Achieving Water Conservation:

Strategies for Good Governance

Policy Report

September 2008

PROGRAM ON WATER GOVERNANCE

Achieving Water Conservation:

Strategies for Good Governance

Policy Report
September 2008

Authors:
Kathryn Furlong
Post-doctoral Researcher
Dept of Geography, UBC

With
Karen Bakker
Associate Professor, Dept of Geography, UBC
Director, Program on Water Governance, UBC

Project Title:
Municipal Water Supply Infrastructure Governance in Canada:
Uptake of water conservation technologies in the context of utility restructuring

Project Location:
UBC Program on Water Governance - Municipal Water Supply Project www.watergovernance.ca/Institute2/municipal

Principal Investigator:
Karen Bakker
Associate Professor
Dept of Geography, UBC

ISBN: 978-0-88865-692-6

Acknowledgements:
Production of this research has been made possible through a financial contribution from Infrastructure Canada. Additional project support is provided by the Canadian Water Network and a doctoral fellowship from the Social Sciences and Humanities Research Council of Canada. We are grateful to Ellen Reynolds for editing the report, as well as to Christina Cook, Alice Cohen and Linda Nowlan for research and editing assistance. Report design by Brad Hornick Communications.

www.watergovernance.ca

PROGRAM ON WATER GOVERNANCE

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF BOXES

LIST OF ACRONYMS

APWA	American Public Works Association
AUC	Alberta Utilities Commission
BRBC	Bow River Basin Council (Alberta)
CBRM	Cape Breton Regional Municipality
CBSM	Community-based Social Marketing
CCME	Canadian Council of Ministers of the Environment
CRD	Capital Regional District (British Columbia)
CSA	Canadian Standards Association
CUC	Constant Unit Charge
DSM	Demand-side Management
EI	Economic Instrument
FCM	Federation of Canadian Municipalities
HWC	Halifax Water Commission
ICI	Industrial, Commercial, Institutional
LRAM	Lost Revenue Adjustment Mechanism
MPMP	Municipal Performance Measurement Program (Ontario)
NSUARB	Nova Scotia Utility and Review Board
OBC	Ontario Building Code
OCWA	Ontario Clean Water Agency
PTTW	Permit to Take Water
SDWA	Sustainable Drinking Water Act
SSM	Shared Savings Mechanism
SSRB	South Saskatchewan River Basin
SWSSA	Sustainable Water and Sewage Systems Act
ULF	Ultra Low Flow
WEP	Water Efficiency Plan
WPACs	Watershed Planning and Advisory Councils (Alberta)

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 the 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:[3]

- 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, see Figure 1).
- 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.

[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] More on the data from both phases is located in Appendix B.

EXECUTIVE SUMMARY

The fact that Canadian water use continues to grow when our industrial peers are achieving reductions suggests that there are systemic obstacles to water conservation in Canada.

- David Boyd, 2003

This report presents key findings from the second phase of the Municipal Water Supply Infrastructure Governance in Canada project.[4]

FIGURE 1: MAP OF PHASE II CASE STUDIES

Focus of the report – This report summarizes lessons learned about the links between "good governance" and water conservation, and explores how different governance models can both constrain and enable water conservation. Other studies have outlined comprehensive strategies for ecological governance for water management in Canada as well as methods to improve conservation in municipal supply (see Brandes and Ferguson 2004; Brandes et al. 2005). This research focuses on good governance strategies and principles that advance municipal water conservation on the ground for utilities and water users; it also addresses the specific challenges faced by small municipalities.

The term "governance" refers in general to the relationship (economic, social and political) between a society and its government, or between an organization and its governing entity. Governance is commonly referred to as the "art of steering societies and organizations" (e.g., Plumptre and Graham 2000). Specific definitions of governance vary depending on context.

BOX 1: GOOD GOVERNANCE: FROM VISION TO PRINCIPLES TO STRATEGIES - REPORT HIGHLIGHTS

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

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.

Key good governance strategies for overcoming the barriers to conservation are:

- **Setting a Vision** that is long-term and developed co-operatively among stakeholders. This vision should embed sustainable water management and align it with other water governance goals.
- **Deriving 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.

[4] The project, subtitled Uptake of Water Conservation Technologies in the Context of Utility Restructuring, was funded by Infrastructure Canada and the Canadian Water Network, and ran from 2005 through 2008. For more information, see www.watergovernance.ca.

The definition used in this report is the one used by Ottawa's Institute on Governance:[5] **"Governance** is the process by which stakeholders articulate their interests, their input is absorbed, decisions are taken and implemented, and decision makers are held accountable." According to this definition, governance includes formal structures of government, but is much broader.[6] "Good governance" is both a method and objective of governance that yields broadly sustainable outcomes.

Structure of the report: The report is divided into four chapters. Chapter 1 explains the concepts associated with good governance and presents key governance options necessary to improve lagging sustainable water management in Canada. Chapter 2 examines the specific roles and tasks of provincial and federal governments associated with these governance strategies. Provincial and federal actions are necessary to enable action at the municipal level. Chapter 3 explores how sustainable water management plays out in municipalities, including: delegation of authority to municipalities, trends in utility governance, and governance for small municipalities. We assert that many of the challenges related to water conservation facing municipalities can be alleviated through the application of the principles and actions laid out in Chapters 1 and 2. Chapter 4 presents conclusions in the form of recommendations for conservation and good governance.

A summary of the report's highlights pertaining to good governance, senior government action, and on-the-ground conservation are provided in Boxes 1, 2 and 3 respectively.

BOX 2: GOOD GOVERNANCE: FEDERAL AND PROVINCIAL ACTIONS - REPORT HIGHLIGHTS

Provincial and federal actions are needed to ensure water accountability.

Price Regulation

- Municipal water pricing should account for social, environmental and economic sustainability.
- Pricing is highly political and requires arm's-length regulation to ensure that sustainability goals—once agreed upon—continue to be met.

Device Regulation

- Broad support exists for binding water efficiency requirements within federal building and plumbing codes.
- Municipal experience shows that comprehensive regulations are politically feasible.
- Standards for the manufacture and sale of efficient devices are needed to support regulations.

Allocation and Reuse

- Provincial governments need to link water allocation to water efficiency and work with the federal government to remove barriers to water reuse.

Benchmarking

- Municipal benchmarking is a tool that encourages municipal water utilities to operate in accordance with sustainability principles. At present it is under-used or used ineffectively.

Build capacity through funding, co-ordination, research and innovation.

- Municipalities and utilities seek leadership from senior government. Leadership means working with regions and municipalities to ensure well-targeted programs.
- This entails: (a) funding mechanisms that are transparent, accessible and consider the long-term financial commitments they may impose on municipal service providers; (b) co-ordination among the various bodies and stakeholders involved in water supply; and (c) renewed commitment to research, innovation and knowledge dissemination.

BOX 3: GOOD GOVERNANCE: THE MUNICIPAL SCALE - REPORT HIGHLIGHTS

Delegation to municipalities offers challenges and opportunities.

- Municipal governance structures can facilitate creative programming through partnerships and can enable more progressive bylaws and ensure consumer protection.
- Municipal politics can also hinder cost recovery, ring-fencing and bylaws for conservation.

Trends in utility governance also have an impact on conservation.

- Conservation is compatible with current business-oriented trends in utility governance (e.g., full-cost recovery). And good governance can overcome any potential challenges to social equity.
- Business models can influence sustainable infrastructure management. For example, municipal departments may develop more comprehensive programs while arm's-length models allow for easier implementation of economic instruments.

Small municipalities have particular challenges with respect to sustainable water management that can be improved through governance.

- Creating economies of scope through a variety of strategies would improve capacity for sustainable water management.
- Small municipalities can avail of opportunities for shared governance that are more effective in small areas. In particular, this includes Community-based Social Marketing (CBSM).

[5] The Institute on Governance, based in Ottawa, is a non-profit organization founded in 1990 to promote effective governance. For more information, see http://www.iog.ca/.

[6] This definition is similar to that used in the background paper on governance prepared for Part II of the Walkerton Inquiry Governance and Methods of Service Delivery for Water and Sewage Systems: the "process of decision making and the process by which decisions are implemented (or not implemented)" (Joe 2002).

1 GOOD GOVERNANCE: FROM VISION TO PRINCIPLES TO STRATEGIES

Our research shows that implementing successful water conservation programming is subject to governance arrangements; it is not strictly a technical issue as is commonly thought. Certain trends in governance conflict with the goal of conservation, but good governance can improve the potential for successful conservation programming. Below, we examine three key principles of good governance for conservation and how they guide progress toward sustainable water management.

1.1 VISION

The first step in good governance for conservation is to create a vision. In other words, progress on **sustainable infrastructure management requires a vision and a good governance strategy**. Once a vision has been agreed upon, the principles of good governance to achieve that vision may be derived (Bakker 2003).

Setting a vision requires buy-in from external stakeholders (Brandes et al. 2005). As such a vision must be developed co-operatively, transparently, and with the whole system (the utility and the environment in which it operates) in mind. It also requires co-ordination to develop mutually reinforcing goals that meet the needs of the entire watershed. The development of a vision for the long-term management of the water supply is the starting point in the process of deriving good governance principles and deciding on a governance model.

Organizations can take a variety of approaches to good governance and, in recent years, many have developed and advocated for specific principles (see Bakker 2002). Our research findings suggest that once a good governance vision has been created, the **key principles for advancing water efficiency** and conservation are: **accountability, fairness and shared governance**. Delegates at the Sustainable Water Infrastructure Management in Canada Workshop held on May 5, 2008, expressed a clear need for **practical and effective approaches to good governance**. A selection of these principles associated with the three primary principles for conservation is outlined in Table 2.

In this report, setting a vision and all three of the primary good governance principles are addressed with a focus on necessary reforms. The

TABLE 1: 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. *Good Governance in Restructuring Water Supply: A Handbook*. Report to the Federation of Canadian Municipalities. 2003.

discussion also examines potential conflicts involved in the mutual application of these principles and how the conflicts might be addressed.

1.2 ACCOUNTABILITY

A key issue in advancing water conservation **is a lack of accountability** for sustainable water use at all levels of government. The problem of insufficient accountability is often identified as a **lack of political will**. Many people working in this field, for example, have identified lack of political will on the part of senior governments as the central factor limiting good water governance and, more generally, ecological governance:

- Analysts at the Policy Research Initiative argue that it is an absence of sustained leadership and political will and not the nature of the governance strategy itself that limits progress on sustainable development in Canada (Stratos 2002). They find Canada's federal sustainable development governance strategy to be as functionally sound as that of European countries whose approaches have produced tangible and impressive results (e.g., Germany, The Netherlands and Denmark).
- In their essay "A Tangled Web," Muldoon and McClenaghan find that the last significant water policy development was the *1987 Federal Water Policy*—more than 20 years ago. They assert that although the policy does not address many contemporary challenges, it describes important and implementable actions that still have not been developed (Muldoon and McClenaghan 2007, 247-248).[7]
- At the recent Sustainable Water Infrastructure Management Workshop, lack of political will was also identified as a central issue.[8]

However, **political will is ultimately an issue of accountability**. Where a vision and strategy for water governance have been developed, implementation should not depend on political will, but on established goals supported by clear lines of accountability for achieving them. Accordingly, analysts at the Policy Research Initiative agree that the most effective governance strategies begin with a common vision, but that it is imperative to bolster this vision with "quantitative long-term targets and interim milestones, and a framework for ongoing monitoring and reporting (including a mechanism for stakeholder engagement)… [defined] roles and responsibilities within and outside of government" (Stratos 2002, 27).

TABLE 2: PRACTICAL GOOD GOVERNANCE PRINCIPLES FOR ADVANCING CONSERVATION

PRIMARY PRINCIPLE	PRACTICAL GOOD GOVERNANCE PRINCIPLES
Accountability	Shared responsibility (among governments) Government accountability at all levels Arm's-length regulation Capacity assured Performance standards Clear understanding of roles and responsibilities Good Information for watershed managers, utilities, and consumers
Fairness	Quality of life Public participation Equity Full-cost recovery Inclusive, open, communicative Sustainable water use
Shared Governance	Shared responsibility (among governments) Municipal government leadership/empowerment Public participation Partnerships Clear understanding of roles and responsibilities Coherence Locally appropriate programming

NB: The supportive principles are derived from good governance principles outlined by various organizations. These are presented in Appendix A.

Municipal accountability for water efficiency requires a variety of oversight mechanisms and actions from provincial and federal governments, including:

- Price regulation for full-cost recovery in municipal water supply that stipulates what is included in full costs
- Regulation of devices through binding water-efficiency requirements
- Water allocation that is linked to performance efficiency
- Municipal benchmarking tools

[7] Other researchers working on Canadian water policy have proposed valuable models for a national water strategy that encompasses an ethic of conservation. Key examples include (Morris et al. 2007; Brandes et al. 2005).
[8] See Gardner (2008), available on the Program website at: http://www.watergovernance.ca/Institute2/municipal/publications.htm

Accountability measures must be accompanied by measures that ensure capacity.

- Appropriate funding mechanisms
- Co-ordination among stakeholders involved in water supply
- Commitment to research, innovation and knowledge dissemination
- Assistance for small municipalities with respect to pricing and planning
- Municipal empowerment to pursue the necessary bylaws to protect resources and raise revenue

A more complex issue in Canada is **ensuring the accountability of provincial and federal governments for their roles in water efficiency.**

- In Canada, there is no mechanism or body to hold each level of government accountable for doing what it should on conservation (Hill et al. 2007). Water resources fall within provincial and territorial jurisdictions and each province follows its own particular approach to municipal water governance.
- A lack of political will has been successfully addressed in other federal states. In the United States, for example, the federal government is more directly involved in regulating state practices of water management. Hill found that the multi-level governance approach in the United States—including multi-level accountability—results in better water quality and public safety compared to Canada where the federal government takes no such role (Hill 2006).
- A national water strategy in Canada led by the provinces, and with federal government oversight for implementation, is important to move forward. Researchers working on Canadian water policy have proposed valuable models for a national water strategy that encompass an ethic of conservation. Examples include Morris et al. (2007) and Brandes et al. (2005). This report does not attempt to repeat that work, but to complement it through discussions about the specific impacts of current governance arrangements on municipal water supply conservation and efficiency. The report also recommends how governance can be improved while supporting progress on other key governance goals.

1.3 FAIRNESS

The research sheds light on the fact that certain **principles are often overlooked** with respect to utility governance in Canada. Crucially, these include limited approaches to fairness and equity.

Fairness is broader than equity and includes fairness to those responsible for providing the service and fairness to those who depend on it. It means that in achieving equity, utilities must have access to sufficient capacity (economic, human and organizational) to meet their objectives and responsibilities. As such, fairness requires a complex view of pricing, inclusive governance, and support for users to reduce their consumption as prices rise.

In economics, **equity** is understood in terms of vertical and horizontal equity, referring to the relative impact of a policy on groups with differing income levels (vertical equity) and the same income level (horizontal equity). Accordingly, vertical equity implies income redistribution and horizontal equity implies that groups of the same income level are treated the same. Both types reject the notion that groups of differing income levels bear the same economic burden of policy.

Government revenue generation through user fees—as with water supply—rarely implements either horizontal

or vertical equity. 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 irrespective of ability to pay. Rather, it is understood that all users of the system pay equally for the service according to their levels of use.

Borrowing from terminology employed by political economists, this situation can be understood as pitting social equity (i.e., equitable access to services irrespective of income) against economic equity (i.e., users pay according to their consumption). Our research suggests that these two approaches to equity can be reconciled in municipal water supply in Canada (section 3.2.2).

1.4 SHARED GOVERNANCE

1.4.1 COMPLEMENTARY RESPONSIBILITIES

Utilities and governments—municipal, provincial, federal and First Nations—have important separate roles to play in advancing sustainability in municipal water supply. These roles are sometimes unique, sometimes overlapping, and often complementary.

The matrix below (Table 3) serves to classify the array of tools and strategies available for water efficiency and conservation programming. Along the horizontal (top) axis, techniques are distinguished according to whether or not they address the supply or demand side of water provision (i.e., do they directly regulate the amount of treated water produced or the amount of treated water demanded?). Along the vertical axis, the approaches are further sorted according to Tate's tripartite classification of demand-side management (DSM) techniques as economic, socio-political and structural-operational (Tate 1990). Finally, the matrix lists actors that have the capacity—alone or in conjunction with others—to implement the measures. For each measure, the actors with the relevant capacity are specified in the cell immediately beneath the strategy.

Table 3 outlines the roles of different levels of government in the implementation of efficiency and demand management programs:

- The table illustrates that the successful implementation of certain techniques requires actions from particular levels of government. Provincial-level actions, for example, are important in the implementation of economic instruments for supply management (Column A, items 1-4).
- The situation for social-political instruments for supply management is similar (Column A, items 8-14). These techniques emphasize environmental sustainability and the provincial government has the capacity to implement them (except for worker education and training where utilities also have a role).
- In terms of structural-operational instruments for supply management (Column A, items 15-16), the utility has the capacity for implementation. A lack of incentives, resources (human and financial) and political at the utility scale, however, may inhibit uptake.
- Incentives can be created through measures that may seem external to efficiency and demand management. For example, improving water quality regulations can also encourage the development of greater efficiency because it increases the value of water, as seen in the case of the Halifax Water Commission (HWC) [Interview #13B].
- On the demand side, most techniques require the complementary or co-ordinated actions of utilities and one or more levels of government. This testifies to the need for broad mandates, beyond those of utilities, in successful efficiency and demand management programs. This is especially relevant in terms of economic and social-political measures.
- Finally, the table shows that while certain measures may be within the domain of utilities, their successful implementation relies on actions that can only be taken by senior governments. Retrofit programs, for example, are implemented by utilities, but the standards that guarantee the performance of efficient devices and the regulations preventing the sale of sub-performing devices can only be implemented at the federal and provincial levels.

1.4.2 DELEGATION TO MUNICIPALITIES

In Canada, both water resources and municipalities fall under provincial jurisdiction. Over the last decade, several provinces have reformed legislation and policy, effectively delegating greater responsibility to municipalities. Some provinces, for example, have revised their municipal laws to give municipalities greater flexibility in the development of bylaws and the collection of revenue. This approach of granting greater powers to municipalities is supported by respondents to both the

TABLE 3: MATRIX OF DSM TECHNIQUES AND THE REQUISITE ACTORS

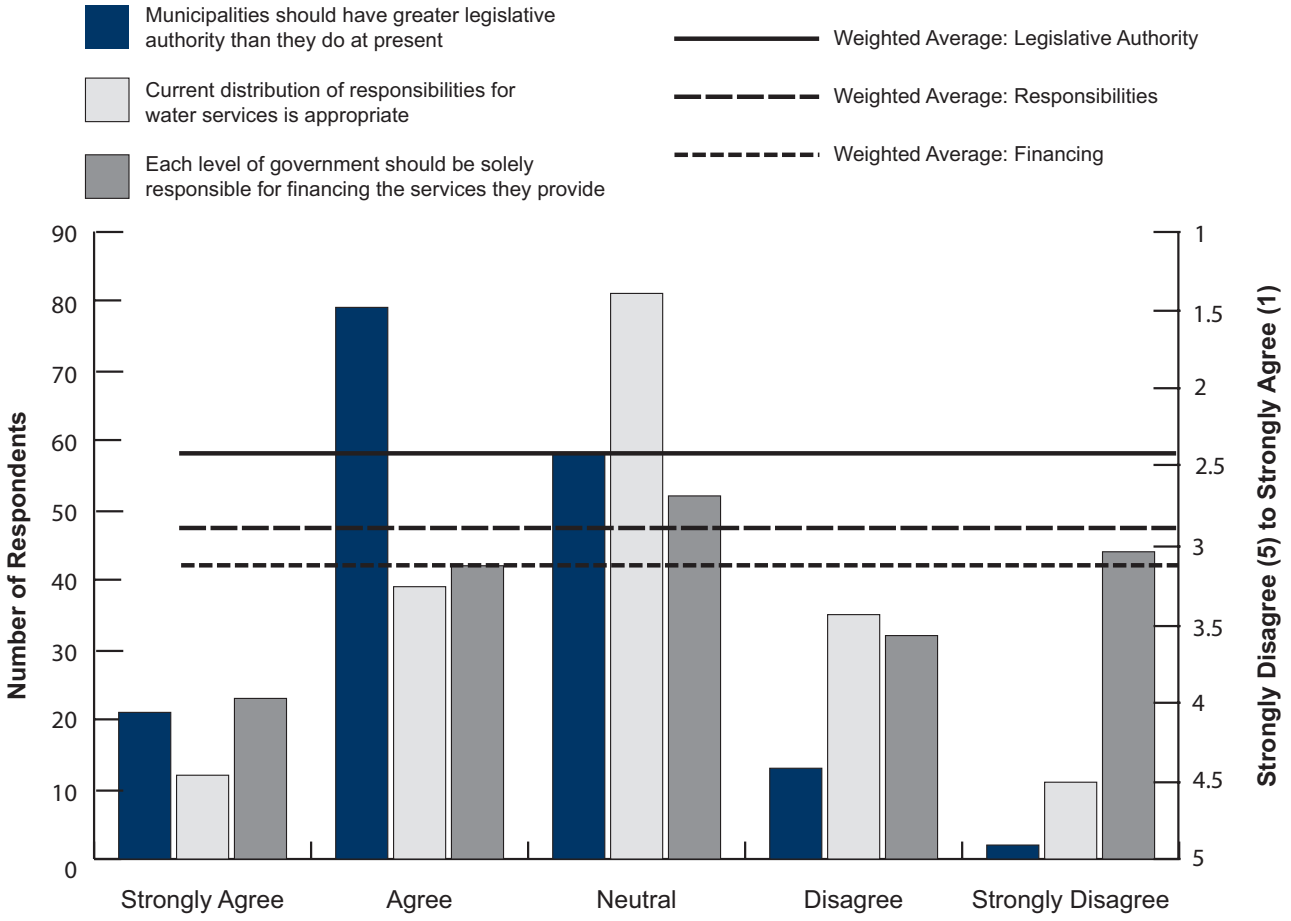
		A. Managing Supply	B. Managing Demand
Economic	1	Charging for water taking	Pricing (various methods)
		Provincial government	Provincial & municipal governments, utilities
	2	Charging for ecosystem services	Ring fencing
		Provincial & municipal (e.g., storm water quality control) governments	Provincial & municipal governments, utilities
	3	Charging for source water protection	Water efficiency audits
		Provincial government	Municipal government, utilities
	4	Tradable water rights	Peak period pricing
		Provincial government	Provincial & municipal governments, utilities
	5	Funding	Funding
		Federal & provincial governments	Municipal government, utilities
	6		Capacity buy-back programs
			Municipal government, utilities
	7		Incentives for consumer programs
			Municipal government, utilities
Social/ Political	8	Education for professionals	Education
		Provincial & municipal governments, utilities	Federal, provincial & municipal governments, utilities
	9	Employee training	Advertising campaigns
		Provincial & municipal governments, utilities	Municipal government, utilities
	10	Regulations for water efficiency	Building codes
		Federal & provincial governments	Federal & provincial governments
	11	Regulations for source water protection	Municipal water-use bylaws
		Provincial government	Municipal government
	12	R&D and knowledge dissemination	Municipal land-use bylaws
		Federal & provincial governments, partnerships, professional associations	Municipal government
	13	Tying water allocation to efficiency	Legislation for water reuse
		Provincial & municipal governments	Provincial government
	14	Including efficiency & conservation in municipal performance measurement	Standards & regulations for water-using devices
		Provincial & municipal governments, professional associations	Federal & provincial governments
Structural/ Operational	15	System leak detection and repair	Water efficient retrofit devices
		Municipal government, utilities	Municipal government, utilities, consumers
	16	Metering	Private leak detection
		Municipal government, utilities	Utilities, consumers
	17		Metering
			Municipal government, utilities
	18		Water cycling/grey water use
			Provincial government, utilities
	19		Sustainable land-use planning
			Municipal government, utilities
	20		ICI process demand reductions
			Provincial & municipal governments, utilities, ICI sector

Ontario and cross-Canada surveys (Figure 2).

Some municipalities have embraced this increased regulatory freedom to make progress on efficiency and DSM programming. BC's *Local Government Act* (1998) grants municipalities broad corporate powers, greater flexibility for cost recovery as well as new regulatory powers vis-à-vis the services they provide (Cashaback

FIGURE 2: SURVEY RESULTS – PROVINCIAL-MUNICIPAL RELATIONS

Source: Surveys conducted for the Program on Water Governance; N=183. NB: The bars are associated with the left axis and the lines with the right



BOX 4: WATER FOR LIFE – SHARED GOVERNANCE IN ALBERTA

Alberta's Water for Life Strategy (2001) was developed in consultation with stakeholders across the province over 18 months. It calls for a 30% increase in water-use efficiency by 2015 for all sectors in the province. Respondents describe the strategy as reflective of Alberta's culture as a frontier province, which prefers voluntary to regulatory governance. For Alberta, shared governance means working through the partnerships to develop shared outcomes; it is a philosophy of governance where stakeholders determine their particular accountability, and roles in decision making and implementation.

1) **The Province as an equal partner** – The Province is represented on the three "Water for Life" partnerships, but its representative is on equal footing with all other stakeholders present.
2) **Individual responsibilities** – No body is solely responsible for the approval of watershed plans developed through the Watershed Planning Advisory Councils (WPACs). Rather, some of the elements of any watershed plan will fall into the jurisdiction of the Province, some under municipal jurisdiction, and some will be better implemented by others such as industry or NGOs.
3) **Challenges to implementation** – Research has shown that under the current system there remains a policy gap in terms of how to implement watershed plans at the municipal level once they have been developed (Stewart 2007).
4) **Regulatory backstop** – The Province retains the regulatory backstop but prefers not to use it: "it is the last tool in the tool-kit, not the first tool" [Interview #21B].

2001). It also recommends a certain amount of transparency (e.g., that board meetings be open to the public (Cashaback 2001). Alberta is seeking a "partnering" approach to the municipal-provincial relationship, focusing on collaboration and distinct sets of responsibilities (Box 4). Not surprisingly, it is in these two provinces that municipalities have introduced the most far-reaching bylaws for water conservation, some of which even extend outside of municipal mandates.

Greater municipal powers, however, are not substitutes for provincial and federal initiatives in their respective jurisdictions. Provincial and federal governments are better placed to address some of the issues that municipalities in these provinces are taking on. Senior governments must be encouraged to assume their roles even where municipalities are beginning to address regulatory voids. Increasing municipal powers must not become a downloading of responsibility or a substitution for provincial and federal presence on important issues. Municipal empowerment is rather an element of moving toward shared or multi-level governance.

1.4.3 DELEGATION TO NON-STATE ACTORS

Delegated governance refers to **the inclusion of non-state actors in decision making**. Partnerships, participation and communication are key elements of delegated (or "distributed") governance. Partnerships involve working directly with another organization on projects and programs, be it private sector, non-governmental or voluntary. Participation involves stakeholders in decision making and communications, and makes information more accessible. In recent years, partnerships, participation and communication in governance have received significant attention—government partnerships with the private sector, in particular. In terms of participation, the focus has been on involving citizens in decision making; however, citizen participation has not gone as far as expected (KPMG 2007, 18).

The experiences of water utilities across Canada that have implemented water efficiency and demand management programs demonstrate the importance of partnerships, participation and communication in the approval, acceptance and success of their programs. Important lessons learned are outlined in Box 5.

BOX 5: SHARED GOVERNANCE: DELEGATING TO NON-STATE ACTORS - LESSONS LEARNED

1. Consult with business, non-governmental organizations and community groups.

- Kelowna's landscaping and irrigation bylaw will go before Council in September 2008. Even with Council support, it was important to learn and address the concerns of developers, the irrigation industry and nurseries, among others [Interview #23B].
- Calgary worked with a variety of groups on the development of its efficient fixture bylaw and considers industry consultation to have been "essential." Industry was primarily focused on having enough lead time to move existing inventory [Interview #6B].
- Cape Breton Regional Municipality (CBRM) partners with the Atlantic Coastal Action Program (ACAP) to run its residential DSM programs because it provides "third party credibility." In CBRM, ACAP is recognized and trusted environmentally [Interview #15B].

3. Capitalize on the knowledge within your community.

- Cochrane local advocates have been instrumental in the development of Cochrane's water conservation programs. Volunteers in the Cochrane Environmental Action Committee (CEAC) have expertise in a variety of fields [Interview #3B&22B].

4. Work with those who will be involved in rolling out programs.

- Many utilities work with retailers on their rebate programs. In Edmonton, for example, EPCOR ran its toilet rebate program through Home Depot, which sold the toilets and gave the rebate, making it easier for people to participate in the program [Interview #19B].

5. Learn from other utilities and partner with them to develop best practices.

- To develop its world-class water accountability program, Halifax partnered with leading groups in the UK through the International Water Association (IWA) [Interview #13B].
- In 2003, 17 municipalities (including five American cities) partnered with Veritec Consulting to develop an approved list of efficient toilets that met the 6-litre flush requirement.

6. Avoid "silos" within your own utility and municipal organization.

- For Halifax, getting its water accountability program to work required significant internal collaboration between engineering and operations, finance, the meter group, and plant operations. "Everybody's got to be talking on the same page because we're all part of the problem and, therefore, part of the solution" [Interview #13B].

6. Lobby government, but do not wait for it (it may be waiting for you)!

- In Quebec Réseau Environnement represents more than 2,000 members from the private sector, institutions and municipalities. This wide base of support means that the provincial government often engages the organization in projects and then implements their recommendations [Interview #26B].
- In British Columbia, the impetus for the inclusion of efficiency requirements for plumbing fixtures came from municipal action on the issue [Interview #8B].

1.5 CHALLENGES TO REFORM

Given our focus on what can be achieved through good governance, it is important to understand the **challenges to reform**. In Canada, research has identified many barriers to conservation, including historical conditions, the myth of abundance, urban development patterns and an ongoing supply-side focus (Brandes and Ferguson 2004). Here we are concerned in particular with **governance barriers** to conservation (see Box 1) and the barriers to reforming governance.

Governance barriers to conservation can be addressed through the implementation of the good governance principles outlined above. The major challenge, however, is to actually implement these principles and thus reform governance in appropriate ways. Experience surrounding the *Watertight Report* in Ontario is indicative that hurdles exist. Although widely read and touching on many of the reforms called for by utility managers interviewed in this research, the report met with significant criticism and its recommendations have not been implemented in a concerted way.[9] Some of *Watertight's* most controversial directives—increasing the scale and capacity of water systems, arm's-length regulation and arm's-length governance—speak to prominent water governance issues across Canada that can influence the success of conservation and efficiency programming. In particular, increasing the scale and capacity of water systems and arm's-length regulation (especially for cost recovery) has proven of great benefit in many jurisdictions, including some in Canada (this report).

To enable appropriate and needed governance reform it is useful to demonstrate the benefits of reform to politically reluctant governments at all levels and to utility managers mired in the inertia of the status quo. The remainder of this report seeks to do just that: to demonstrate the benefits of and possibilities for reform while remaining sensitive to the difficulties that water managers and governments face in reforming governance. In particular, we examine the how certain conflicts can arise between strategies for achieving conservation and other utility goals. Here again, solutions lie with strategic governance reforms that consider the whole picture. These issues are brought together in the Conclusion (Chapter 4).

[9] The government seems to be enabling rather than adopting the report's recommendations. The provincial government has enacted legislation to make it possible for municipalities to adopt municipal corporations as described in the report for water supply delivery (the Municipal Services Corporations Regulation under the Municipal Act and the City Services Corporations Regulation under the City of Toronto Act, December 2006). Also, under the SWSSA, the Government of Ontario requires reports on the Full Cost of Service and the Full Cost Recovery Plan, which are subject to approval by the minister.

2 GOOD GOVERNANCE: FEDERAL AND PROVINCIAL ACTIONS

Water conservation is often assumed to be a municipal responsibility, but our research indicated that action by higher levels of government is often necessary for conservation to be effectively implemented. This chapter explores the need for action and co-ordination by provincial and federal governments to ensure accountability (through regulation and benchmarking) and the capacity to be accountable (through funding, co-ordination, research and innovation) for water conservation at the municipal level.

2.1 ENSURING ACCOUNTABILITY: REGULATION

The research results[10] demonstrate that there is support and desire for increased regulation from higher levels of government to promote water conservation and efficiency. For example, 60% of survey respondents agreed ("considerably" or "very much") that increased governmental regulation to improve sustainability in the water sector was necessary. Similarly, Rouse argues that "some form of arm's-length regulation is essential" for sustainable water services; neither municipal government nor market regulation are sufficient to ensure sustainability (Rouse 2007, 21). In terms of water conservation and efficiency, two types of regulation pertain: economic (relating to prices) and environmental (relating to devices and allocation) (Rouse 2007).[11]

2.1.1 PRICES

KEY POINTS

- Researchers and utility professionals agree that Canada lacks a pricing strategy for municipal water supply.
- This is to the detriment of all three arms of sustainability: social, environmental and economic.
- Water pricing is a political issue and requires regulation to ensure both cost recovery and social equity.

There is a broad consensus among researchers and utility professionals in Canada that, in general, utilities do not recover sufficient revenues to cover the full costs of providing water services. In his book *Unnatural Law*, Boyd cites the agreement of the OECD and the Canadian Council of Ministers of the Environment (CCME) that Canada's "municipal water systems are unstable under current approaches to pricing" (Boyd 2003, 49).

Insufficient cost recovery was a persistent problem throughout the 1990s[12] and had compounding effects. In 1999, Environment Canada concluded that "the combination of low levels of residential water metering, conservation-discouraging pricing structures, and lack of real price increases in rates has led to substantially increased residential water use levels in 1999 and [would] continue to erode municipalities' ability to finance needed infrastructure" (Burke, Leigh and

[10] Including the interviews, survey and the findings based on observation of current and evolving practices.
[11] A fourth relates to enforcement of business and commercial law and is indistinct from other services or from commercial areas.
[12] See Tate and Lacelle (1995) and NRTEE (1996).

Sexton 2001). Since 1999, the average daily domestic water use has declined, and metering coverage and prices have increased in many Canadian municipalities (Environment Canada 2007).

Still, researchers find that assessments of full costs remain incomplete. Renzetti and Kushner argue that unaccounted costs in Ontario, including "capital, energy, raw water and changes in water quality," result in actual costs being undervalued by between 16 to 55% (Renzetti and Kushner 2004). For Renzetti, appropriate prices must meet four criteria: (1) financially sound (sustains the utility), (2) economically efficient (sends appropriate price signals), (3) environmentally sustainable, and (4) fair (includes consumer equity) (Renzetti 2007).

Assessing Renzetti's four criteria involves both municipal and provincial governments. Financial soundness and economic efficiency are in the municipal domain.[13] In some cases, however, meeting these goals is stymied by local politics or insufficient expertise, making provincial regulatory guidance an indispensable backstop. Guidance from governments on questions related to environmental sustainability and fairness is even more essential. These issues involve political decisions that transcend municipal mandates, requiring input from other levels of government (especially provincial and First Nations' governments) and non-state actors (e.g., watershed groups). Such regulatory measures exist elsewhere: the European Water Framework Directive includes environmental externalities in its definition of the full costs of supplying water.

Pricing and cost recovery are appropriate for regulation

TABLE 4: SUMMARY OF METERING AND PRICING TYPE AVERAGES BY PROVINCE AND TERRITORY*

	RESIDENTIAL FLOW L/C/D	METER COVERAGE (%)		POPULATION (%)				MEAN $/ MONTH/35M³	
		Residential	ICI	Flat Rate	CUC	DBR	IBR	Residential	Commercial
Newfoundland & Labrador	501	0	49.4	98.6	1.4	0	0	22.06	30.90
PEI	238	1.5	93.1	100.0	0	0	0	27.52	29.88
Nova Scotia	321	93.3	98.6	17.0	11.2	71.0	0.7	30.66	58.06
New Brunswick	438	47.8	82.1	50.7	45.9	2.1	1.4	29.21	28.64
Quebec	424	16.0	34.9	85.3	10.0	0.1	4.6	21.69	39.51
Ontario	260	92.0	98.2	3.6	55.8	3.8	36.8	50.54	57.80
Manitoba	219	96.7	96.7	1.1	5.1	93.8	0	45.83	43.21
Saskatchewan	303	98.2	98.9	1.4	54.1	43.0	1.4	48.41	49.38
Alberta	271	88.6	98.9	1.9	64.3	2.9	30.9	50.48	58.31
British Columbia	426	29.8	87.1	59.7	35.5	0.1	4.7	27.93	55.50
Yukon	645	ID**	100	100.0	0	0	0	55.68	30.95
NWT	257	97.2	100	0	100	0	0	90.56	101.4
Nunavut	113	76.1	14.8	0	100	0	0	146.0	192.4

Source: 2004 data taken from Environment Canada (2004a) various tables.
**Response rates for all provinces were above 80% of provincial/territorial population represented, except for Quebec (60%), PEI (51%) and Nova Scotia (26%).*
***Insufficient data*

[13] Setting prices involves complex political decisions. In Alberta, if the Province were to price water takings, equity across water sectors may not mean that everyone pays the same price. For example, industries whose activities have more impact on the watershed might have to pay more [Interview #18B].

and provincial oversight, given: (a) the political nature of water pricing, (b) the complexity of the decisions involved, (c) the challenges of achieving pricing goals once they have been established, and (d) economic, environmental and social impacts of ongoing pricing practices in Canada. Several approaches to provincial-level pricing regulation exist in Canada. Examples of arm's-length provincial regulation include: the Nova Scotia Utility and Review Board (NSUARB), the PEI Island Regulatory and Appeals Commission (IRAC), and the Saskatchewan Municipal Board. The Alberta Utilities Commission (AUC) oversees pricing for investor-owned utilities only.[14] In other provinces, such as Quebec and British Columbia (for improvement districts) a provincial government agency oversees pricing decisions. In Quebec, it is the Ministry of Municipal Affairs and Regions.[15]

Ontario is the only province to require full-cost recovery through legislation. Following recommendations of the Walkerton Inquiry to ensure that water utilities are financially sustainable, the Province developed two new pieces of legislation, the *Safe Drinking Water Act* (SDWA 2002) and the *Sustainable Water and Sewage Systems Act* (SWSSA 2002). Under the SDWA, utilities must submit a financial plan to the minister responsible as a condition of approval for their operational permit. 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. This legislation would affect accounting practices; in the Niagara Region, for example, it would mean a cost increase of 14.5% above 1998 levels (Renzetti and Kushner 2004). However, the Government of Ontario has yet to enact the legislation. Consequently, some municipalities are pursuing cost recovery while others are lagging behind, resulting in a "patchwork approach to the problem" (Editorial 2008).

Cost recovery mechanisms vary nation wide. Table 4 shows the percentage of metered water delivery and the percentage of population served by various rate structures by province and territory. It is clear that philosophical approaches to pricing and cost recovery differ across jurisdictions.

[14] The Alberta Utilities Commission, which regulates pricing by investor-owned utilities, must also give its approval for the transfer of ownership of a water utility to be affected.

[15] The minister also reserves the right to compel a municipality to extend or improve services or to charge for water takings.

BOX 6: THE NOVA SCOTIA UTILITY AND REVIEW BOARD

The NSUARB is an arm's-length "quasi-judicial body" which has both regulatory and adjudicative functions. Its current form was established through the *Utility and Review Board Act* (1992). Its mandate includes 16 regulatory and judicial functions (NSUARB 2008). Relevant to water supply, it is responsible for the "general supervision of all public utilities including approving: the establishment of utilities, rates and terms of service, capital expenditures in excess of $25,000, resolution of certain types of complaints and abandonment of service" (NSUARB 2008). Amendments to utility rates (especially increases) and regulations must be approved by the board and will generally require a public hearing. The Province of Nova Scotia has striven for transparency in all aspects of the board's operations. All decisions are posted on the Internet and steps have been taken to ensure the fair and apolitical appointment of board members (see Aucoin and Goodyear-Grant 2002). The NSUARB is composed of eight full-time members and one part-time member who review and decide on applications.

Interview respondents in the regional municipalities of Cape Breton and Halifax found the arm's-length economic regulation highly effective. The regulator is deemed to (1) provide justification for price increases necessary to meet Nova Scotia's new standards for water quality (the Province adopted the *Guidelines for Canadian Drinking Water Quality* as binding regulations in 2002); (2) hold important expertise; and (3) practise exhaustive review of proposed pricing strategies to ensure that prices are sufficient to meet costs and protect consumer interests.

All board applications are subject to a public hearing. In CBRM, following public concern over well-field impacts in the Sydney area, the NSUARB directed the water utility to implement measures to reduce its demand on the local well field. The CBRM water utility implemented a domestic water conservation program for its customers that are serviced by that source [Interview #15B]. The NSUARB also directed CBRM to reduce its leakage; the regulator recommends municipal unaccounted for water rates of no more than 10% [Interview #16B].

In cases where the water utility is a department of the municipality (such as CBRM), proposed rate amendments need to pass before municipal council before they can be submitted to the NSUARB. This can prove problematic when rate review and electoral cycles coincide. Respondents also noted that the length of time to arrive at decisions can be long due to the thorough review process and the two-step approval system. Typically, the utility will undergo at least one iteration with the board before presenting its final submission. Upon final submission, decisions are relatively rapid. In 2005-06 the average time for a decision was 15.6 days, and in 2006-07 it was 30 days (NSUARB 2007). In 2006-07, the board decided on 597 cases requiring a hearing, of which 20 were water related. In 2005-06, these figures were 659 and 19 respectively.

It is difficult to draw specific conclusions about policy from the above data given its inadequacies and lack of context. The lack of data for Nova Scotia and Prince Edward Island make the effects of arm's-length regulation difficult to assess. What can be said though, is that the lack of regulation in most of the country has yielded inadequate results in terms of sustainability. Rather, clear rules and expectations need to be set to achieve sustainable cost recovery. The model of arm's-length regulator, such as the NSUARB, was proposed in Ontario through the *Watertight* report. It met with a negative reception chiefly due to what people saw as an extra layer of bureaucracy. In Nova Scotia, however, municipalities deem the NSUARB to function well given the expertise of board members, the thorough application review process, and their transparent decision-making process that is open to utilities, local governments and the public.

2.1.2 DEVICES

KEY POINTS

- Broad support for an enforceable national plumbing code to include water-efficiency regulations.
- Examination of existing efforts in Canada demonstrates sufficient political will to implement federal/provincial efficiency standards and regulations.
- Such regulation has been successful in the energy sectors in Canada and in the water sector in other countries.
- Care needs to be taken to ensure that regulations are formulated as codes that are ready to use at the municipal scale.

Both survey and interview data indicate strong municipal support for federal/provincial efficiency standards and regulations for water-using devices. Participants from municipalities in each province called for binding requirements for water-efficient fixtures, indicating federal standards and regulations to be the correct approach.[16]

Achievements in energy conservation regulations have been made across Canada's provincial and territorial jurisdictions.[17] In the water sector, there has been much less progress. This is despite significant interest.

Provincial governments have demonstrated willingness for national harmonization of efficiency requirements on the one hand and hesitation at enacting provincial-level efficiency requirements on the other.

- Research participants working at the provincial level often expressed reluctance toward water-efficiency requirements in provincial building codes. In cases where provinces have incorporated efficiency into their building codes, municipalities have been important in achieving these gains (Table 5).
- Provincial/territorial support for federal standards and regulations for water-using devices is widespread. All three territories subscribe to the *National Building Code* and to the *National Plumbing Code*, as do Quebec, Nova Scotia, Manitoba (with certain modifications and additions, none applying to water efficiency), Prince Edward Island, and Newfoundland. New Brunswick subscribes only to the *National Plumbing Code* at the provincial level. British Columbia's building code is based on the *National Building Code*, but includes water conservation requirements for certain municipalities (Table 5).

Territorial governments have gone the furthest by incorporating measures for water efficiency into their energy efficiency programs. All three have energy efficiency programs that include either rebate or retrofit programs for water-saving appliances. In the Yukon and Northwest Territories, these programs include front-loading washing machines; the Yukon also includes energy-efficient dishwashers. In the NWT, there are also incentives for water conservation within its energy efficiency regulations. The Saskatchewan EnerGuide includes low-flow and dual-flush toilets in its list of eligible home improvements.[18]

In Alberta and British Columbia, the involvement of municipalities in the development of efficient device bylaws at

[16] In seven of the 11 municipalities studied in the cross-Canada phase, participants argued for national standards and regulations for the sale and installation of water-using devices.
[17] The federal *Energy Efficiency Regulations* under the *Energy Efficiency Act* (2006) are an example.
[18] Several other provinces have energy-efficiency regulations that do not spill over into water efficiency. Quebec has energy-efficiency regulations for appliances and New Brunswick has energy-efficiency standards. Nova Scotia and British Columbia have the *Energy-efficient Appliances Act* (1992) and the *Energy Efficiency Standards Regulation* respectively.

TABLE 5: PROGRESSIVE REGULATION FOR WATER EFFICIENCY

	ALBERTA	BRITISH COLUMBIA	ONTARIO
Provincial Regulation for Water Efficiency?	No. The adoption of efficient fixtures is seen as an issue of municipal policy.	Partial. The *Water Conservation Plumbing Regulation* B.C. Reg. 198/2005, under the *Local Government Act*, applies differentially to BC municipalities.[19]	Yes. Under amendments to the *Ontario Building Code Act* (1996).
Municipal Involvement	Several municipalities have adopted their own bylaws requiring the installation of water-efficient fixtures and appliances in all new development. These include Calgary *Low Water Use Fixture Bylaw* (2005), Edmonton *Water Efficient Fixtures Bylaw* (2008), Cochrane *Water Conservation Measures Bylaw* (1992/2006) and Okotoks *Water Fixture Bylaw* (2002). Their bylaws cover all new construction and renovations requiring a plumbing permit. The County of Strathcona also has a bylaw.	Capital Regional District (CRD) lobbied the province for mandated water-efficient devices in all new development. The Province presented the proposed regulation to municipalities; those not in agreement were given a less strict regulation. Vancouver, not being subject to the *BC Plumbing Code*,[20] revised its building bylaw in 1995. Kelowna did so under its *Plumbing Regulation Bylaw* in 1993 (currently under revision).	The former council in the City of Toronto worked with the Province on amending the plumbing code. Its work is considered important in achieving the amendments.
Description of Regulations	**Calgary**: Toilet (6L), urinal (3.8L), faucet (commercial 1.8L/m, home 8.3L/m), showerhead (9.5L/m), recirculating cooling. **Edmonton**: Same, commercial faucets (1.9L/m). **Cochrane**: Same, plus toilet (dual flush, conforming to CSA B45), faucets (home 5.7L/m with aerator), showerhead (7.6L/m with aerator), residential water pressure (max 65psi).[21] **Okotoks**: Same, except faucets (require aerator, no flow limit) and no regulation against once-through cooling.	All: Lavatory and kitchen faucets (8.3L/m), showerhead (9.5L/m), toilets (13.25L). Some regions: Also urinals (5.7L) and toilets (6L). This originally applied only to the CRD; 38 geographic areas have joined (representing 90% of the population). **Vancouver** (1995): Toilets (6L), urinals (3.8L), showerheads (9.5L/m), faucets (8.3L/m), recirculating cooling systems and ornamental fountains. **Kelowna** (1993): Toilets (7L), showerhead (10L/m), residential faucet (9L/m).	All new development in the province (not including renovation) is required to install toilets with no more than a 6L flush.
Challenges	• Multiple showerheads: Calgary and the CRD identified regulation against multiple showerheads as an unmet challenge. • Retail availability of inefficient devices: A ban on the sale of inefficient toilets and fixtures is widely deemed critical for progress. • Municipal code: The legal mandate to set plumbing regulations rests with provincial and the federal governments, leaving municipal efforts open to legal challenges.		
Opportunities	• Landscaping bylaws: Cochrane, AB, has approved its *Land Use Bylaw* (2004) which requires certain amounts of naturescaping on lawns and green spaces. Kelowna, BC, has linked water efficiency to development approvals. They are developing a bylaw to ensure that lawns need less watering. This includes, for example, soil depth and irrigation system requirements in all new development. • Well-functioning devices: Early problems with low-flush toilets have been addressed through municipal collaboration with Veritec Consulting on the MAP testing program, which produced a list of high performance low-flow toilets. This work could be incorporated into the CSA Plumbing Standards. • Regulating lawn sprinklers: Kelowna is considering this for its bylaw update.		

the municipal level demonstrates certain key truths:

1) These bylaws are beyond the scope of municipal mandates and subject to legal challenge—an indication of their significance for municipalities.
2) Due to this uncertainty, those who have developed their own bylaws have engaged in extensive consultation with local stakeholders to ensure support for the new regulations from the parties affected.
3) Legislation as extensive as in Alberta's municipalities for fixtures and in Kelowna for landscaping is politically feasible. As such, the bylaws demonstrate the breadth of regulation on water-efficient devices

[19] The Province sees this as effective because 70% of the population lives in urban areas covered by the code and it enables differential legislation that is flexible to local needs: "We are always much more conscious of regional and local variation...tell them what you want and let them find the best way of doing it" [Interview #28].
[20] This was only the case for the City of Vancouver, which has its own charter the other local municipalities in the GVRD are subject to the *Provincial Building Code*.
[21] The original bylaw (1992) required a 6L toilet and low-flow taps and showerheads without specification. Cochrane was the first municipality in Canada to establish such a bylaw.

that is acceptable to the public and the Industrial, Commercial, Institutional (ICI) sectors in Canada.

4) This practice cannot be emulated Canada-wide. The approach is costly for municipalities while senior government leadership would be more cost effective. It took Calgary two years to develop its bylaw. It provided a template for other municipalities, but there are still challenges of co-ordination among local bylaws in the region. Enforcement is complicated because the bylaws are not part of the plumbing code, making them unenforceable by plumbing and building inspectors. In Calgary, plumbing inspectors are asked to notify bylaw inspectors who can then enforce the bylaw. In other provinces, using bylaws to create efficient standards is not possible. In Ontario, municipalities are required to follow the *Ontario Building Code* (OBC) and are unlikely to simply overstep it.

There is **need, support and guidance for national efficiency standards** for water-using devices to be included in the *National Building Code*.

- This would have an important impact as many provinces adopt the *National Building Code* directly or with certain amendments.
- This would align code jurisdiction with commercial procurement practices in Canada, making the standards more effective. In Alberta, for example, a municipal participant explained that retail-purchasing practices often do not comply with the *Alberta Plumbing Code* because the buying offices of many retailers operating in Alberta are located in Ontario.
- The federal government can draw on the well-researched and broadly consultative experience of municipalities in Alberta and British Columbia to develop regulations that meet the needs of municipal utilities, address a broad scope of issues, and are politically feasible.
- In so doing, the federal government must also remain conscious of writing and presenting its building and plumbing codes in a way that enables effective adoption at the municipal level. One respondent in Quebec indicated that the *National Plumbing Code* was problematic not for its content but for its presentation, which is lacking in diagrams and schematics for installation, and is written in legalistic language [Interview #27B].
- Finally, this code needs to be supported by standards for water-using devices allowed for retail sale. This is clearly within the federal jurisdiction.
- The federal level should introduce objective performance testing such as that carried out by Veritec Consultants.
- The federal government should work with the Canadian Standards Association (CSA) to improve implementation and remove barriers to change. The CSA sets Canadian standards and seeks to protect industry by ensuring that new products do not enter the market at a competitive advantage to existing suppliers. For example, the CSA was opposed to dual-flush toilets until its members had competing products to the Australian Caroma toilet [Workshop].
- Federal standards would lead to significant cost savings for water utilities that need the funding for infrastructure. Savings include reduced costs for water production, infrastructure development, and efficient fixture programs. As one participant asked, "Why must a municipality expend around $40 million to provide financial incentives to direct a consumer purchase toward a water-efficient device (e.g., ultra-low flow (ULF) toilet) when other jurisdictions (e.g., the United States) have banned the sale of inefficient toilets outright?"

2.1.3 ALLOCATION AND REUSE

KEY POINTS

- Certain jurisdictions already link water taking to water conservation at the provincial scale—an approach that is broadly feasible across other jurisdictions.
- Allocation is within provincial jurisdiction and cannot be left to another level of government. Basin-level groups like conservation authorities can administer allocation, but require provincial regulatory support.
- Current regulation prohibits water reuse. There are sectors, however, where this could prove beneficial.

Regulation for water allocation and reuse that supports water efficiency and conservation falls within provincial jurisdiction. The federal government role in these areas is important, but limited to transboundary waters.

In some provinces, **regulation that links water taking and allocation to its efficient use** already exists or is under development. Approaches to allocation are becoming more complex in some

cases, and the legislation surrounding allocation more evolved. In Alberta, water allocation is based on the principle of "first in time, first in right." The provincial government finds this approach effective in times of scarcity because it provides a convenient method to determine who receives water and in what amount [Interview #18B].[22] In 2006, three of the sub-basins of the South Saskatchewan River Basin (SSRB)—including the Bow River Basin, the source of Calgary's water supply—were closed to new water licences, having been declared "fully" or "over" allocated. Recent comments by Alberta's minister of the environment indicate that under such conditions the provincial government recognizes the need to reconsider allocation such that "water is allocated in a fair manner with opportunity for all users to have access to water resources."[23]

In this evolving closed-basin regime, Alberta is developing and implementing economic instruments for the re-allocation of water among users. At present users may sell unneeded portions of their allocation provided that they can demonstrate water efficiency and conservation. For the provincial government, the potential revenue acts as an incentive for users to improve their efficiency. One respondent expressed concern that small users and municipalities could be priced out of the market by industry [Interview #21]. Excess allocation held by a user that is not practising conservation cannot be sold, but can be reallocated. Currently, allocation increases are based on availability. Having water users demonstrate efficiency to increase their allocations would be an incentive in a competitive market for allocations; those who do use water more efficiently would be able to secure needed water before inefficient users [Interview #17]. The Ministry of Environment is considering requirements to demonstrate water conservation efforts to increase allocations [Interview #21]. Among the key issues in this regime is how to transfer a seasonal use (e.g., irrigation) to a year-round use (e.g., municipal) given seasonal variations in water availability.

Forms of efficiency regulation for water allocation and use also exist in Ontario and British Columbia.

- In 2005, the Government of Ontario added water-efficiency requirements to its permit to take water (PTTW) legislation. It requires the director evaluating the application to determine if water conservation is being implemented (O.Reg 387/04). The agreement, however, grandfathers the water takings of existing users (e.g., municipalities and industry) (see Ministry of the Environment 2005).
- In British Columbia, the *Fish Protection Act* (1997) empowers water managers to consider impacts on fish and fish habitat when making licensing decisions.

The federal government also has a role to play. The Government of Canada does have jurisdiction over boundary waters and, together with the provinces of Ontario and Quebec, has been involved in pushing for efficiency requirements for all new water takings from the Great Lakes. The federal government signed the Great Lakes Charter Annex in 2001,[24] under which municipalities must demonstrate water efficiency programs prior to the approval of additional or new water withdrawals.[25]

Still, requiring efficient water use for water takings is a responsibility that falls largely to the provinces. These regulations should provide a range of options that enable comparable, fair, and transparent methods for evaluating whether or not efficiency in water use is being achieved. This also gives users clear means to work toward their goals. The provincial governments are best placed to fill this role and can only pass it onto a separate body where they likewise bestow a clear and executable mandate. Although watershed-level organizations may be well placed to deal with allocation, in practice it may prove politically difficult given their weak

[22] Protecting the "first in time, first in right" approach to allocation was instrumental in the success of Water for Life because it brought licensed large irrigation districts to the table.
[23] Quoted by Bow Riverkeeper: http://www.bowriverkeeper.org/node/200
[24] Also known as the Great Lakes Basin Sustainable Water Resources Agreement.
[25] Also water withdrawn from one lake must be returned to the same lake. This has complicated possibilities for building pipelines to municipalities seeking additional sources of supply.

mandate and their proximity to resource consumers. Even in Alberta where the trend is against provincial regulation and where extensive and mutually supportive bodies have been established to address water management, the Watershed Planning and Advisory Councils (WPAC) indicated that they wanted the provincial government, as the regulator, to be responsible for allocation [Interview #18B].

One form of efficiency that is under used in Canada is **water reuse**, a practice that is prohibited by public health regulations in most Canadian jurisdictions. Researchers find that only British Columbia and Alberta have grey water reclamation and reuse standards to facilitate water reuse (Brandes and Ferguson 2004, 46).[26] In Ontario, amendments to the OBC in 2006 enabled rainwater harvesting in cases using a dual plumbing system inside a building. The BC *Municipal Sewage Regulation* (2004 amendments) was the first to enable the use of reclaimed water.[27] Although for many utilities water reuse seems unfeasible for municipal water conservation (due to costs and regulatory impediments), its applications are more apparent in other uses that compete for allocations in watersheds. It is important that water users have access to all available opportunities to improve their water efficiency. Currently, legislation against water reuse impedes the innovation that is needed to find applicable solutions for Canada's diverse water-using sectors and contexts (Boyd 2003).

2.2 ENSURING ACCOUNTABILITY: MUNICIPAL BENCHMARKING

In recent years, as part of the rise in prominence of business principles in municipal governance, governments have increasingly turned to strategies such as municipal benchmarking which compares the performance of municipalities on a number of measures. In a recent report on governance, the consulting firm KPMG found that quality of service was the key focus of government agencies across western countries. Accordingly, the study found that 61% of governments favoured "a tight focus on performance targets [as] the best way to achieve the goal of better quality services" (KPMG 2007, 8).

Such exercises can provide municipalities with a set of criteria on which to focus their efforts and resources. How performance is evaluated, however, can have direct impact on an agency's focus. Methods of performance evaluation connote particular political and management approaches; their design should carefully account for the outcomes they seek to engender and avoid. Australia's process benchmarking, which compares practices, procedures and performance rather than metrics, is one avenue (Piccinin 2006).

In 2000, the Government of Ontario instituted the mandatory Municipal Performance Measurement Program (MPMP), which requires municipalities to report on 54 measures of "efficiency" and "effectiveness" in 12 service areas.[28] The reporting measures associated with water supply[29] do little to encourage conservation in that (1) neither water efficiency nor conservation are among the criteria for municipal performance measurement, and (2) the measures discourage investments that increase costs but which may be necessary for initial financing to make improvements to sustainable water management.

Ontario's MPMP is not unique in Canada. Other efforts exist that indicate a desire on the part of (especially large) municipalities for performance standards to help focus their efforts and to learn from practices in other municipalities.

- The National Water and Wastewater Benchmarking Initiative has 36 municipal participants across the country (EarthTech and National Research Council 2007).[30] Its list of measures is much more wide-ranging than that of the MPMP. They are derived from a series of goals developed in consultation with the participants, which include protecting the environment, reliability and sustainability, minimum sustainable cost, infrastructural adequacy, workplace safety, public health and customer satisfaction. The program

[26] Citing Marsalek et al. (2002, 9, 13).
[27] Municipal Sewage Regulation website http://www.qp.gov.bc.ca/statreg/reg/E/EnvMgmt/129_99.htm
[28] "Effectiveness" refers to the extent to which a service is achieving its intended results. For example, the percentage of garbage that is recycled. "Efficiency" refers to the amount of the resource used to produce a given amount of service and is based on operating costs only (Burke 2005).
[29] There are five required measures for water supply. In terms of effectiveness, municipalities must report on: "Weighted number of days when a boil water advisory issued by the Medical Officer of Health, applicable to a municipal water supply was in effect"; and "number of water main breaks per 100 kilometres of water distribution pipe in a year." With respect to efficiency, reportings required for: "Operating costs for the treatment of drinking water per megalitre"; "operating costs for the distribution of drinking water per kilometre of water distribution pipe"; and "operating costs for the treatment and distribution of drinking water per megalitre (Integrated System)" (Burke 2005).
[30] These are located mainly in Ontario and British Columbia.

won the American Public Works Association (APWA) Management Innovation Award in 2003.

- British Columbia has also initiated performance reporting. However, communities are to determine their own objectives as well as the measures they wish to use to report their progress (Ministry of Community Aboriginal and Women's Services 2003).
- At the Sustainable Water Infrastructure Management workshops, participants called for **federal leadership and co-ordination** on developing benchmarks for municipal water and wastewater services.

2.3 ENSURING CAPACITY

As much as the federal, provincial and territorial governments must recognize diversity among municipalities and regions, they must also provide leadership to these groups to alleviate complexity and improve capacity. This is crucial to enabling accountability. On many issues, municipalities and utilities are calling for leadership. These issues are discussed below. Table 6 summarizes the issues and actions applicable to federal and provincial levels of government (see page 21).

KEY POINTS

Senior governments are responsible not simply provide funding, but also to:

- Work with municipalities and regions to ensure that funding is targeted in appropriate and efficient ways.
- Consider the regional context including: (1) the long-term financial viability of the project; and (2) the entity that will ultimately be responsible for servicing and financing the project over the long term.
- Level the playing field for municipalities and regions applying for funding. This includes making funding procedures and allocation decisions transparent and providing support at the provincial level, especially for smaller municipalities, to complete and submit competitive grant applications.
- Help all municipalities learn from the experiences of others. This includes publishing both the applications of the successful grants as well as reports on the outcomes of the projects that were funded [Interview #23B]. Synthesis studies on best practices and successful projects would provide learning tools to improve funded projects over time. These activities would also improve the transparency and accountability of the programs.
- Use funding 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.

2.3.1 FUNDING

Issues such as Canada's infrastructure deficit[31] and the vertical fiscal imbalance between the various levels of government (although debated) are evident in the calculations of provincial and municipal officials as they consider the most appropriate roles for higher levels of government to promote conservation and efficiency in municipal water supply. In fact, all participants listed funding as a primary role for the federal government and somewhat less so for provincial/territorial governments.

These issues are not new to the provinces and territories, and several of Canada's jurisdictions are taking steps toward improving funding mechanisms for water supply.

First, the diverse needs of communities must be recognized. The BC Task Force on Community Opportunities, for example, argued for more collaborative relationships with Infrastructure Canada to "achieve more flexible, locally adaptable and administratively streamlined programs" (Task Force on Community Opportunities 2006, 26). In terms of federal funding for municipal infrastructure, staff at the Cape Breton Regional Municipality (CBRM) called for more consideration of the service provider responsible for maintaining the infrastructure. As such, the long-term financial feasibility of projects should be carefully considered. Flexible funding mechanisms that address the needs of funding bodies, service providers and local communities are key.

Second, several provinces are thinking of ways to strategically direct their funding. The Province of Alberta is looking toward incentive-based funding to support conservation and already has mechanisms in place to encourage the regionalization of small water supplies through

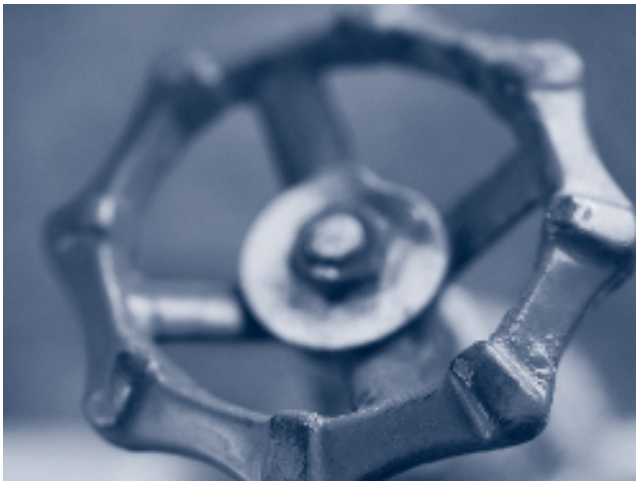
[31] The Federation of Canadian Municipalities (FCM) defines the infrastructure deficit as the difference between the quality and capacity of the infrastructure that is in place and the quality and capacity of that which is needed. They measure the deficit according to "the cost to build, maintain and repair essential infrastructure." Published estimates of the deficit's magnitude in Canada vary widely (Infrastructure Canada 2004a). The Canadian Water and Wastewater Association (CWWA) estimates a required investment of $88.4 billion for the period from 1997 to 2012 (CWWA 1997).

TABLE 6: PRESCRIBED FEDERAL AND PROVINCIAL ACTIONS ON KEY ISSUES

	Federal	Provincial
Funding	**Issues:** • The infrastructure deficit. • Vertical fiscal imbalance. **Actions:** • Consider regional context in funding decisions. • Cost-sharing with other levels of government on programs. • Facilitate the application process for funding. • Tie funding to improved water efficiency. • Provide funding for ICI water auditing and support for sectoral implementation.	**Issue:** • Many rural water suppliers lack the capacity and funds to provide sustainable water services. **Actions:** • Grant funding with strategic goals developed in collaboration with municipalities. • Publish outcomes of grants, sharing experiences and best practices in an easy-to-navigate portal. • Facilitate the application process for funding (e.g., dedicate staff to assist municipalities with applications).
Monitoring	**Issue:** • With growth and increased water demand, monitoring of water quantity and quality becomes more important. **Actions:** • Support provinces and municipalities through research, data collection, funding, and inter-jurisdictional co-ordination. • Establish nation-wide common monitoring protocols so that data can be compared. • Establish national benchmarks for water efficiency in utilities.	**Issue:** • With growth and increased water demand, monitoring of water quantity and quality becomes more important. **Actions:** • Support and require water-use accounting from water users to generate much-needed knowledge. • Provide financing and support for water auditing.
Partnerships/	**Issues:** • Lack of leadership. • Duplication of efforts. • Unclaimed roles. **Actions:** • Bring provincial and other agencies together to co-ordinate efforts and share best practices. • Develop a federal water strategy to focus efforts and avoid duplication • Support work such as that of the CCME Taskforce on Conservation.	**Issues:** • Water tends to fall under the jurisdiction of multiple ministries and pieces of legislation. • Water management plans require the involvement of diverse groups. **Actions:** • Make formal arrangements to bring water-related programs into contact. • Prepare a guide to water-related legislation and regulation in each province • Support basin-level organizations.
Knowledge Building & Dissemination	**Issues:** • Lack of leadership. • Lack of standards for and research on many water-using products. **Actions:** • Develop and implement a new National Water Policy • Research devices such as humidifiers and ice machines	**Issue:** • Lack of knowledge about water use **Actions:** • Develop sectoral Conservation Efficiency Plans as in Alberta. • Support basin-level organizations. • Revise legislation to encourage proactive innovation appropriate to context and sector.
Encouraging Innovation	**Issue:** • Established devices have a market advantage over efficient devices. **Actions:** • Devise regulatory standards for water-using devices and amend the building codes accordingly. • Ban inefficient fixtures.	**Issues:** • Legislation that inhibits innovation (e.g., against water reuse). • Inertia that impedes innovation at the municipal level. **Actions:** • Remove legislative barriers to innovation for water reuse. • Make funding for infrastructure on the water and wastewater side conditional on water conservation programming.
Leading by Example[32]	**Action:** • Implement water efficiency in federal jurisdictions, buildings and initiatives.	**Action:** • Implement water efficiency in provincial buildings and initiatives.

[32] Boyd, for example, notes the importance of federal actions to reduce its own consumption through its Greening Government Operations program (Boyd 2003, 50). In Quebec, where municipalities are prohibited from charging provincial institutions for water, these can be the most profligate users with no incentive to invest in efficiency [Interview #27B].

its infrastructure grants program. Similarly, the BC Task Force sees its role in revenue sharing as one of "managing outcomes" (Task Force on Community Opportunities 2006, i). The BC Infrastructure Planning Grant Program provides up to $10,000 for communities to prepare long-term comprehensive plans for infrastructure management. Two million dollars per year will be directed toward encouraging municipalities and regional districts to plan for water supply management, including water conservation, metering and demand management. This program will help ensure progressive results from British Columbia's upcoming grants for infrastructure development, the majority of which are to be directed at water (approximately $250 million) [Interview #28B].



2.3.2 PARTNERSHIPS AND CO-ORDINATION

Several recent studies have identified a lack of co-ordination, duplication of efforts and inaction on certain issues as significant water policy issues across the country (e.g., Hill and Harrison 2004; Hoover et al. 2007; Hill et al. 2007; BC Auditor General 2003).

In the Canada-wide survey, when asked about the division of responsibilities among levels of government, approximately 15% of the respondents commented on the need for co-ordination; others noted a lack of leadership, and changing expectations due to a lack of defined responsibilities and expectations. These issues were said to result in a lack of responsibility, accountability, transparency, consistency, enforcement, and efficiency. The challenge for the provinces and territories in terms of co-ordination lies with the many pieces of legislation and the many departments that drinking water issues fall under. **Provincial governments have developed diverse strategies to co-ordinate these efforts.**

- Manitoba is the only province to bring all water issues under a single ministry: the Manitoba Ministry of Water Stewardship.
- Alberta Water for Life is led by the Ministry of Environment, which works with 14 other ministries, with an inner core of six to eight ministries. In this way, Water for Life is considered a '"Government of Alberta initiative" that is led by the Ministry of Environment.
- In other provinces, regular meetings of co-ordinating networks have been organized. In British Columbia, the Assistant Deputy Ministers' (ADM) Drinking Water Committee meets regularly to co-ordinate among the relevant ministries. In Nova Scotia, the Ministry of Environment and Labour holds the co-ordinating function, which it fulfills through a regular meeting of senior managers to address water issues.[33]

Provincial governments also need to assist with **co-ordination and partnering at the local and regional levels.** Water management for sustainability (that includes a source-to-tap approach) requires a wide-range of local partnerships. In Ontario, the Conservation Authorities have been assigned this task in the development of watershed management plans under the SDWA.[34] In Alberta, the role falls to the WPACs. These organizations have differing responsibilities, differing levels of authority, and differing roles in co-ordination. In British Columbia, legislative arrangements to facilitate partnerships and incentives to co-ordinate local and regional interests have been discussed (see Task Force on Community Opportunities 2006). The difficulty of achieving co-ordinated efforts in the Okanagan Basin demonstrates the need for such work (see Hoover et al. 2007).

2.3.3 KNOWLEDGE BUILDING AND ENCOURAGING INNOVATION

In many respects, Canada has gone from being

[33] For further discussion see Hill et al. (2007, 370-374).
[34] This situation is not without challenges. For example, lake-based source water intakes (applying to many municipal water utilities in Ontario) fall outside of the jurisdiction of Conservation Authorities.

a leader to being virtually non-existent in water research and innovation over the past 40 years (Schindler 2001; Booth and Quinn 1995). Over the last decade, however, there has been resurgence in the commitment to water science, policy and innovation at the provincial level. In their essay "Challenging the Status Quo," de Loë and Kreutzwiser attribute the decline of the past decade to the increased complexity of water management since the 1950s, and the decrease in provincial and federal attention to water policy since 1980. They associate the current resurgence with the contamination incidents at Walkerton and North Battleford (de Loë and Kreutzwiser 2007, 91-93).

Other actions at the provincial and federal levels actually act as **barriers to innovation in water-efficient technologies.** These include: regulations against water reuse (Boyd 2003, 51); and legislation that entrenches the market advantage of inefficient devices, which remain cheaper, more prevalent, and better understood. Such barriers to innovation are well documented in research on technical change (Norberg-Bohm 1999). In fact, it has been argued that government environmental policy is one of the greatest determinants of the success of environmental technologies over the long term (Jaffe, Newell and Stavins 2002).

3. Good Governance: The Municipal Scale

This chapter of the report focuses on how water conservation, under current and changing governance arrangements, plays out at the municipal level. We examine the influence of municipal governments, and competing and complementary utility goals. In particular, we look at the effects of continuous improvement, fairness, and trends in business models on conservation. We conclude by focusing on the unique situation of small municipalities and how resolving their governance challenges can improve conservation.

3.1 DELEGATION TO MUNICIPALITIES: CHALLENGES AND OPPORTUNITIES

Above, we discussed the delegation of authority to municipalities as an aspect of shared governance. This research project found evidence of both challenges to and opportunities for improving conservation through municipal governance. In some provinces, the empowerment of municipalities through delegation of authority and opportunities to improve capacity (e.g., new fundraising mechanisms) has resulted in more municipal action toward sustainability, including progress on conservation.

The first report in this series focused extensively on governance at the municipal scale, finding that municipal politics may present challenges to efficiency and DSM programs, and limit opportunities for improvement. Political and economic barriers to metering, bylaw and retrofit programs still exist, as do limits on opportunities to promote consumer protection and sustainability. The Canada-wide research, which built on the research from the pilot-phase, confirms these challenges and expands the original findings. As outlined in Box 7, the subsequent research has resulted in a more thorough understanding of the situation (see page 25).

3.2 UTILITY GOVERNANCE

3.2.1 CONTINUOUS IMPROVEMENT

Continuous improvement refers to all aspects of drinking water provision. It implies persistent gains in efficiency and effectiveness, including: a utility's social and environmental impacts, its use and quality of infrastructure, and its financial management. Continuous improvement requires a long-term vision of sustainable water management supported by sufficient and reliable funds that are allocated appropriately. It also relies on the availability of reliable information to inform decisions about the best use of limited resources. Continuous improvement that addresses the social and environmental aspects of water supply requires shared governance and accountability.

Cost recovery supported by accountability and fairness is necessary for infrastructure maintenance and rehabilitation—key elements of continuous improvement. Where maintenance and rehabilitation are concerned, continuous improvement and reduced water demand are linked through programs to control water loss and water

BOX 7: MUNICIPAL GOVERNMENT INFLUENCE ON SUSTAINABLE WATER MANAGEMENT

1. Where councils champion sustainability, utilities improve programs and overcome barriers.

- The Imagine Calgary program provided goals, motivation and pressure for Calgary Water to go yet further on conservation [Interview #5B].
- Vancouver's council endorses residential metering. Despite cost concerns, the utility has responded by examining options for implementation that reduce the economic burden on residents (e.g., increasing the length of pay-back periods) [Interview #11B].

2. Bylaws are useful tools beyond outdoor water-use regulation.

- The BRBC identifies municipal policies and bylaws as the areas of greatest legislative change in Alberta since 2000 (BRBC 2005). For plumbing fixture and landscaping bylaws, see Table 5.
- Waterloo's ban on once-through cooling in 1990, led some companies to reduce consumption by 60% (Boyd 2003).

3. Ideas about consumer protection are complex and require careful consideration.

- In Quebec, meters are often seen as the first step toward private-sector management and to adversely affect low-income users [Interviews #25B, 26B], making domestic metering politically unfeasible. Yet, metered pricing can improve social equity and is crucial for continuous improvement.

4. Utilities need to address bureaucratic issues to facilitate the acceptance of programs.

- In Kelowna, support for the landscaping bylaw meant working with City Hall to minimize the bureaucratic burden on developers trying to comply with the new regulations[35] [Interview #23B].

5. Municipal governments can serve as a vehicle for partnering to broaden programs.

- In Calgary, municipal departments and the council work together through an advisory group on sustainability. Calgary Water is working on changing the municipal purchasing policy to require efficient devices and on a program to reduce development fees for green buildings with the building approvals group [Interviews #5B, 6B].
- Municipal associations can effectively co-ordinate municipal efforts. In Alberta, the urban and rural municipal associations are working with municipalities to develop sustainability plans. Réseau Environnement has been effective in Quebec.

6. Encouraging full-cost accounting frees grant funding for other municipal infrastructure.

- In the CBRM, since 2004, the utility has been working on $54 million in capital upgrades; all but $3.4 million has come from water rates. Council took this decision so that available senior government funding is spent on infrastructure instead of depending on the property tax [Interview #16B].

7. Dedicated and independent staff working on sustainability is necessary to put issues on equal footing with other municipal issues and demands.

- Sustainability issues can often be sidelined for other concerns or be promoted on an ad hoc basis.

accountability.[36] Such programs also require funding to sustain and improve necessary infrastructure. Adequate and stable revenue is achieved through ring-fencing, full-cost accounting, and a sufficient customer base that allows a utility to raise funds without undue hardship to the consumer. A comparison to the wastewater experience in many municipalities is telling.

- In the CRD, wastewater infrastructure is a responsibility of the local municipalities and is funded through the property tax. In the local municipality of Oak Bay, the wastewater infrastructure is "of much lower quality" than that of water [Interview #8B].
- For the same reason, the HWC incorporated the region's wastewater services into its mandate in August 2007 [Interview #13B]. It is now the first regulated utility in Canada to be responsible for operations and infrastructure from intake to effluent.[37]

Methods and conflicts: Continuous improvement relies on good information (for watershed managers, utilities and customers), full-cost recovery, and reliable revenue streams. These require metering technology and supportive practices (maintenance, and appropriate billing and pricing practices), education, and political accountability.

The experiences of some municipalities show the two main benefits of metering and pricing: (1) some utilities have witnessed a marked drop in consumption with the introduction of meters and consumption-based pricing, and (2) metering enables breakthroughs in leak detection programming that results in significant water and cost savings.

- In both the CBRM and Kelowna, consumption dropped with full metering. Consumers were surprised when they were informed of their consumption levels [Interview #15B & 23B]. In CBRM, prices for water supply increased as the utility upgraded its infrastructure. In

[35] For instance, tying building permits to efficiency standards is limited by the fact that, currently, the home is built and the owner moved in before the building permit is issued. This issue needs to be addressed in some way [Interview #23B].
[36] Water accountability is a specific approach to leak detection and repair that moves away from the traditional focus on unaccounted-for water (see Yates 2005).
[37] Other utilities, including Toronto Water (1998) and Calgary Water Services (2006), have brought water and wastewater services under one management structure. Halifax Water, however, is the only one that is regulated by an arm's-length body (the NSUARB).

Kelowna, however, prices were designed such that bills for metered consumption would initially remain the same as bills paid under the flat-rate system.
- Halifax Water's internationally renowned water accountability program is dependent on metering. They made a major breakthrough in the program when they placed large meters in their districts metered areas. The economic savings from this program have increased every year (Yates 2005).

Conservation can come into conflict with continuous improvement when reduced water demand results in reduced revenue. This has proven to be a significant issue in some Ontario municipalities (Gombu 2008).[38] Municipalities such as the City of Toronto stipulate that the utility remain revenue neutral under conservation. Initially, this may mean increasing water prices as consumption decreases because prices are based on operations and capital infrastructure projections. Often, utilities approach conservation on a cost-benefit basis whereby the programs are highly cost-effective due to the savings they provide on infrastructural expansion. In Toronto, Peel and Durham, the benefits of conservation programs must outweigh new infrastructure costs by a ratio of three to one (3:1). In the long term, the reduction in required capital through conservation means that less revenue is needed, balancing the effect of conservation.

Nonetheless, the issue of decreasing revenue associated with DSM requires attention. It has also proven problematic in the energy sector. In Ontario, for example, Pollution Probe recommended two mechanisms to counter lost revenue due to lower energy consumption: (1) the Lost Revenue Adjustment Mechanism (LRAM) which ensures that the province's energy utilities will not lose money by improving conservation, and (2) an incentive for utilities to pursue conservation through the Shared Savings Mechanism (SSM) (Gibbons 2004).

Challenges: Overcoming inertia and path dependency requires a vision and is necessary for continuous improvement. Research on the history of water supply in Europe has shown that decisions taken today, or in the past, can limit the options available in future decision making. For example:

- Decisions not to meter water, to use lead piping, and to use water-based toilets (leading to water-borne sewage) had long-term impacts and have presented difficulties for adaptability and transition.
- Inadequate attention to demand management, cost recovery, and wastewater treatment after World War II in Eastern Europe will continue to have long-term effects requiring more investment and major rehabilitation (Juuti and Katko 2005).

In Canada, the clearest example of this is with metering. While 63.4% of residential customers were metered in Canada in 2004, in some provinces no residential customers were metered (Environment Canada 2007). Metering is an important tool for continuous improvement in water supply, but implementation is often limited by inertia where meters were not installed early in the utility's history. The municipalities of Kelowna, Toronto, Kingston, and the CBRM have all virtually—if not completely—realized full metering in the last 15 years. Their experiences demonstrate that full metering is achievable. It requires a political decision about what is included in the cost of providing water and the decision to provide

BOX 8: CONTINUOUS IMPROVEMENT IN CAPE BRETON REGIONAL MUNICIPALITY, NOVA SCOTIA

In 1995, several municipalities in Cape Breton County were essentially bankrupt and dependent on emergency funding from the Government of Nova Scotia. In response, the Province mandated the amalgamation of eight municipalities, eight water utilities, a regional planning authority and a regional transit authority in Cape Breton County. These municipalities are spread over 500 square kilometres and range in population from just over 1,000 in Louisbourg to 33,000 in Sydney. Compounding its economic situation, the region is experiencing rapid population decline (Heseltine 2004).

The CBRM Water Utility is responsible for providing service to all former municipalities of Cape Breton County. By sharing the costs across them, the utility has made significant gains that might otherwise have been impossible. Since amalgamation, the water utility has achieved full metering, embarked on infrastructure improvements worth $54 million dollars to meet new drinking water standards, and instituted some consumer DSM programs. The utility has added more than 700 new customers and is pumping less water today than in 1995 due to the tightening of its system through leak detection [Interview #15B].

[38] When the CBRM Water Utility completed metering in its remaining areas, 50% of the household water bills decreased from the earlier flat rate (by an average of 15 to 18%). This represented a reduction in revenues of $250,000 [Interview #15B].

system knowledge, accurate information, equity and sustainability. These are local political decisions, but can also be taken at the provincial level by legislating full-cost accounting for water supply (as was done in Ontario), and by defining what those full costs are.

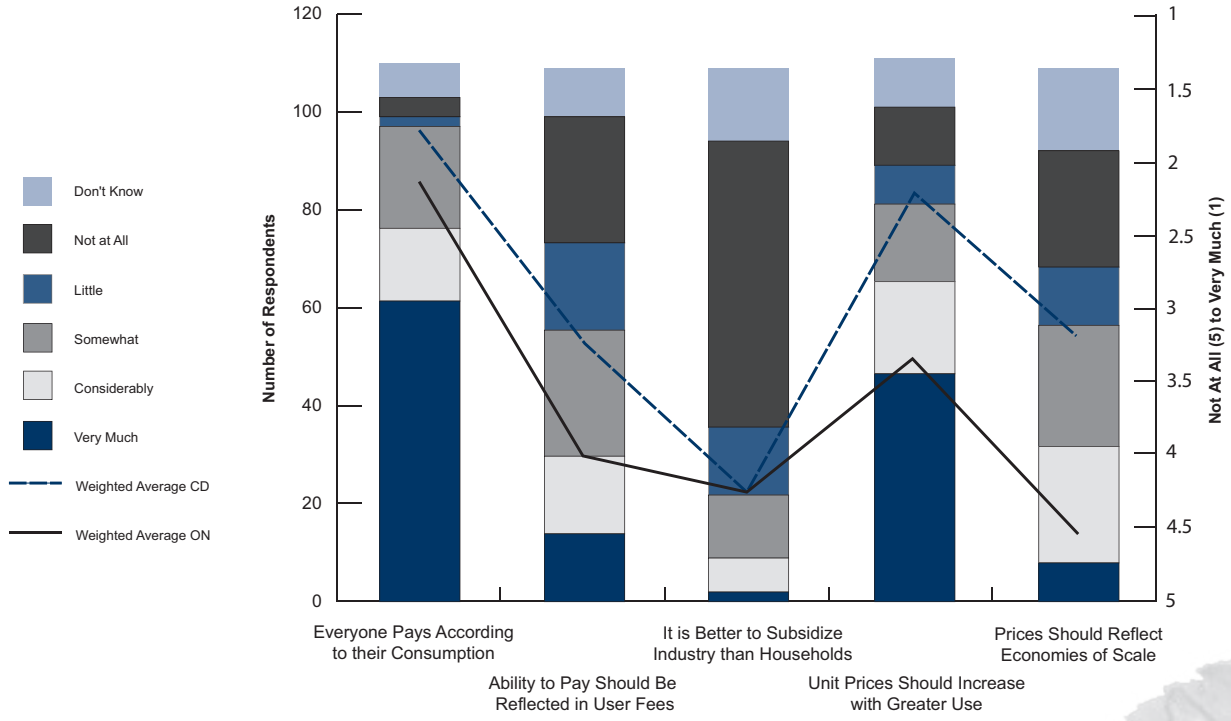
Governance arrangements can facilitate a utility's ability to raise funds in ways that do not unduly burden consumers. In their study of the evolution of water supply services in 29 cities in 13 countries across Europe from 1850 to 2000, the WaterTime Project found that the economic capacity of a region did not correlate with efforts toward water pollution control and that "sometimes the opposite is true" (Juuti and Katko 2005, 227). Achievements can be made in a variety of economic circumstances given good governance. The Cape Breton Regional Municipality is a case in point (Box 8).

3.2.2 FAIRNESS

The first report in this series made links between pricing for full costs, DSM and economic equity[39] (user-pay according to consumption) (see Furlong and Bakker 2007). Here, we highlight the need to ensure fair pricing (including social equity) in that context. Fairness generally receives little consideration in municipal water supply in Canada (see Figure 3 "ability to pay"). However, fairness in this context is of increasing importance, and is compatible with the contemporary demands for economic equity and full-cost recovery. Moreover, fair pricing can improve conservation where supportive measures (such as appropriate billing practices) are integrated. Finally, fairness can lead to improved conservation because it means helping people reduce consumption as prices rise. These issues are explored below.

Most respondents agreed that water consumers should pay according to their consumption; they argued for the economic equity derived from the user-pay principle. At the same time, respondents were skeptical of pricing structures that accounted for a consumer's ability to pay.

FIGURE 3: TO WHAT DEGREE DO THE FOLLOWING STATEMENTS REPRESENT YOUR ORGANIZATION'S POINT OF VIEW?
Source: Canada and Ontario Expert Surveys. Legend: CD = Canada



[39] Economic equity refers a situation where users are charged according to their consumption. Social equity refers to a situation whereby all users have equivalent access to water services.

This was borne out in both the survey (Figure 3)[40] and the interviews. In general, interview respondents either felt that social welfare was a responsibility for higher levels of government or that ability to pay was not an issue in their community (especially given the low price of water). In general, municipal councils attribute more importance to the issue than utility management.[41]

While the lack of attention paid to social equity may stem from traditionally low water prices in Canada, things are changing. Prices are rising rapidly in many municipalities across the country, calls for full-cost recovery and user-pay approaches are increasing, and demographics are changing. Several issues and possibilities emerge:

- **Non-metered pricing and equity:** With flat-rate pricing, those who use less water subsidize those who use more. Flat rates are determined according to lot size, number of bathrooms etc.; however, the equity implications of flat rates are questionable (Dresner and Ekins 2006; Bakker 2001). For example, a fixed-income pensioner who still owns his or her property may pay the same as a middle-income family. With metered pricing, some people's bills will be lower. In this way, social equity is compatible with full-cost recovery and user-pay models.
- **Demographic change and equity:** In Peel, one official questioned the social equity of rising-block rates for households given that the demographic of the single family home is shifting with immigration. Increasingly, more than one family may share a suburban home and thus be penalized for using more water per household, but not necessarily more water per capita [Interview #27]. This is an argument for Constant Unit Charge (CUC) pricing.
- **Options for meeting equity goals under full-cost recovery and user-pay:** Utilities and municipal governments have several options to ensure social equity amid rising prices that will still meet their financial goals. One example is lifeline tariffs that ensure a certain volume of water at an affordable rate. In the Canadian context, however, where social equity is considered a welfare (and therefore government) mandate, other strategies may be more easily implemented.

- In 2002, **Hamilton** started the Utility Arrears Assistance Program, which draws $500,000 from water rates to subsidize low-income user water bills. [42]
- **Kingston** City Council started a subsidy fund for low-income water users at the Kingston Economic Development Corporation with $5,000 in November 2005, anticipating contributions from other local bodies and levels of government.
- **Australia** uses the building-block model for rates; this cost of service model includes the costs of conservation programming (including water recycling) and allows for local variation in rates (Baxter 2005). A community fund supports social objectives and the source of funding is separate from rates revenue.
- **Fairness** can also be improved through improvements to conservation. The implementation of and assistance with household DSM measures can help consumers reduce their consumption as prices rise. This is a key element of fairness.

User-pay metered pricing used as a tool for conservation (in addition to economic equity, good business practice, and system knowledge) affects pricing structures and billing arrangements. In terms of pricing structures: (1) for DSM, it could mean rising-block or constant-unit rates as opposed to declining-block rates; and (2) for conservation generally, it could mean including environmental costs in prices. In Calgary, they have had some "good success" including the costs of protecting their upstream watershed in their rate base. In terms of billing, it means accurate, monthly billing. This in turn has implications for meter maintenance and meter reading. Mechanical meters may read lower than accurate as they age,[43] which points to the importance of maintenance. Meter readings must not be estimated and they must be done monthly. In Hamilton and Toronto,

[40] Figure 3 represents an agglomeration of data from a survey conducted on Ontario in the summer of 2005 and another conducted on the remaining provinces in 2007. These data and surveys are available at www.watergovernance.ca/Institute2/municipal. The bars show the responses from the pan-Canadian survey and the lines compare the weighted averages of the responses from the Ontario and Canada-wide surveys.
[41] See discussions on Hamilton and Kingston in the first policy report in this series (Furlong and Bakker 2007). In CBRM, utility management also noted the concern of municipal council with pensioners' ability to pay [Interviews #15B, 16B].
[42] It became a water-to-energy subsidy program, however, with 93% of funds directed at energy bills (City of Hamilton 2004) (See Furlong and Bakker 2007, 19).
[43] A study conducted on Hamilton's water metering program found that, due to financial losses from the low readings of aging meters, an "aggressive" large-meter preventative maintenance program could result in up to $2 million in increased revenues for the utility (City of Hamilton 2002, 16).

where users are billed on a three-month cycle, consumers do not receive discernable price signals according to their consumption [Interview #41], nor do they receive information about changes in their consumption, which might alert them to leakage on their property.[44]

3.2.3 BUSINESS MODELS

Business models encompass the practical arrangements for achieving good governance goals. Governance reflects processes through which decisions are made and a governance model is a formula for achieving the desired principles of governance in decision making (e.g., the Carver model or the planning model). A business model delineates features such as ownership, organizational structure, and the risks and responsibilities for the management of the organization and its improvement (Bakker 2003, 5).

Restructuring business models changes how actors interrelate and changes their involvement in decision making. In this way, business models affect the form and uptake of efficiency programs. In fact, in Halifax, "the same inefficiencies of waste, high cost, overruns and poor service" precipitated three business model restructuring efforts to address the issues: (1) from a private company to a board of commissioners in 1861; (2) from the board to the City Works department in 1894; and (3) finally, to the Public Service Commission of Halifax in 1945 (today the HWC) (Curwin and Halifax Water Commission 1995, 41).

TABLE 7: IMPLICATIONS OF VARIOUS BUSINESS MODELS FOR CONSERVATION AND EFFICIENCY PROGRAMMING

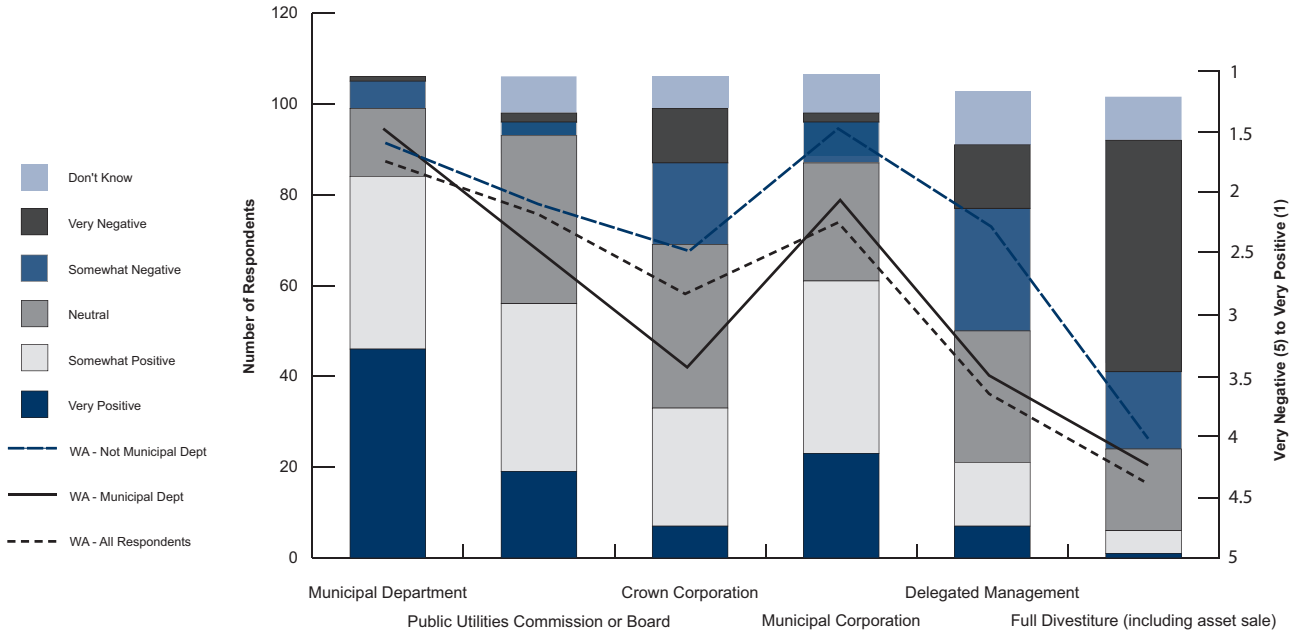
BUSINESS MODEL	IMPLICATIONS FOR CONSERVATION PLANNING
Municipal Department	• Conservation programs and budgets require council approval and fora exist for public input through council. • Greater care must be taken to develop programs that are acceptable to the public. This may mean compromises—especially on economic and regulatory measures—but it can also mean more robust and broader programs in the long term. • May present barriers to ring fencing of water rates where municipalities face financial challenges. • Consumer protection is a stronger consideration than with other models.
Board or Commission	• Program development and approval has more autonomy from council. • They have been credited with providing the necessary budget autonomy to implement a broader range of ambitious programs. • They can suffer similar limitations as the corporation (see below).
Municipal Corporations	• Greater scope for economic measures for conservation. • A narrower focus in terms of overall programming. • Supply-side measures such as leak detection are favoured over demand-side measures. • Municipal government leadership may be needed to ensure that broader and more ardent programs are pursued.
Delegated Management to an External Operator (External Concession)	• Conservation programming becomes a value-added option that a municipality can opt for from the range of services provided by the contracted operator. • Municipalities, rather than utilities, may need to take the initiative for conservation in these cases. • Delegated governance of conservation to local agencies becomes more important.
Full Divestiture (Privatization)	• Economic incentives are favoured. • Regulatory oversight is required to ensure conservation.
Two-tier Models	• Can enable broader conservation programs over a larger area. Distance from local politics can facilitate the implementation of economic and regulatory measures at the regional level. • It can be difficult to achieve bylaw and rate harmonization across local municipalities. Provincial assistance may be necessary. • Bulk water cost-sharing incentives to increase efficiency in local municipalities are possible.
Exogenous Governance	• Political distance can facilitate higher pricing and efforts to link water provision to a certain level of efficient use in the receiving municipality. • The receiving municipality can suffer from a feeling of having an insecure supply, encouraging them to seek local supply solutions. • Receiving municipalities should have long-term guarantees of supply with conditions for efficiency clarified up-front.

[44] Halifax Water takes a different approach to this problem. Using their metering data, they call customers when there is a noteworthy change in their consumption. This is effective in terms of both under and over consumption. If a customer has gone away in the winter and forgotten to leave a tap dripping, the program helps to prevent pipe freezes and basement flooding. If a customer has domestic leakage, this can also be rectified. The program contributes to the goals of efficiency, conservation, and customer service.

FIGURE 4: WHAT IS YOUR OPINION OF THE FOLLOWING BUSINESS MODELS FOR WATER UTILITIES IN CANADA?

Source: Canada-wide survey, N=119 (before controlling for unfamiliarity), N Utility Municipal Dept=44, N Utility Not Municipal Dept=16

NB: The bars include data from all respondents. The lines reflect weighted averages from different groups of respondents.



Business model restructuring—especially with respect to delegating management to the private sector—has received a great deal of attention in Canada over the last 15 years. The case research indicates strong interest in arm's-length business models that retain municipal government involvement and ownership by the municipality or a municipal utility (i.e., PUCs or boards) and municipal corporations. These findings were echoed in the Canada-wide survey where participants were asked their opinion on a series of business models for water utilities in Canada (Figure 4). [45]

- On average, respondents favoured the municipal department model, followed by the public utilities commission (PUC) and the municipal corporation.
- Preference for the municipal department model is reduced when findings are adjusted to account for the fact that Canadians are most familiar with this model—the most common business model for water delivery in Canada.[46] Respondents felt most confident expressing an opinion on the municipal department model.[47]
- Overall, those working in municipal departments tended to favour the municipal department model; those not working in municipal departments tended to favour other business models.
- Sixteen of the responding municipalities (22%) indicated that they would like to change their business model. Of these, the majority preferred the municipal corporation model followed by the PUC or board.
- In terms of delegated management, respondents were further asked to specify a preference for a public or private operator; only two of 61 respondents indicated a preference for a private-sector operator.
- There was no support for full-divestiture (privatization).

The pilot phase research in Ontario demonstrated that as utilities become more arm's length from municipal government, their programming adheres more strictly to legislative mandates to provide a utility service as opposed to, for example, an environmental or social service. The greater the public orientation of a utility, the broader the scope of its approach to good governance. In general, arm's-length business models mean that a utility is less concerned with the politics of municipal councils in terms of program approval. The relationships between different business models

[45] The figure contains no data for Ontario because this question was not asked in the first survey (in Ontario). That said, the case study research in Ontario indicated a strong interest in arm's-length business models (see Furlong 2007a).
[46] This was done by eliminating all responses in which the respondent answered "I don't know" for more than half of the options presented.
[47] It received approximately one third the number of "I don't know" responses as the other options.

and programming for efficiency and conservation, as revealed through the research, are summarized in Table 7 with further details in the remainder of this section.

In the case of a **municipal department model**, utilities may omit certain techniques to ensure approval at council. They may also take greater care developing the program so that it is acceptable to the public. This requires the inclusion of a diversity of actors. While municipal councillors at Utilities Kingston have expressed concern that they cannot get environmental issues onto the agenda, the design of the Toronto water efficiency plan (WEP) involved extensive efforts to develop a program the council would endorse [Interview #37]. Toronto Water hired a public consultant who organized meetings with the public, council and industry to secure their support [Interview #37].

The **arm's-length model** may in theory have more options in terms of supply and demand management programs; however, this model tends to focus on particular program areas. This is particularly true of economic programs for demand management, which are of interest to utilities but can be politically difficult to implement (see Table 3). Recent research on economic instruments (EIs) concluded that, due to the lack of political interference, arm's-length business models for water supply are the most amenable to EI implementation (Renzetti and Marbek Resource Consultants 2005). Arm's-length models, however, may yield a more limited approach to the range of programs that are applied overall.

- Utilities Kingston, a municipal corporation, actively pursues structural-operational supply-side efficiency programs in the form of leak detection; demand-side programs such as retrofitting are not implemented. Leaking pipes are considered lost revenue, whereas excess demand is not [Interview #17].
- EPCOR's water efficiency activities in Edmonton (aside from leak detection) focus primarily on public education and communication using the AWWA's "only tap water delivers" messaging.[48] The City of Edmonton is a key mobilizing force on water efficiency. It was the City that pursued the efficient fixture bylaw, involving EPCOR and other stakeholders [Interview #19B].

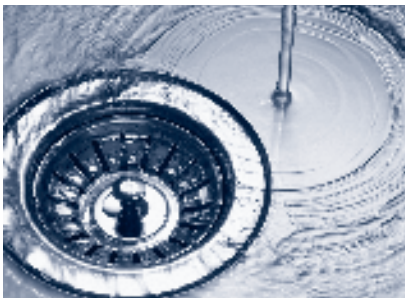
Assurance of a distinct revenue stream can also give arm's-length utilities greater freedom to pursue programs where they are proactive.

- Through its restructuring efforts, the Halifax Water Commission (HWC) credits "management by a commission that owned and operated the system on behalf of the City" for enabling the utility to overcome its perennial problems of wastage, cost overruns and poor service (Curwin and Halifax Water Commission 1995, 9).
- The HWC is rare in Canada as a utility that both owns and operates the water (and now wastewater) infrastructure.[49] Ownership at HWC is seen as essential to accountability and responsibility; otherwise "the utility is responsible for the outputs without having control over the inputs" [Interview #13B]. In Ontario, respondents indicated that infrastructure ownership would facilitate capital projects by enabling the utility to borrow without affecting the municipal credit rating [Interview # 23].
- In the CRD in British Columbia, the separate commission status secures a distinct revenue stream. One commissioner credited the model with giving the utility greater freedom in decision making, thereby enabling its success on water conservation [Interview #8B].[50]

With a **delegated management to an external operator** (or "external concession") **model**, experience suggests that water supply and demand management programs would be approached as a value-added option and not of direct benefit to the income stream of the contracted entity. This is how the Ontario Clean Water Agency (OCWA) approaches supply and demand management in its contract municipalities. Water supply and demand management programs are not part of the Crown corporation's basic offer, but municipalities can ask OCWA to implement such programs at extra cost [Interview #13].

Formerly, OCWA did have a water conservation section when it owned the water facilities that it services (1993-

[48] EPCOR has also conducted a toilet rebate program in Edmonton.
[49] In most cases in Canada, the municipality retains ownership of the infrastructure. EPCOR is another exception. A recent development in Ontario has given utilities the ability to legally own water infrastructure. The relevant legislation is the Municipal Services Corporations Regulation, enacted under the *Municipal Act* (2006).
[50] The participant noted that only once has the Commission rejected a proposed conservation program from the utility. This was for grey-water use. They reasoned that due to current health regulations it wasn't worth the cost, but that they would keep it open as a long-term option [Interview #8B].



1997). The decline of the water conservation program began when OCWA was formed as a separate entity from the Ministry of Environment and given a mandate for cost recovery.

> What OCWA was told to do, was to turn yourself into a cost recovery operation. So go to your clients, provide services and recover the costs of providing those services. What we found was that, at that time, there wasn't much of a market for water conservation and so it basically ended up kind of withering on the vine. So we focused more on the provision of operation and maintenance services. [Interview #13]

When OCWA owned the facilities it had a distinct motivation for efficiency when infrastructure was nearing capacity. Although their water efficiency section was minimal, with approximately three staff, OCWA implemented a range of water conservation services in the water-stressed greenhouse region of Essex [Interview #13].

In terms of **privatization**, although it has not taken root in Canada and lacks support from those in the water industry (Figure 4), fear of privatization can have a negative impact on progress for sustainable infrastructure management and associated good governance principles. Privatization is an issue to be concerned about. In the European context, it has been found that "one of the most binding constraints" on the implementation of good governance principles is the choice of external concession as business model (Juuti and Katko 2005, 234). In Quebec, however, public and political nervousness about privatization is adversely affecting the implementation of residential metering which, combined with the province's lack of institutional metering, is likely to have adverse consequences for sustainable infrastructure management into the future.

Exogenous governance: This research indicates that when water supply wholesalers and distributors are separate entities, the incentives and disincentives for water efficiency and DSM diverge from those for service providers serving both functions. Separate wholesalers and distributors can be seen in two cases in Canada: (1) in two-tier regional governance models; and (2) in the case of bulk water sales between municipalities.

Regional two-tier models exhibit fewer of the concerns that lead water utilities to distance themselves from municipal governments. Still, two-tier models do have concerns associated with the regional-local division of responsibilities. For example, regions have more political freedom to set appropriate wholesale water prices, but they have little control over local municipal pricing in terms of either making prices uniform across the region or using them to encourage conservation. In Part II of his report to the Walkerton Inquiry, Justice O'Connor identified jurisdictional confusion and overlap with such arrangements and recommended that production and delivery be consolidated at the regional scale (O'Connor 2002).

Brandes and Ferguson find that: (1) "[t]he additional fragmentation of tiered water delivery requires government to co-ordinate their involvement in the planning and implementation of conservation measures" (Brandes and Ferguson 2004, 35); and (2) that the GVRD's regional status enables more comprehensive conservation programs over a larger geographical area (Brandes and Ferguson 2004, 44).

- The Region of Waterloo provides bulk water to seven local municipalities responsible for distribution. In terms of jurisdictional issues, the Region has not been successful with the harmonization of rates or outdoor water-use bylaws—topics they began to discuss in the region in 1987 (RACWC 1987). Many residents do not understand that regional restrictions supersede municipal bylaws (RACWC 1988). On the other hand, the Region has not experienced political problems related to pricing, water-use restrictions, or other programs for water supply and demand management [Interviews #43 & 44].
- The CRD likewise does not have uniform pricing across the local municipalities, as it has no control over local billing and pricing. The CRD Water Commission has considered a bylaw on Xeriscaping, but land-use is local issue [Interview #8B]. A provincial representative expressed skepticism about regional providers assuming distribution, and stated that the provincial government was moving toward involving regional wholesalers in local billing and pricing [Interview #28B].

The political distance of regional governments is

evident **when utilities wholesale water** to other municipalities. Wholesalers are able to charge higher prices for water to external purchasers than they can locally.[51] They also have the ability to engage with the external purchasers and influence water consumption practices to encourage greater efficiency. On the other hand, such arrangements may challenge water conservation initiatives in the wholesaling municipality and may threaten the water security in the purchasing municipality.

- In terms of pricing, Hamilton charges Haldimand 150% the local rate and, from 1987 to 1996, Metro Toronto consistently charged York Region from 22 to 36% more than it charged its area municipalities (Department of Works 1979-1996; City of Hamilton 2003).
- In Peel, the sale of bulk water to York Region has meant that establishing a lawn-watering bylaw in Peel is politically unlikely. Regional council negated bylaw proposals on the basis that no Peel resident will be asked to modify their consumption as long as water is being sold to York Region [Interview #27, 28].
- In supplying water to York Region, both Metro Toronto and the City of Toronto sought to improve the region's water efficiency. Metro Toronto moved that York Region be asked to adopt Metro's water efficiency measures to reduce peak demand and delay infrastructural expansion. In 2005, the mayor of Toronto indicated that, prior to another water agreement, York Region must shift to a planning approach that increases urban density and reduces infrastructure costs [Interview #34].
- These issues make purchasing municipalities nervous about water supply security should political, water demand or supply conditions change in the supplying municipality. This can encourage municipalities to seek their own supply sources. Costs and efficiency requirements in the purchasing municipality must be debated and agreed upon from the outset.

3.3 GOVERNANCE FOR SMALL MUNICIPALITIES

3.3.1 BUILDING CAPACITY THROUGH ECONOMIES OF SCOPE

Small municipalities face particular challenges, many of which stem directly from the difficulty of raising sufficient funds from a small consumer base. These challenges include: (1) financing infrastructure upgrades and maintenance; (2) financing, retaining, and attracting sufficient expertise; and (3) managing the environmental impacts of their facilities.

The financial challenges also have an impact on water efficiency and demand management. According to the *2004* Municipal Water Use Database, small municipalities used nearly twice as much water as large municipalities that year:

- Per capita residential water use averaged 291 litres per day in municipalities with a population of greater than 500,000, and 497 litres per day in municipalities with a population of 2,000 to 5,000.
- Residential metering averaged 73% in municipalities with a population of greater than 500,000, and 34% in municipalities with a population of 2,000 to 5,000 (Environment Canada 2007).
- In its 2001 Municipal Water Use Database, Environment Canada collected data on the implementation of eight categories of DSM programs. Statistics on this data show that smaller municipalities tend to have much fewer programs (Table 8).

Small municipalities often have a strong commitment to local autonomy, which makes these issues difficult to resolve. Amalgamation of small systems has worked well in some cases, but it is highly controversial. Several provinces and many small municipalities are seeking more collaborative approaches to creating **economies**

TABLE 8: UPTAKE OF DSM PROGRAMMING BY MUNICIPAL SIZE IN CANADA

POPULATION	NUMBER OF MUNICIPALITIES	MUNICIPALITIES WITH ONE OR MORE PROGRAMS		MUNICIPALITIES WITH FOUR OR MORE PROGRAMS	
1000-1999	736	108	14.7%	8	1.1%
2000-4999	607	131	21.6%	17	2.8%
5000-49,999	536	219	40.9%	44	8.2%
50,000-499,999	74	49	66.2%	20	27.0%
500,000 plus	10	8	80.0%	5	50.0%

Source: Compiled and processed from the 2001 Municipal Water Use Database (Environment Canada 2001)

[51] This assumes that there is no independent price regulator (such as the NSUARB), which is the case in many parts of Canada.

BOX 9: OVERVIEW OF EFFORTS TO ACHIEVE ECONOMIES OF SCOPE FOR SMALL MUNICIPALITIES

Consolidation of small systems into "water service areas" – *Watertight Report*, Ontario.

- The Water Strategy Expert Panel, commissioned by the Government of Ontario, proposed the consolidation of small systems into designated water service areas or clusters. These would be locally derived, but overseen by an arm's-length water board. The panel recommended that counties and clusters develop business plans together which would be subject to approval by a newly created provincial water board (Swain 2005). The recommendation sparked controversy.

"Made in British Columbia" solutions to create stronger communities.

- The BC Task Force on Community Opportunities identified four key barriers to building stronger communities: (1) the challenges of collaboration, (2) the need for creative leadership, and (3) the challenge of promoting regional action. The task force sought solutions that avoided forced amalgamation and emphasized "collaboration, incentives and co-operation" (Task Force on Community Opportunities 2006, i).
- For water supply, the provincial government is interested in regional systems although progress is slow. Of approximately 3,000 rural water systems, "75% are underperforming." Regionalization is seen as creating "collections of individual jurisdictions that get together for a common purpose, as opposed to a unitary jurisdiction." In terms of water supply, different levels of government may be better placed to provide different services [Interview #28B].
- British Columbia is exploring working with the Municipal Insurance Association to set up an insurance fund to address the liability of some of the under-performing systems [Interview #28].

Encouraging regionalization and knowledge sharing in Alberta.

- The provincial government in Alberta uses financial incentives to encourage small municipalities to present joint proposals for shared treatment facilities. Provincial grants are available for municipal water systems, and regional proposals are eligible for a larger share of the funding.
- The Province has requested that Calgary share their efficiency program information with smaller municipalities that lack the capacity to develop such programs and the City has been "more that happy to do that" [Interview #5B].

Bulk water purchase from a neighbouring municipality.

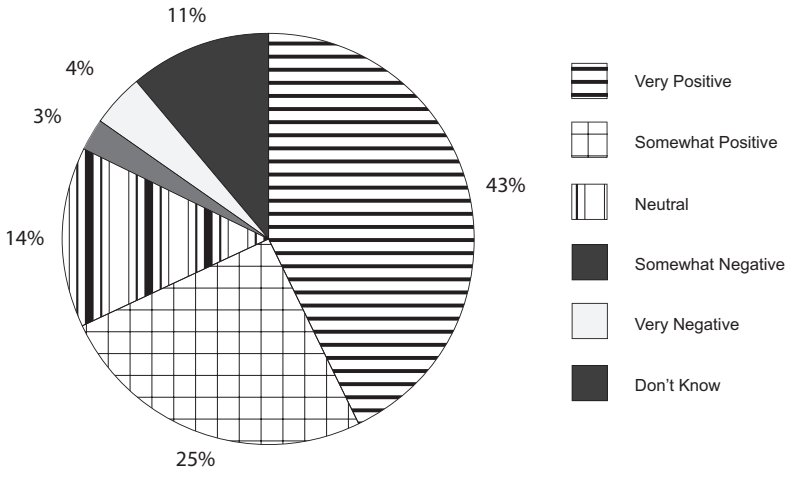
- Small municipalities (or others with insufficient supply) may look to neighbouring municipalities for bulk water purchase. However, if political or water demand/supply conditions change in the supplying municipality, it causes some nervousness about the security of the supply. Costs and efficiency requirements in the purchasing municipality need to be debated and agreed upon from the outset.

Delegated management to a public or private operator.

- In Canada, this model is most often employed for small municipalities. The two most prominent contracted entities are OCWA and EPCOR.

of scope (Box 9). These efforts are important because municipal amalgamation is politically unpopular and lacks the collaborative approach to governance necessary to address municipal diversity and complexity. Despite this, the Canada-wide survey results show strong support for the amalgamation of small water utilities. Specifically, 68% of respondents were either "very" or "somewhat positive" toward "amalgamating small water utilities to create economies of scope" (Figure 5). The amalgamation experiences of several Canadian munici-

FIGURE 5: WHAT IS YOUR OPINION OF AMALGAMATING SMALL WATER UTILITIES TO CREATE ECONOMIES OF SCOPE?



palities are described briefly in Box 10.

BOX 10: AMALGAMATION EXPERIENCES

CBRM, Nova Scotia

- Amalgamation, although a difficult process, is credited with enabling the CBRM utility to improve the quality of service while being self-funded. Prior to amalgamation, there were eight separate water utilities. Cost sharing across the customer base has enabled the municipality to build an $8.4 million treatment plant for Louisbourg's 500 accounts while keeping their rates at approximately $400 per year. The increased ability to accomplish goals is also credited with spurring the utility forward to exceed standards. The region can still treat municipalities uniquely, where appropriate. The water conservation programming, for example, is targeted according to where the need is greatest [Interviews 16B, 17B].

Sherbrooke, Quebec

- Sherbrooke was amalgamated from eight former municipalities, and the impacts for water supply do not seem to have been significant. Unmetered commercial and industrial accounts became metered, but metering of residential accounts—where it existed—was stopped. The central water utility, however, does have a greater influence over development in the outskirts of the municipality [Interview #27B].

Ontario

- Amalgamation experiences in Ontario were fraught with controversy and difficulty. They have proven to be a double-edged sword for the advancement of efficiency and DSM. On one hand, amalgamation has set back programs and working relationships between the provincial government and utilities on legislation for demand management in certain case. It also showed limited effectiveness in rate harmonization across formerly separate municipalities. On the other hand, amalgamation has led to greater information sharing and larger, better-funded programs (Furlong 2007a).

3.3.2 OPPORTUNITIES FOR SHARED GOVERNANCE

Small municipalities face funding and staffing challenges and they tend to use their water in different ways than larger municipalities. According to Environment Canada's latest water use statistics, the residential sector is a much more important source of demand in small municipalities (Table 9). Although few of the very small municipalities provided data, the table clearly shows that for small municipalities, the residential demand accounts for 70 to 75% of supply; it drops to below 55% for the largest municipalities. Greater levels of industrial-commercial demand[52] and water loss account for the difference.

This means that, in most cases, small municipalities can focus on residential water demand management to improve sustainable water use in their communities. Such programs can be relatively inexpensive compared to controlling water loss, and small communities have a distinct advantage in promoting residential water conservation, especially through effective Community-based Social Marketing (CBSM) (see Box 11).

CBSM has been an effective tool in municipalities of various sizes (e.g., the Region of Durham, Ontario, population 531,000 in 2001). But for small municipalities in particular CBSM provides a unique opportunity given the ability to canvass most residential customers face-to-face at a reasonable cost. Also, the barriers to and benefits of conservation are shared by a larger percentage of the population.

- Driven by population growth and a proposed highway development, in 1997 the Town of **Okotoks, Alberta**

TABLE 9: MUNICIPAL WATER DEMAND BY SECTOR AND POPULATION SIZE

Population	Percentage of Demand: Domestic		Percentage of Demand: Industrial/ Commercial		Percentage of Water Loss	
	Municipalities with Data (#)	Average	Municipalities with Data (#)	Average	Municipalities with Data (#)	Average
0-1000	53	75.7%	35	25.0%	28	9.0%
1000-1999	248	73.5%	183	24.1%	154	7.0%
2000-4999	302	70.3%	235	26.3%	192	7.7%
5000-49,999	429	66.9%	367	28.2%	319	10.6%
50,000-499,999	71	57.8%	66	31.1%	65	11.6%
500,000 plus	11	54.3%	11	33.3%	11	12.4%

Source: Compiled and processed from the 2004 Municipal Water Use Database (Environment Canada 2004b).

[52] The database does not include average demand data for institutions.

began with a community vision: Sustainable Okotoks. They organized a focus group with long-time residents, used their input to develop a survey, and conducted a 45-minute survey door-to-door with residents. The result was a decision to "live within the capacity of the Sheep River." The Municipal Development Plan and *Land Use Bylaw* set limits on growth, directed the type and location of development, and the size of infrastructure allowed to be placed in the new development areas (including water pipes) (Pearce 2002) [Interview #22B]. In 2000, Okotoks began door-to-door marketing and education of sustainability initiatives identified through the survey. In 2003, with funding from Environment Canada, they co-operated with their two upstream neighbours (Turner Valley and Black Diamond) in the Tri-Community Water Conservation Initiative. In three years they visited 6,000 households in the three communities; they also changed their bylaws and created the River Valley Management Plan [Interview #22B].

- Seeing the success of the CBSM program in Okotoks, **Cochrane, Alberta** invited representatives to learn from their success [Interview #3B]. Although Cochrane implemented a fixture bylaw as early as 1992, its water conservation programming had gone dormant. In 2005, Cochrane began to implement its new Demand Management Strategy, which involved: visiting 3,200 homes from 2005 to 2006, developing new bylaws to reinforce the CBSM program, incentive-based fixture rebate programs water audits, and school-based education programs, among others. The goal is to reduce residential and commercial consumption by 25% and 10% respectively by 2009 (Fox 2006). Cochrane is also involved in the Calgary Regional Partnership (see Butler 2004).

Certain themes emerge from the CBSM experiences in these municipalities:

- The importance of having and retaining active CBSM campaigners on staff, including a sustainability manager, which can sometimes be difficult for small municipalities. This makes the work more dynamic and integrated. To ensure stability in the position, community budgets should include a line item for the manager's salary.
- Partnering with other municipalities is also important. This can be co-operative (as in the Tri-Community Water Conservation Initiative) or for learning purposes. Making commitments to work with other municipalities can help ensure that program life-cycles are not limited by shifts in local politics or budgets.
- The need to continue CBSM for it to be successful.
- The importance of leadership and sharing of experiences.

Additional themes:

- The local parks department is another potentially significant water consumer in a municipality—one with little industrial consumption. Working with the parks department to reduce consumption can yield important savings.
- Economies of scope can be created by following the leadership of a larger neighbouring municipality that already has well-developed conservation initiatives.

BOX 11: COMMUNITY-BASED SOCIAL MARKETING

In their book *Fostering Sustainable Behavior*, McKenzie-Mohr and Smith describe CBSM as a unique and proven method to bring about behavioural change.

- CBSM involves "identifying barriers and benefits to a sustainable behavior, designing a strategy that utilizes behavior change tools, piloting the strategy with a small segment of the community, and finally, evaluating the impact of the program once it has been implemented across a community."
- The tools involved in CBSM "are carried out at the community level and frequently involve direct personal contact. Personal contact is emphasized because...we are most likely to change some behaviors in response to direct appeals or social support from others."

(McKenzie-Mohr and Smith 1999)

4 CONCLUSIONS AND RECOMMENDATIONS FOR GOOD GOVERNANCE

We really need to bring more ecological principles into water use, management and governance. This seems intuitive but in practice it rarely happens.

– Survey Respondent

This report has summarized key issues with respect to sustainable water management and governance in municipal water supply in Canada. Based on the analysis, we conclude that the limitations to sustainable water management imposed by governance models can be overcome. Moreover, municipalities have a suite of governance and business models to choose from to meet their diverse needs.

POTENTIAL CONFLICTS BETWEEN GOOD GOVERNANCE AND CONSERVATION GOALS

The discussions above also highlight the fact that certain conflicts may arise between good governance and conservation goals. These in turn present particular challenges. Five key examples include:

CHALLENGE 1: ACCOUNTABILITY CAN LIMIT MUNICIPAL AUTONOMY.

Given the lack of political will to act on water protection at all levels of government, more accountability is needed. The provinces and territories can assure the accountability of municipal governments for sustainable water management through a variety of mechanisms. These mechanisms, however, tend to treat all municipalities the same way, whereas municipalities must have choices to meet their particular needs.

CHALLENGE 2: MULTI-LEVEL GOVERNANCE IS NEEDED, BUT IS DEPENDENT ON ACCOUNTABILITY.

Multi-level governance requires accountability for water at all levels of government to achieve sustainable water management. In Canada, multi-level accountability related to environmental protection and water management is wanting.

CHALLENGE 3: BUSINESS MODELS MAY IMPOSE TRADE-OFFS BETWEEN CONSERVATION AND OTHER GOALS.

The business models that most effectively facilitate full-cost recovery, consumption-based pricing, and metering (i.e., arm's-length models) are not the same as those that most effectively facilitate broad-based conservation programs (i.e., municipal department models).

CHALLENGE 4: POPULAR BUSINESS MODELS MAY NOT FOSTER SHARED GOVERNANCE.

While shared governance is found to be indispensable for sustainable water management, the common business models for water delivery do not effectively involve non-state actors. Given trends toward arm's-length models, existing channels for public input at municipal councils may become even more limited.

CHALLENGE 5: SMALL MUNICIPALITIES FACE TRADE-OFFS BETWEEN ECONOMIES OF SCOPE AND SHARED GOVERNANCE.

Small municipalities need models that provide economies of scope, such as the amalgamation of small utilities, delegated management to an external operator, and bulk water purchases from a larger municipality. Delegated management tends to result in limited value-added conservation programming, and bulk water purchases may be perceived as threats to municipal autonomy and local water security.

RECOMMENDATIONS TO IMPROVE GOVERNANCE AND CONSERVATION

Our analysis points to governance strategies, or measures, to resolve these challenges that can also be used to broaden the implementation of sustainable water management. The strategies are classified into three groups: (1) governance strategies for improving accountability, (3) governance strategies to improve business models, and (3) governance strategies specifically for small municipalities.

GOVERNANCE STRATEGIES FOR ACCOUNTABILITY

RECOMMENDATION 1: IMPLEMENT PROVINCIAL REGULATIONS AND POLICIES THAT ENSURE MUNICIPAL ACCOUNTABILITY AND AUTHORITY RELATED TO WATER MANAGEMENT.

Examples include: water allocation linked to efficiency, legislative or arm's-length regulation for full-cost recovery, definitions of full-cost recovery that include source water protection and reliable data collection, and requirements that municipalities engage in watershed-level resource management with other water users in the watershed.

RECOMMENDATION 2: USE VOLUNTARY GOVERNANCE MEASURES SUCH AS BENCHMARKING TO IMPROVE MUNICIPAL WATER ACCOUNTABILITY.

Benchmarking facilitated by provincial governments can encourage municipalities to achieve a higher level of performance through effective criteria and reporting standards that promote progressive management. It also promotes knowledge sharing to help municipalities govern their resources better.

RECOMMENDATION 3: DEVELOP/REFINE A NATIONAL WATER STRATEGY TO IMPROVE PROVINCIAL WATER ACCOUNTABILITY.

Development (or refinement) of a national water strategy led by the provinces and territories and implemented by the federal government could create mutual incentives for the provinces to take action on water supply issues. Provincial agreement on common goals and strategies could give provinces the incentives and political support to push water protection further.

RECOMMENDATION 4: ADDRESS CURRENT DISINCENTIVES FOR WATER ACCOUNTABILITY AT THE FEDERAL LEVEL.

The federal government faces disincentives to establish national efficiency requirements for water-using fixtures. These include: (1) the risk of overstepping provincial mandates and (2) concerns in the commercial sector that Canadian-made devices are not competitive enough in the market for water-efficient fixtures. With respect to the first, this research demonstrates broad provincial and municipal support for national legislation and standards for water-using devices. With the respect to the second, the way forward is to encourage Canadian retailers to stock the appropriate efficient devices, to phase out old inventory, and to work with manufacturers to develop competitive Canadian models. Municipal experience has shown that advanced warning to retailers and manufacturers can ease the political difficulties of establishing efficient fixture requirements.

GOVERNANCE MEASURES TO IMPROVE BUSINESS MODELS

Municipalities must be able to select the appropriate business model for their local needs without limiting conservation or other important measures for sustainable water management (e.g., full-cost recovery, metering).

RECOMMENDATION 5: FACILITATE DISTRIBUTED GOVERNANCE AT THE MUNICIPAL LEVEL TO ALLEVIATE THE LIMITATIONS OF SOME BUSINESS MODELS.

Distributed governance can encourage broader conservation programming within arm's-length business models. Strategies to incorporate distributed governance include ensuring a certain number of public board meetings each year and establishing a citizens'

advisory board to the utility with broad community representation.

RECOMMENDATION 6: PROMOTE ARM'S-LENGTH REGULATION OF WATER UTILITIES THAT ENCOURAGES BROAD CONSERVATION PROGRAMMING ACROSS DIFFERENT TYPES OF BUSINESS MODELS.
Arm's-length business models were found to offer fewer opportunities for public engagement, reducing their potential for broad conservation programs. An arm's-length regulator at the provincial level, such as the NSUARB, can enable broader programming for all types of business models by (1) having a mandate to ensure adequate consumer and environmental protection, and (2) holding public hearings for rate approvals.

RECOMMENDATION 7: USE PROVINCIAL OVERSIGHT MECHANISMS TO IMPROVE THE MUNICIPAL DEPARTMENT MODEL.
The municipal department business model, while important for broad-based conservation programs, can present barriers to cost recovery, ring-fencing revenues and universal metering. Governance that compels full-cost recovery through provincial legislation, provincial approval of financial plans, or an arm's-length regulator, can ensure that municipal department models do not face these barriers or their consequences.

RECOMMENDATION 8: ENSURE SUFFICIENT FLEXIBILITY AND AUTHORITY FOR MUNICIPALITIES TO GENERATE REVENUE AND DEVELOP BYLAWS FOR LOCAL CONSERVATION.
Provinces can enable municipalities through shared governance to raise revenues and pass bylaws for local resource protection. This can alleviate some of the conflicts over scarce resources within municipal governments, which make it difficult to ring fence revenues for water utilities.

RECOMMENDATION 9: LINK WATER-USE EFFICIENCY TO WATER ALLOCATION AT THE PROVINCIAL LEVEL TO ENCOURAGE CONSERVATION IRRESPECTIVE OF THE BUSINESS MODEL.
Regulatory or incentive-based voluntary measures that tie water allocation to a level of water-use efficiency can compel all municipalities (especially those that are growing) to develop more ambitious efficiency programs whether they are operated as municipal departments or arm's-length models. This can also assist inter-municipal relationships regarding water supply and bulk water sale by establishing the rules externally.

GOVERNANCE MEASURES FOR SMALL MUNICIPALITIES
The following recommendations are directed at provincial governments and the municipal governments in small municipalities. The goal is to preserve the diversity of business models available to small municipalities (that need choices to meet their specific needs) while enabling them to improve conservation.

RECOMMENDATION 10: SPECIFY EFFICIENCY REQUIREMENTS FOR EXTERNAL OPERATORS.
Small municipalities can ensure that contracts include water-use efficiency requirements to secure their bulk water purchase from a larger municipality. This way, allocation will not be subject to the changing water needs of the supplying municipality. Such arrangements would also protect the supplying municipality by ensuring that its customers maintain a reasonable level of demand. The development of efficiency and level-of-use provisions in contracts would require assistance from the provincial government.

RECOMMENDATION 11: USE INCENTIVE-BASED VOLUNTARY MEASURES AT THE PROVINCIAL LEVEL THAT TIE INFRASTRUCTURE FUNDING TO EFFICIENT USE.
This means that municipalities would be encouraged to pass on the efficiency requirements to their local operator contractually or to run a municipal efficiency program (funded through municipal revenues or the taxes paid to the municipality by the contracted entity).

RECOMMENDATION 12: ENCOURAGE INNOVATION IN SMALL MUNICIPALITIES WITH THE POTENTIAL FOR KNOWLEDGE TRANSFER TO LARGER CENTRES.
Provincial governments can encourage innovation in small municipalities, which have advantages in terms of developing innovative conservation programming. Given their small size, it is particularly effective to run pilot programs and test efficiency initiatives in small municipalities. This knowledge can then be transferred to senior levels of government. Knowledge transfer and leadership *from* senior governments, which already exists, are also important and should continue to be fostered.

CITED WORKS

Aucoin, Peter, and Elizabeth Goodyear-Grant. 2002. "Designing a merit-based process for appointing boards of ABCs: Lessons from the Nova Scotia reform experience." *Canadian Public Administration/Administration publique du Canada* 45.3: 31-327.

Bakker, Karen. 2001. "Paying for water: Water pricing and equity in England and Wales." *Transactions of the Institute of British Geographers* 26.2: 143-164.

——. 2003. *Good governance in restructuring water supply: A handbook.* Federation of Canadian Municipalities & Program on Water Issues.

Bakker, Karen, and David Cameron. 2001. *Good governance in municipal restructuring of water and wastewater services in Canada.* Toronto: Munk Centre for International Studies, University of Toronto.

Baxter, Paul. 2005. *Outcomes of the act's pricing review: Pricing externalities.* Australia: ACT Independent Competition and Regulatory Commission.

BC Auditor General. 2003. *Report 8: Follow-up of performance reports.* Victoria, BC: Office of the Auditor General of British Columbia.

Booth, Larry, and Frank Quinn. 1995. "Twenty-five years of the Canada water act." *Canadian Water Resources Journal* 20.2: 65-90.

Boyd, David R. 2003. *Unnatural law: Rethinking Canadian environmental law and policy.* Law and society series. Vancouver: UBC Press.

BRBC. 2005. *Nurture, renew, protect: A report on the state of the bow river basin.* Calgary, AB: Bow River Basin Council. http://www.brbc.ab.ca/publicat.asp.

Brandes, Oliver M., and Keith Ferguson. 2004. *The future in every drop: The benefits, barriers, and practice of urban water demand management in Canada.* Victoria, BC: University of Victoria, POLIS Project on Ecological Governance.

Brandes, Oliver M., Keith Ferguson, Michael M'Gonigle, and Calvin Sandborn. 2005. *At a watershed: Ecological governance and sustainable water management in Canada.* Victoria, BC: University of Victoria Polis Project on Ecological Governance.

Brandes, Oliver M., Tony Maas, and Ellen Reynolds. 2006. *Thinking Beyond Pipes and Pumps: Top 10 Ways Communities Can Save Water and Money.* Victoria, BC: University of Victoria Polis Project on Ecological Governance.

Burke, D., L. Leigh, and V. Sexton. 2001. *Municipal water pricing, 1991-1999.* Ottawa: Environment Canada. http://www.ec.gc.ca/water/en/info/pubs/e_pubs.htm.

Burke, John. 2004. "Ontario's municipal performance measurement program: Fostering innovation and accountability in local government." *Government Finance Review* June: 22-27.

Butler, Rick. 2004. *Thinking regionally, acting locally.* Cochrane, AB: Town of Cochrane. http://www.menet.ab.ca/bins/view_practice.asp?pid=471.

Cashaback, David. 2001. *Regional district governance in British Columbia: A case study in aggregation.* Ottawa: Institute on Governance. http://www.iog.ca/publications.

City of Hamilton. 2002. *Water distribution: 2003-2005 business/action plan.* Hamilton, ON: City of Hamilton.

——. 2004. *Water and wastewater budget and business plan.* Hamilton, ON: City of Hamilton.

——. 2003. *City of Hamilton 2003 Water and Wastewater Budget.* Hamilton, ON: City of Hamilton.

Curwin, Trevor, and Halifax Water Commission. 1995. *Downstream: An historical reflection of the Halifax water supply system.* Halifax, NS: Halifax Water Commission.

CWWA. 1997. *Municipal Water and Wastewater Infrastructure - Estimated Investment Needs 1997-2012.* Ottawa: Canadian Water and Wastewater Association.

de Loë, Rob, and Reid Kreutzwiser. 2007. "Challenging the status quo: The evolution of water governance in Canada," in *Eau Canada: The future of Canada's water*, ed. Karen Bakker, 85-103. Vancouver: UBC Press.

Department of Works. *Annual Reports 1979-1996.* Toronto: Metropolitan Toronto Department of Works.

Dresner, S., and P. Ekins. 2006. "Design of environmentally and socially conscious water metering tariffs for the UK." *Journal of Environmental Planning and Management* 49.6: 909-928.

EarthTech, and National Research Council. 2007. *National water and wastewater benchmarking initiative: Public report.* Vancouver, BC and Markham, ON.

Editorial. 2008. Low water rates, crumbling pipes. *Toronto Star*, March 25.

Environment Canada. 2001. *Municipal water use database.* Ottawa: Environment Canada. http://www.ec.gc.ca/water/en/manage/use/e_data.htm.

——. 2004a. *Municipal water and wastewater survey pricing summary database - summary tables.* Ottawa: Environment Canada. http://www.ec.gc.ca/Water/en/manage/use/e_data.htm.

——. 2004b. *Municipal water use database*, 2004 data. Ottawa: Environment Canada. http://www.ec.gc.ca/water/en/manage/use/e_data.htm.

——. 2007. *Municipal water use, 2004 statistics*. Ottawa: Environment Canada. http://www.ec.gc.ca/water/en/info/pubs/sss/e_mun2004.htm.

Fox, Lisa Maria. 2006. *Comprehensive demand management of municipal water resources.* Cochrane, AB: Town of Cochrane. http://www.menet.ab.ca/bins/view_practice.asp?pid=819.

Furlong, Kathryn. 2007a. *Municipal water supply governance in Ontario: Neoliberalization, utility restructuring, and infrastructure management.* Vancouver: University of British Columbia.

——. 2007b. *Report for the water governance in transition: Utility restructuring and demand management in Ontario workshop.* Vancouver: Program on Water Governance and Infrastructure Canada. http://www.watergovernance.ca/Institute2/municipal/publications.htm.

Furlong, Kathryn, and Karen Bakker. 2007. *Water governance in transition: Utility restructuring and demand management in Ontario.* Vancouver: UBC Program on Water Governance & Infrastructure Canada.

Gardner, Julie. 2008. *Workshop report: Sustainable water infrastructure management in Canada.* Vancouver: Program on Water Governance. http://www.watergovernance.ca/Institute2/municipal/publications.htm.

Gibbons, Jack. 2004. *A lost revenue adjustment mechanism and a shared savings mechanism for Ontario's electric utilities.* Toronto: Public Interest Economics on behalf of Pollution Probe.

Gombu, Phinjo. 2008. The high cost of using less water: Municipalities discover the inconvenient truth - lower consumption means less revenue, *Toronto Star*, January 26. http://www.thestar.com/article/297647.

Graham, John, Bruce Amos, and Tim Plumptre. 2003a. *Governance principles for protected areas in the 21st century.* Ottawa: Institute on Governance, Parks Canada, Canadian International Development Agency. http://www.iog.ca/view_publication_section.asp?area=9.

——. 2003b. *Principles for good governance in the 21st century.* Ottawa: Institute on Governance. http://www.iog.ca/publications.asp.

Heseltine, John. 2004. *Re: Population projections for Cape Breton municipal units - 2001-2021.* Cape Breton Regional Municipality (CBRM), NS: Terrain Group Inc.

Hill, Carey. 2006. *Two models of multi-level governance, one model of multi-level accountability: Drinking water protection in Canada and the United States.* Vancouver: University of British Columbia.

Hill, Carey, et al. 2007. "A survey of water governance legislation and policies in the provinces and territories, appendix 1," in *Eau Canada: The future of Canada's water,* ed. Karen Bakker, 367-395. Vancouver: UBC Press.

Hill, Carey, and Kathryn Harrison. 2004. *Intergovernmental regulation and municipal drinking water.* Paper presented at the Conference on Multi-Level Regulatory Governance in Canada in Ottawa, ON.

Hoover, Greg, et al. 2007. *Navigating the shoals: Assessing water governance and management in Canada.* Ottawa: The Conference Board of Canada.

Infrastructure Canada. Our research priorities 2004. http://www.infrastructure.gc.ca/research-recherche/result/wr-atr/decks/nrcan_e.shtml.

Jaffe, Adam B., Richard G. Newell, and Robert N. Stavins. 2002. "Environmental policy and technological change." *Environmental and Resource Economics* 22: 41-69.

Joe, Jim, Jacinta O'Brien, C. Erv McIntyre, Micheal Fortin, and Mike Loudon. 2002. *Governance and methods of service delivery for water and sewage systems.* Toronto: Ontario Ministry of the Attorney General.

Juuti, Petri S., and Tapio S. Katko, eds. 2005. *Water, time and European cities: History matters for the futures.* Tampere, Finland: European Commission.

KPMG. 2007. *Performance agenda: An international government survey.* Toronto: KPMG International.

Marsalek, J., Q. Rochfort, L. Grapentine and B. Brownlee. 2002. "Assessment of stormwater impacts on an urban stream with a detention pond." *Water Sci. Technol*. 45(3): 255-263.

McKenzie-Mohr, Doug, and William Smith. 1999. *Fostering sustainable behavior: An introduction to community based social marketing.* Gabriola Island, BC: New Society Publishers.

Ministry of Community Aboriginal and Women's Services. 2003. *A guide to municipal progress reporting: Meeting the requirements of the community charter.* Victoria, BC: Government of British Columbia.

Ministry of the Environment. 2005. *Green Facts: New Water Conservation Requirements for Permits to Take Water.* Toronto: Ministry of the Environment.

Morris, T.J., et al. 2007. *Changing the flow: A blueprint for federal action on freshwater.* The Gordon Water Group of Concerned Scientists and Citizens.

Muldoon, Paul, and Theresa McClenaghan. 2007. "A tangled web: Reworking Canada's water laws." in *Eau Canada: The future of Canada's water,* ed. Karen Bakker, 245-261. Vancouver: UBC Press.

NRTEE. 1996. *State of the debate on the environment and the economy: water and wastewater services in Canada.* Ottawa: National Roundtable on the Environment and the Economy.

National Research Consortium. 2008. *Innovative management and treatment options for municipal water systems: Defining opportunities for research.* Toronto and Calgary: Canadian Water Network and Ontario Centres of Excellence.

Norberg-Bohm, Vicki. 1999. "Stimulating 'green' technological innovation: An analysis of alternative policy mechanisms." *Policy Sciences* 32.1: 13-38.

Nova Scotia Utility and Review Board (NSUARB). 2007. Annual accountability report for the fiscal year ended March 31, 2007. Halifax, NS: Nova Scotia Utility and Revue Board.

——. 2008. Business plan: Fiscal year ending March 31, 2008. Halifax, NS: Nova Scotia Utility and Revue Board.

O'Connor, Dennis. 2002. *Report of the Walkerton Inquiry Part 2: A Strategy for Drinking Water.* Toronto: Queen's Printer for Ontario.

Pearce, Will. 2002. *"Sustainable Okotoks": Planning and visioning process.* Okotoks, AB: Town of Okotoks. http://www.menet.ab.ca/bins/view_practice.asp?pid=40.

Piccinin, Claude. 2006. "From metric to process benchmarking." *Benchmarking water supply, wastewater management and water control.* Amsterdam, NL: International Water Association.

Plumptre, Tim, and John Graham. 2000. *Governance in the new millennium: Challenges for Canada.* Ottawa: Institute on Governance.

RACWC. 1987. *Regional Advisory Committee on Water Conservation Minutes 09/29/87*. Kitchener, ON: Region of Waterloo.

RACWC. 1988. *Regional Advisory Committee on Water Conservation Minutes 07/07/88.* Kitchener, ON: Region of Waterloo.

Renzetti, Steven. 2007. "Are the prices right? Balancing efficiency, equity, and sustainability in water pricing." in *Eau Canada: The future of Canada's water*, ed. Karen Bakker, 263-279. Vancouver: UBC Press.

Renzetti, Steven, and Joseph Kushner. 2004. "Full cost accounting for water supply and sewage treatment: Concepts and case application." *Canadian Water Resources Journal* 29.1: 13-22.

Renzetti, Steven, and Marbek Resource Consultants. 2005. *Analysis of economic instruments for water conservation.* Submitted to the Canadian Council of Ministers of the Environment Water Conservation and Economics Task Group.

Rouse, Michael. 2007. *Institutional governance and regulation of water services.* London: IWA Publishing.

Schindler, David. 2001. "The cumulative effects of climate warming and other human stresses on Canadian freshwaters in the new millennium." *Canadian Journal of Aquatic Sciences* 58: 18-29.

Stratos. 2002. Governance models for sustainable development. Ottawa: Policy Research Initiative.

Swain, Harry. 2005. *Watertight: The case for change in Ontario's water and wastewater sector.* Toronto: Ministry of Public Infrastructure Renewal & Queen's Printer for Ontario.

Task Force on Community Opportunities. 2006. *Building stronger communities: Better services, economic growth, solutions that work.* Victoria, BC: British Columbia Task Force on Community Opportunities.

Tate, Don. 1990. *Water demand management in Canada: A state of the art review.* Ottawa: Environment Canada, Inland Waters Directorate.

Tate, Don M., and D.M. Lacelle. 1995. *Municipal Water Rates in Canada: Current Practices and Prices*, 1991. Ottawa: Environment Canada, Water and Habitat Conservation Branch.

Yates, Carl D. 2005. "Water accountability at the Halifax regional water commission." *Leakage 2005*, ed. Roland Liemberger, 15-21. Halifax, NS: International Water Association and the Halifax Regional Water Commission.

APPENDIX A – CONCEPTS

GOVERNANCE

Governance is 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

Good governance is both a method and objective of governance that yields broadly sustainable outcomes (including social, environmental and economic aspects) that are consistent with citizens' goals (see Plumptre and Graham 2000). Examples of Canadian and global good governance principles are presented in Bakker (2002).

GOVERNANCE MODEL

Governance reflects processes through which decisions are made and a governance model is a formula for achieving the desired principles of governance in decision-making (Bakker 2003). The governance model includes, for example, "the agreements, procedures, conventions or policies that define who gets power, how decisions are taken and how accountability is rendered" (Graham, Amos and Plumptre 2003b: 1).

BUSINESS MODEL

Business models define arrangements for getting things done once decisions have been made. More specifically, a business model delineates features such as ownership, organizational structure, and the risks and responsibilities for the management of the organization and its improvement (Bakker 2003, 5).

INFRASTRUCTURE

We assume a broad definition of infrastructure in keeping with recent research conducted via Infrastructure Canada (Infrastructure Canada 2004) and Brandes (2006). It integrates the analysis of both "hard" and "soft" technologies. For water conservation, these include technologies such as retrofit programs, and water recycling, which are usually implemented in conjunction with "softer" techniques that help to regulate the use and life-span of infrastructure. Pricing mechanisms and water use restrictions are examples.

APPENDIX B – DATA

INTERVIEWS

In the pilot phase (2005-2006), 54 people participated in 50 interviews. In the Canada-wide phase, 33 people participated in 28 interviews. The interviews were conducted with officials from municipal and provincial governments and boards, utilities, conservation associations, consulting companies and environmental groups. The list of interviews is located in Table 11 below. Their anonymity is preserved according to UBC ethics requirements.

CANADA-WIDE AND ONTARIO EXPERT SURVEYS

Both surveys followed the same two-part format. The first part was general and to be completed by all respondents. The second part was specific to municipal water utilities and completed only by persons representing a municipal water utility. The pilot survey in Ontario was conducted from June to September 2005 and received a 24.3% response rate, with 82 responses from 340 surveys. A breakdown of respondents and discussion of that survey can be found in the first report in this series (Furlong and Bakker 2007). The breakdown of respondents by province and territory for the Canada-wide survey is shown in Table 10. It is important to note is that the surveys are tools for further investigation. Their results generate new questions and refocus existing ones. The surveys do not provide "answers" per se.

TABLE 10: SURVEY RESPONDENT DISTRIBUTION

PROVINCE	# SENT	# RECEIVED	% RETURN
AB	53	18	34%
BC	175	60	34%
MB	25	7	28%
NB	20	3	15%
NL	18	2	11%
NS	32	6	19%
NT	2	0	0%
NU	4	1	25%
PE	2	1	50%
QC	65	15	23%
SK	20	5	25%
YT	5	1	20%
Total	421	119	28%

WORKSHOPS

The Water Governance in Transition: Utility Restructuring and Demand Management in Ontario workshop was held April 13th, 2007 at the Peter Wall Institute, UBC. The workshop addressed issues arising from the pilot phase of the project in Ontario. Details of

the first workshop can be found in Appendix C3 of the Water Governance in Transition Report (Furlong and Bakker 2007), in the associated workshop report for that workshop (Furlong 2007b) or on the workshop website www.watergovernance.ca/Workshop1. A second workshop Sustainable Water Infrastructure Management in Canada related to the Canada-wide phase of the project was held on May 5, 2008 at the Peter Wall Institute UBC. Details are available in the associated workshop report (Gardner, 2008) or on the workshop website at www.watergovernance.ca/Workshop4. All documents are also available on the project website: www.watergovernance.ca/Institute2/municipal/publications.htm.

TABLE 11: LIST OF INTERVIEW RESPONDENTS

Phase I Interviews			
Interview #1	Consultant	Interview #26	Union
Interview #2	Researcher	Interview #27	Regional Staff
Interview #3	Researcher	Interview #28	Regional Staff
Interview #4	Researcher	Interview #29	Utility Staff
Interview #5	NGO	Interview #30	NGO/Consultancy
Interview #6	National Association	Interview #31	Utility Board Member
Interview #7	NGO	Interview #32	Municipal Council
Interview #8	NGO	Interview #33	Conservation Authority
Interview #9	Professional Organization	Interview #34	Municipal Staff
Interview #10	Government Think Tank	Interview #35	Consultant/Former Municipal Staff
Interview #11	Provincial Association	Interview #36	Municipal Council
Interview #12	Provincial Board	Interview #37	Municipal Staff
Interview #13	Provincial Corporation (2 persons)	Interview #38	Municipal Staff
Interview #14	Consultant	Interview #39	Municipal Staff (2 persons)
Interview #15	Regional Staff	Interview #40	Municipal Staff
Interview #16	NGO	Interview #41	Municipal Staff (3 persons)
Interview #17	Utility Staff	Interview #42	Municipal Staff
Interview #18	Utility Staff	Interview #43	Regional Staff
Interview #19	Union	Interview #44	Regional Council
Interview #20	Conservation Authority	Interview #45	Regional Staff
Interview #21	Municipal Staff	Interview #46	Regional Staff
Interview #22	Municipal Council	Interview #47	Regional Staff
Interview #23	Municipal Staff	Interview #48	Consultant
Interview #24	Utility Staff	Interview #49	Regional Staff
Interview #25	Consultant/ Former Utility Staff	Interview #50	Municipal Council
Phase II Interviews			
Interview #1B	Conservation Council	Interview #15B	Municipal Staff (2 people)
Interview #2B	Municipal Staff	Interview #16B	Municipal Staff
Interview #3B	Environmental Activist/ Former Municipal Council	Interview #17B	Municipal Staff
Interview #4B	Consultant/ Former Municipal Staff	Interview #18B	Provincial Official
Interview #5B	Municipal Staff	Interview #19B	Corporate Staff
Interview #6B	Municipal Staff	Interview #20B	Corporate Staff
Interview #7B	Municipal Staff	Interview #21B	Provincial Official
Interview #8B	Water Supply Commissioner	Interview #22B	Consultant
Interview #9B	Regional Staff (3 people)	Interview #23B	DSM Manager
Interview #10B	Municipal Staff	Interview #24B	Local Staff
Interview #11B	Municipal Staff	Interview #25B	Municipal Staff
Interview #12B	Regional Official	Interview #26B	Non-profit Organization
Interview #13B	Municipal Staff	Interview #27B	Municipal Staff
Interview #14B	Provincial Official (3 people)	Interview #28B	Provincial Official

www.watergovernance.ca

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.

Contact

Linda Nowlan
Faculty Research Associate
Program on Water Governance
IRES and Department of Geography
IRES-UBC, 439-2202 Main Mall
Vancouver, BC V6T 1Z4
lnowlan@ires.ubc.ca
(604) 822-6474