas are included in the programs early on.

Although water efficiency and demand management programs will be tailored to each community, there are certain steps that any community can follow to improve the success of implementation. The key steps of a successful program are:

1. **Educate** – Use education and outreach, the hallmarks of all success-

ful programs. This component is continuous and outlives the utility's involvement in other aspects of the program.

2. **Consult** – Consult with groups affected by the program as it expands (e.g., retailers, developers, other city departments and neighbourhood associations).
3. **Pilot** – Pilot your program within a particular neighbourhood or sector of water users.
4. **Expand** – Build on your successful pilot to involve wider swaths of the community. Expanding the program can also mean involving new actors and delegating responsibility for parts of the program.
5. **Enable** – Ensure that users have the resources and information readily available to pursue the program on their own. This includes, for example, ensuring that retailers are carrying the appropriate products (e.g., efficient devices and drought-resistant plants).
6. **Legislate** – Because enforcement of local bylaws can often be problematic, it is vital to establish local buy-in by pursuing the bylaw as a complement to and natural progression from ongoing community efforts.
7. **Pass-on** – Ensure the expansion and longevity of a utility's programs by passing them on to local community groups and businesses to continue. This will also enable the utility to initiate new programs.
8. **Celebrate** - Do not keep your successes a secret. Let the community know the benefits of your conservation programs in terms of water savings and watershed health.

EFFICIENT FIXTURE PROGRAMS

Utilities are responsible for implementing fixture retrofit programs. Yet, the impact of these programs is greatly disadvantaged by the continued absence of federal-level testing, standards, and a ban on the sale of high-consumption fixtures.

FAIRNESS REQUIRES INCLUSION

Fairness and shared governance overlap. Including multiple perspectives implies fairness because (1) it gives voice to the variety of groups affected by utility programming and policy; and (2) it enables policy adjustment to account for their needs. This way, no group is unduly burdened by the design of sustainable water management programming.

Fairness in shared governance, especially in the delegation to non-state actors, also helps to ensure more successful programs that are easier to implement and that enjoy better uptake. These issues are dealt with more thoroughly below in the section "Shared Governance Requires Inclusion."

PRINCIPLE 3: SHARED GOVERNANCE

SHARED GOVERNANCE REQUIRES STRATEGIC DELEGATION

With true shared governance, a significant part of the conservation burden is lifted from utilities and resource managers. Programs developed at the local level have a greater impact and a greater chance of success. Senior government involvement is particularly important for: (1) ensuring cost recovery, (2) regulating fixtures and appliances, (3) linking water allocation to water conservation, (4) creating incentives for conservation, and (5) the removal of legislative barriers to grey-water reuse.

Standards and requirements for efficient devices, an example

In Canada, there are no retail requirements for the efficiency of water-using devices and few jurisdictions have included water-efficiency requirements in their plumbing and building codes. Western European countries, the United States and Australia have all legislated requirements for low-flow fixtures in new development and banned the sale of high-volume toilets (e.g., 13-litre flush).

Across Canada, municipalities that are concerned about water supply due to limitations of infrastructural capacity (given population growth and increasing demand) or due to strains on water sources (including degradation) are looking for ways to reduce water demand. For many municipalities, indoor and outdoor water use, particularly poorly performing toilets and inefficient irrigation practices, are central reasons for excessive water demand.

This research found strong support among municipalities for efficiency standards, and a desire for the federal government to take action on this issue through:

1. A binding adjustment to the federal building and plumbing codes that set efficiency standards for water-using devices and appliances. This is the most economically and environmentally efficient solution; it enables the needed efficiency standards without the duplication of efforts and resources across Canadian municipalities.

2. Federal research, standards and testing of water-using devices and appliances.
3. A national ban on the retail sale of inefficient water-using devices and appliances.
4. Programs to help retailers and manufacturers adjust to the new water-efficiency requirements.

Federal efficiency requirements could follow those of municipalities in Alberta:

1. The Alberta experience demonstrates that regulating efficiency is not a politically sensitive issue.
2. Developers, retailers and the public are on side. The key issues are: (1) the time to move existing inventory, and (2) the quality of efficient devices.
3. These are easily met by providing time for adjustment and for federal testing and standards for efficient devices.
4. Outdoor water-use standards should be included in these or additional regulations.
5. Beyond Canada, federal and provincial governments can look to other jurisdictions and experiences such as the development of the *Uniform Plumbing Code* in the United States (Schultz 2006).

SHARED GOVERNANCE REQUIRES CO-ORDINATED LEADERSHIP

Municipal benchmarking

Governments have increasingly turned to strategies that encourage improved performance such as municipal benchmarking, which compares the performance of municipalities on a number of measures. Such exercises can provide municipalities with a set of criteria on which to focus their efforts and resources. Notably, the method of performance evaluation can have direct impact on the focus of the evaluated agencies. As such, their design should carefully account for the outcomes they seek to engender or avoid. At the Sustainable Water Infrastructure Management workshops, participants called for **federal leadership and co-ordination** on developing benchmarks for municipal water and wastewater services.

National water strategy

A national water strategy is a key tool for moving toward shared governance in Canada. It should be led by the provinces and territories, with federal oversight for implementation. The development (or refining) of a national water strategy could create the mutual incentives to encourage

the federal government and the provinces to take action on water supply issues. Provincial agreement on common goals and strategies could give federal bodies and provinces the incentive and political support to "sustain our water legacy" (Morris et al. 2007).

SHARED GOVERNANCE REQUIRES INCLUSION

Shared governance is about each level of government taking on appropriate roles to further water conservation. It's about delegation of authority and capacity to municipal governments and utilities where appropriate. And, on the municipal scale, it's about including non-state actors in decision making (distributed governance) and implementation (delegated governance) for the creation of more effective programs and the removal of barriers.

Such inclusion can improve the results of almost any program that promotes sustainable water management. Inclusion must be combined with education to facilitate public participation, and must include:

1. Consultation
2. Addressing concerns
3. Partnering
4. Communicating results

Municipal development of water-efficient fixtures and landscaping bylaws demonstrates the importance of including non-state actors in decision making. Several of the key methods for achieving workable bylaws involve distributed governance directly (Box 3).

BOX 3: SHARED GOVERNANCE AND WATER EFFICIENCY BYLAWS

1. Work with a range of local stakeholders

- Important groups to include: developers, retailers of the devices, landscapers, municipal staff working with bylaws, homeowners associations and community groups.

2. Educate and advertise in your community

- As part of an ongoing educational campaign, include information on the water savings gained through household low-flow devices in and around the home.
- Demonstrate that the performance of low-flow devices has improved.

3. Learn from other jurisdictions

- Model your efforts on success elsewhere. For example, Edmonton adopted Calgary's ***Efficient Fixture Bylaw***, which took two years to develop.
- Look to research in other jurisdictions for data about which devices function to standard.

4. Imitate and work with your neighbours

- Where neighbours have an existing bylaw, seek to align yours with theirs to improve acceptance by developers and retailers.
- Work with neighbouring municipalities to co-ordinate efforts and outcomes.

5. Give sufficient warning and allow time for adjustment

- Development of a bylaw should be a process that involves the community and incorporates community concerns. Typically, affected parties need time to adjust to new requirements, inventory and staff training.

6. Communicate your case to senior governments

- Where provincial regulations exist, municipal involvement has been instrumental.
- Promote this work to the provinces and federal government through municipal associations to show the need for and ease of introducing water-efficiency regulations and standards in Canada.

SUMMARY RECOMMENDATIONS

The main finding from the Program on Water Governance research project on conservation and efficiency in municipal supply is that improving governance is a key—though often overlooked—factor in advancing municipal water efficiency and conservation.

Current governance arrangements present important barriers to conservation. This is confirmed in the axiom that while technical methods for reducing water consumption and wastage are well developed, the problems reside with insufficient implementation. Through our research on municipal supply, we have identified the following **critical governance barriers to conservation:**

1. Short-term thinking
2. Lack of co-operation and assistance from senior government
3. Limited opportunities for delegation

The Program on Water Governance research advances **good governance strategies to overcome these barriers**. Good governance involves setting a vision for sustainable water management.

Setting a vision addresses short-term thinking in municipal water supply governance. It enables communities to set goals for how their water resources should be managed and for the outcomes of that management. Once a vision is set, principles can be derived and a plan can be developed for how to realize the vision.

Three key governance principles to overcome governance barriers to conservation are:

1. Accountability

2. Fairness
3. Shared Governance

Accountability at all levels of government is important to counter the current dearth of senior government engagement in water conservation and efficiency. Without particular actions by senior governments, conservation programming at the local level will consistently fall short. All parties must be held accountable for fulfilling their roles; water resource protection should not be dependent on political will. Accountability, however, cannot exist in a vacuum. Accountability requires: leadership, knowledge about water supply, checks and balances, and the capacity to meet specified standards.

Fairness is crucial to ensuring the success of water conservation programming. Moreover, conservation programming can be used to improve the fairness of pricing trends in water supply in Canada. Currently, fairness is insufficiently considered. Improving fairness means: taking a complex view of pricing, helping people reduce their consumption as prices rise, and including a diversity of perspectives in conservation and utility planning.

Finally, **shared governance** is important for addressing all three governance barriers to conservation. It has direct implications for sharing responsibilities among the various levels of government and for generating opportunities for delegation. Indirectly, however, the inclusion of multiple perspectives will help to address the issue of short-term thinking. Necessary actions for shared governance are: strategic regulation, co-ordinated leadership from different levels of government, and the inclusion of various actors and perspectives.

ENDNOTES

[1] The pilot phase research was undertaken between February 2005 and June 2006. The primary data were collected through a province-wide expert survey, seven municipal case studies, key informant interviews, archival material consisting of municipal reports and committee minutes dating back to 1975, and an expert workshop held on April 13, 2007.

[2] Environment Canada organizes the provinces and territories into five regions: Atlantic (NF, NS, NB, PEI), Quebec, Ontario, Prairie (MB, SK, AB, NT, NU) and Pacific (BC, YT). As Ontario was the focus of the pilot phase, we selected the case studies from the leading municipalities in the four remaining regions.

[3] Charlottetown, City of Summerside, the towns of Charlottetown South and Charlottetown West are overseen by their respective municipal councils.

[4] However, Conservation Authorities have no jurisdiction over lake-based water source intakes (which apply to many municipal water utilities in Ontario).

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Note: An annotated bibliography is available on the UBC Program on Water Governance website http://www.watergovernance.ca/

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The Program on Water Governance at UBC

conducts basic research on water management, engages the wider community in outreach and education on water issues, and facilitates dialogue on water governance among universities, communities, government, NGOs and the private sector.

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