

Challenges for Water Governance in Canada: A Discussion Paper

Governance for Source Water
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Preface

This discussion paper was prepared as part of the project *Governance for Source Water Protection in Canada*. The primary authors, Georgia Simms and Rob de Loë, are grateful for the considerable assistance they received from members of the project team. Special thanks are due to the following people for their advice and intellectual contributions: Dan Murray, Ryan Plummer, John Sinclair, Sarah Michaels, Oliver Brandes and Henning Bjornlund. Thanks are also due to members of the WPGG team who assisted in the research, editing and publication effort for this report: Becky Swainson, Natalya Melnychuk, Bryan Poirier, and Alicia Vacing.

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Executive Summary

Threats to water quality and quantity in Canada are growing, and new problem solving strategies are needed to address them. Across Canada, recognition is growing that governments, acting on their own and using conventional command and control policy tools, will not be able to solve the complex water challenges we face. Therefore, alternative approaches to governance are being pursued. These can be thought of as experiments in new ways of sharing responsibilities for water-related decisions. How these governance approaches are developed and implemented, and how they continue to evolve, is a key concern for the future of Canadian water resources.

Governance has traditionally been the responsibility of governments, especially with respect to water resources. This is changing. Over the past two decades in Canada, there has been a clear shift toward new approaches to governing water. New actors are playing key roles, and new ways of governing are being used. A particularly important and widespread trend is the use of multi-sector, *collaborative* approaches to governance. These involve actors inside and outside of government coming together to share information and resources, and to work together on common problems.

This discussion paper identifies and discusses water governance challenges that are common across many locations in Canada. These challenges are relevant to a variety of different water users and policy makers. They were identified through a detailed review of literature relating to water and environment of governance, and then confirmed through discussions and dialogues with people involved in management and governance in Canada.

Challenges discussed in this document relate to the following broad, interrelated themes:

- **Leadership and Commitment:** People and organizations that sustainably champion a project or plan with ongoing dedication to its successful implementation
- **Resources and Capacity:** The capabilities and resources that are required to accomplish goals and objectives
- **Legitimacy:** The genuine approval of institutions or actors by those subject to its actions
- **Accountability:** The acknowledgement and assumption of responsibility
- **Actors, Roles and Relationships:** The people who are involved, their responsibilities and the qualities and characteristics of their interactions
- **Learning:** The acknowledgement that participants must engage in processes of self, social and organizational learning in order to participate effectively in governance
- **Knowledge:** Different ways of knowing and interpreting the environment
- **Adaptation:** Consistently monitoring change and using new information and knowledge to improve plans and decisions
- **Integrating Institutions:** Achieving coordination among different policy tools at different scales
- **Evaluation:** Learning from previous approaches and evaluating success

The goal in this discussion paper is to introduce these challenges and to highlight their importance for water governance in Canada. We briefly explore different ways in which water governance has taken place in Canada historically, and then we examine recent developments in the field, notably the shift to collaborative, multi-stakeholder approaches. We then identify key challenges facing people engaged in collaborative water governance. Selected examples from real-world water governance processes across Canada are used to illustrate how common challenges are emerging in different contexts, and how they are being addressed.

A central goal in our ongoing project, *Governance for Source Water Protection in Canada*, is identifying ways in which challenges relating to these themes can be addressed effectively. Subsequent reports and discussion papers in this series will concentrate on solutions to the governance challenges discussed in this report.

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1. Introduction

Threats to water quality and quantity in Canada are growing, and new problem solving strategies are needed to address them^{[32][33]}. Some of the solutions needed to address contemporary water problems are technological in nature. For example, improved industrial processes and technologies can conserve water and improve the quality of effluent discharges. However, because threats to water quality and availability are strongly related to human activities, the solutions to many water problems today exist in the realm of human behaviour and *governance*.

In this discussion paper, we use the term governance to refer to the ways in which societies are organized to make decisions and take actions to accomplish goals. Water governance, therefore, is concerned with the processes and institutions that exist for making decisions that affect water^[55]. We view water *management*, which includes activities such as the issuance of licenses and permits, monitoring, and enforcement of rules, as being guided by decisions taken through water governance processes.

Water is a realm in which the achievement of effective governance is especially difficult.

- Water moves endlessly through the environment with no respect for administrative boundaries^[55]. Thus, attempts to exert control over this critical resource have often been fragmented^[18].
- Water is valuable in many different, sometimes incompatible ways. For example, water is essential to ecosystems, a critical input in agriculture and industrial processes, vital to human health and well being, and sacred in Indigenous cultures^[58].
- Management of water resources has always been extremely challenging due to natural variability. However, the challenge is increasing due to climate change^[63], greater global interconnectedness, a proliferation of actors at all scales in policy fields within and beyond water, and increasing pressures on ecological systems from human activities^[30].

In this turbulent environment, the ability of governments to solve water problems using conventional, command and control tools is eroding. As a result, water governance around the world is evolving rapidly. New approaches to water governance are being used, sometimes with limited understanding of their implications.

Practitioners at all levels – inside and outside governments – are faced with the challenge of identifying and understanding governance challenges, and then determining appropriate solutions. This discussion paper has been written with these people in mind. We examine recent trends in water governance in Canada and identify emerging major challenges that those designing new ways of governing, and those participating in governance, must address.

In the remaining sections, we briefly explore different ways in which water governance has taken place in Canada historically, and then we examine recent developments in the field, notably the shift to collaborative, multi-stakeholder approaches. We then identify key challenges facing people engaged in collaborative water governance. Selected examples from real-world water governance processes across Canada are used to illustrate how common challenges are emerging in different contexts, and how they are being addressed.

2. The Changing Landscape of Water Governance in Canada

The conventional “command and control” approach to environmental problems has had some remarkable successes in the twentieth century. However, serious limitations of this approach are now evident. These include compliance and enforcement costs, conflicts and polarization associated with regulations, and limited effectiveness in addressing problems characterized by complexity and uncertainty^{[31][45][53]}. In the context of water, many now believe that governments, acting alone and using the traditional tools of the state, cannot solve pressing water-related problems such as poor water supplies, inadequate sanitation, pollution, water shortages, and ecosystem degradation^[88]. Reflecting recognition of this new reality, water governance around the world is being transformed.

Governments are – and will continue to be – dominant actors in the water field. However, it is now well accepted that governments, acting alone and using the traditional tools of the state, cannot solve the range of increasingly complex water problems faced by societies around the world^{[6][88]}. As a result, the roles of governments and non-government actors in water governance are changing, as are the ways in which governance occurs^[23]. Examples from around the world include increased use of market mechanisms to determine access to scarce water resources^[10], and a shifting of responsibilities for water from higher levels to lower levels within the state^[52]. A particularly important and widespread trend is the use of multi-sector, *collaborative approaches* to governance^[28]. In the environmental realm, the term “collaborative governance” is often used interchangeably with terms such as “co-management”, “partnerships”, and a host of terms that describe situations where diverse actors work together or co-operate under different degrees of formality and power sharing^[78]. In this section, we explore the diverse ways in which water governance has taken place in Canada historically, and is taking place now.

2.1. The Roles of Governments

Governments in Canada have critical water-related responsibilities. Under Canada’s constitution, specific authority for water is assigned to, and shared by, the federal government and the provinces^[83]. In the case of water bodies that fall solely within the provinces, constitutional authority falls primarily to provincial governments. The federal government’s responsibilities relate to several specific matters. These include national parks, First Nations reserves, and other federal lands; fish and fish habitat; navigable waters; and waters that flow across provincial/territorial boundaries and the international boundary between Canada and the United States. Municipalities do not have constitutionally-defined authority. However, they do have key water-related responsibilities under provincial statutes. Territorial governments also play key roles in northern Canada. In Nunavut and the Northwest Territories, water is a federal responsibility except where aboriginal governments have authority under self-government agreements. In the Yukon, responsibility for water was transferred to the territory’s government in 2003. Historically in Canada, indigenous people have not been viewed as having powers akin to governments. However, due to the entrenchment of Aboriginal rights in the Constitution, land claims and self-government agreements and treaties, and ongoing affirmation of Aboriginal rights by the Supreme Court of Canada, it now is understood that Aboriginal peoples in Canada have unique rights, both as governments and as individual rights-holders, to be active participants in water-related decision-making^[76].

Water governance has therefore been the primary domain of *governments* for much of Canada's history. However, this is changing. Many actors beyond governments are now playing key roles in decision-making processes relating to water. These include industries, non-government organizations, citizens, and, in parts of Canada where land claims agreements have been negotiated, Aboriginal governments. At the same time, reflecting the international trends described in the introduction, the tools and approaches used in governance are becoming more diverse. Governments historically have relied on regulatory tools such as legislation, approvals, and licenses. As the range of actors involved in governance has become more diverse, so too has the range of tools. In addition to market mechanisms, there is a new emphasis on voluntary agreements, stewardship arrangements, and other non-regulatory tools.

2.2. Increasing Democratization of Water Governance

The move towards 'democratization' or 'decentralization' of water governance that is occurring in Canada reflects a global trend towards greater public participation and more involvement in decisions about the environment by non-traditional actors (e.g., industry associations, civil society committees, non-government organizations)^{[15][16][38][65]}. In addition, democratization has been encouraged by the emergence of local action and demand for more inclusive approaches including partnerships and collaboration among agencies and organizations^[92]. These trends also indicate growing recognition of the fact that water use is inherently political and involves bargaining, negotiation, and compromise^{[48][86]}. For this reason, there is widespread support for water governance processes that are more collaborative and deliberative^{[4][74]}. In deliberative processes, governments cannot simply define the rules and set the objectives. Instead, these must be negotiated by the participants.

As noted in the introduction, one of the motivations for this shift in governance is the complexity and uncertainty inherent in the management of water. Given that there are many possible objectives and priorities for water use, as well as divergent values for water, decisions based on one or a few sources of knowledge and authority increasingly are regarded as being ineffective, unrepresentative and inappropriate^{[41][53]}. Furthermore, it has become clear that governments acting alone cannot accomplish goals for effective water management, and that the input and participation of other key players is needed^[48].

A further driver of change in water governance in Canada and around the world is the belief that watersheds are critical units for planning and implementation^[82]. Many believe that watersheds can be used to align water use and land use policies with ecological systems, and that organizing decision making around watersheds helps to harmonize actions across local and regional scales. While few working in the water field would dispute the importance of watersheds for water management, their role in *governance* is less clear. Watershed boundaries overlap with many different types of political and administrative boundaries, and they are not necessarily a relevant frame of reference for all citizens^{[36][37]}. Despite these concerns, watersheds increasingly are being used to define the scope of governance. This means that efforts are needed to coordinate decisions and actions of the many actors whose interests intersect with watershed boundaries, and to ensure that they have the capacity to play their roles in governance.

2.3. Collaborative Water Governance in Canada

In the context of Canadian water governance, the changes described here have occurred despite the fact that the constitutionally-defined responsibilities of the federal and provincial governments have *not* changed. Thus, regulation and enforcement remain critical elements of water governance even though collaborative approaches involving stakeholders working together at the local or watershed scale are being used across the country.

- Some of collaborative forums for water governance were created by governments. Examples include Source Protection Committees in Ontario, Watershed Planning and Advisory Committees in Alberta and Watershed Organizations in Quebec^[67].
- Examples also exist of new structures and processes for water governance that emerge without leadership from governments, or even independently of governments. Examples include Irrigation Advisory Committees in Ontario^[85]
- Finally, some local collaborative processes have formed in response to government priorities, e.g., watershed stewardship groups in New Brunswick that voluntarily undertake Watershed Classifications for the provincial government^[79].

From both theoretical and practical perspectives, it is possible to identify a number of challenges that are commonly experienced under collaborative approaches to water governance that are resulting from the inclusion of new actors. These are discussed next.

3. Common Water Governance Challenges

Water is unifying and ubiquitous. However, water governance and management often are fragmented and compartmentalized. Finding ways to effectively manage one of the most complex and necessary natural resources is a fundamental challenge in contemporary society. In the past, decisions about water that concerned its use and protection did not reach far beyond government offices. In the context of increasing roles for non-government actors and more collaborative approaches to governance discussed in the previous section, the scope of potential contributors to a decision is considerably larger and requires different organizational structures and new processes. As such, there are many challenges that must be faced.

This section presents a relatively comprehensive list of common, cross-cutting governance challenges that have been identified through a review of environmental governance literature, interviews with practitioners and group dialogues at professional workshops¹. Each challenge is described, supported with literature and, where possible, illustrated with a Canadian experience. The various challenges are relevant in relation to almost every way of governing – but experiences around the world show that they are particularly significant in collaborative process. Collectively, these challenges and examples highlight the complexity that is inherent in developing and implementing effective governance approaches for water. Challenges are identified and discussed under the following headings:

- Leadership and commitment
- Legitimacy
- Actors, roles and relationships
- Knowledge
- Integrating institutions
- Resources and capacity
- Accountability
- Learning
- Adaptation
- Evaluation

These are by no means the only important governance challenges pertinent to water in Canada. However, they do reflect some of the pressing and persistent challenges that exist in Canada at this time in areas of water governance where collaboration among multiple stakeholders is common. Additionally, rather than being viewed as stand-alone, these challenges usually are interconnected. For instance, accountability and legitimacy are discussed under separate headings in this section, but it must be understood that these normally are intertwined. It is for this reason that addressing challenges relating to one of these themes often can lead to improvements in other areas.

1 A report prepared for Alberta Environment in 2009^[27] provided an important starting point for our literature review. The themes presented here represent an expansion of the ones considered in that document. They also reflect the perspectives and advice received from practitioners with whom we are collaborating through the *Governance for Source Water Protection in Canada* project (www.governanceforwater.ca).

3.1. Leadership and Commitment

A critical foundation for governance is leadership, often in the form of people and organizations that can sustainably champion a project with ongoing dedication to its successful implementation. Recognizing that water use decisions can be lengthy, time consuming processes, it can be challenging to identify leaders who can motivate, guide and support the sustainable development of a collaborative governance approach^[87].

It can also be a challenge to sustain commitment to the objectives set out in a management strategy, such as a watershed management plan, both in terms of long term financial resources as well as commitment from skilled individuals who (in many cases) voluntarily participate in the implementation of such strategies^[61].

In many cases, the success or failure of an initiative hinges on the ability of leaders to sustain energy and attention from participants. This can be a difficult task, especially when faced with conflict over divergent water values.

In the case of water governance in Canada, it is generally assumed and expected that provincial and territorial governments will provide the leadership and necessary resources to ensure the safety and security of water supplies. However, fragmentation across political boundaries, as well as discrepancies among the mandates and administration of different Ministries and Departments, can lead to confusion surrounding leadership responsibilities and inconsistencies in the provision of resources. When governments create conditions of strong leadership coupled with firm financial commitments, the impacts can be significant, but this remains a persistent challenge.

Governments are far from the only source of leadership in water governance. For example, a well-documented approach to collaborative wetland management in Sweden was created through the development of a municipal organization known as the Ecomuseum Kristianstads Vattenrike (EKV) in Sweden^[70]. Motivated by threats to the ecological and cultural integrity of the watershed, a local policy entrepreneur stimulated a process among government and stewardship associations by initiating trust-building dialogue, mobilizing social networks and information flows, and generating activities for coordination, knowledge sharing and learning. The previously unconnected system of management was greatly influenced by individual leadership and resulted in a watershed-based set of collaborative arrangements.

3.2. Resources and Capacity

A persistent and re-occurring challenge is that of securing resources from year to year in order to meet objectives within water governance programs. Financial, human and information resources are often inconsistently available^{[17][20]}. This can hinder the capacity of organizations to plan or implement programs as part of new governance arrangements.

The ability to perform activities in order to meet objectives and goals, whether they are internally defined by an organization or received from an external authority, is critical to effective decision-making for water^{[1][19]}. It is a fundamental aspect of all governance processes and underpins each challenge listed in this section. Given that there are multiple dimensions of capacity^[26], from the capacity to achieve consensus among a diverse group of stakeholders to the capacity to gather and assess scientific information, there are many challenges to consider.

The distribution of resources and capacity can vary from place to place. In some instances, the places that need attention and action in terms of water governance are the places where resources are limited or capacity is difficult to build, such as in small, rural communities. For example, in Ontario, Source Protection Committees exist only where Conservation Authorities are already established, meaning that most of northern Ontario does not have the capacity to participate in the management strategy. These discrepancies can be challenging when attempting to coordinate activities at a provincial or territorial scale. It is important to have an awareness of capacity limitations in the design of governance approaches that involve various actors at different scales, especially with respect to context (e.g., size of community, linkages to external support agencies, political leadership).

3.3. Legitimacy

Legitimacy exists when there is genuine approval of institutions or actors by those subject to its actions. It can be created when actions are considered desirable, proper and appropriate given the current context, and that actors involved in making or influencing decisions demonstrate an acceptable level of credibility^{[14][51]}. In collaborative governance processes that involve people drawn from diverse sectors of society, ensuring legitimacy is an ongoing challenge. Additionally, in moving away from government control in some governance approaches, there is a risk to established democratic principles such as the representation of public interest through formal elections. To involve actors who have not been publicly elected into situations of influence requires that other types of effort be put forth in order to achieve legitimacy^[68].

Especially in the context of water governance, where approaches such as network governance or community-based management are possible and power is not clearly held by one group, legitimacy needs to be built through the cumulative development of trust and acceptance over time, which is often based on the evidence of past efforts, current activities and future plans. Other aspects that are important to consider include the ways in which participants become involved, the openness of communication and information exchange and the extent of authority and power that is delegated from government^[40].

An important challenge relating to legitimacy is the fact that it is in constant fluctuation and must be re-created in each new governance process. Among organizations that can be involved in governance, the characteristics of the relationships, the nature of interactions and the assumption of responsibilities must be continuously assessed and re-defined as processes unfold^{[50][90]}.

3.4. Accountability

While constitutional responsibility for water in Canada is held primarily by governments, the emergence of more diverse governance approaches creates the need for new systems of accountability. Decentralization of power and control allows actors other than government to make decisions about certain aspects of water management. This means that checks and balances must be put in place^[66] both horizontally (at the same scale, e.g., municipality to municipality) and vertically (across scales, e.g., provincial government to watershed authority). Source Water Protection Planning in Ontario provides an important example of the need for, and difficulty of achieving, accountability using collaborative approaches (see Box 1).

Because collaborative approaches usually create new forums for water governance activities, it can be difficult to apply traditional, hierarchical accountability structures that are based in legislation. To create accountability in this new governance context requires clearly defined roles and responsibilities among actors as well as the presence of consequences that are linked to outcomes and performance^[42]. These consequences can be both formal (e.g., legal, financial) and informal (e.g. reputation, public support). Another important component is responsiveness, most critically in collaborative scenarios. In the instance of voluntary contributions from local water stewardship groups or advisory councils, it is necessary that there be an established protocol for communication between these actors and upper-tiers of government to ensure transparency of decision-making e.g. government must provide reasons for not accepting recommendations generated by a local stakeholder committee.

Other forms of accountability can include the timely fulfillment of commitments, adhering to procedure and protocol and demonstrating financial responsibility. While these aspects are important, it can be challenging to find the appropriate balance between meeting strict expectations and allowing for some flexibility within new governance approaches because, in many cases, the need for flexibility can compete with the need for due diligence. Additionally, it is critical to ensure that accountability structures and expectations are aligned with the capacity of organizations that are charged with tasks and responsibilities.

Box 1: Source Water Protection Planning in Ontario

Watershed-based planning is the primary strategy for source water protection (SWP) in Ontario. SWP planning involves identifying surface water intake protection zones and wellhead protection areas, with different sensitivity zones based on the time and path of water travel. Plans focus on identifying and addressing threats to drinking water in vulnerable zones. In addition to the standard implementation tools, provincial regulatory measures under the Clean Water Act can be used to restrict or limit activities in these zones (under certain conditions as prescribed in regulations).

Under the direction and coordination of the Source Protection Authorities (which are the province's existing Conservation Authorities), multi-stakeholder Source Protection Committees are responsible for the development of Source Protection Plans. The committees are formed based on provincial regulations that prescribe how representatives are to be selected and how different sectors and interests are to be distributed (i.e., the number of seats available to municipal or agricultural representatives). Planning involves three formal steps: development of terms of reference, completion of watershed assessment reports, and, finally, creation of source water protection plans. The products of each step are accountable to detailed regulations, and must be submitted to the Ministry of the Environment for approval.

A highly visible challenge for SWP in Ontario is that of accountability with respect to municipalities and how implementation of Source Water Protection Plans will (or will not) occur. The tools available to municipalities in terms of implementing SWP recommendations from the plans include their Official Plans, Zoning By-Laws and Variance Applications. These tools are not necessarily strong or consistent, as they are impacted by the votes of city councilors based on information provided by city staff. Decisions about SWP, therefore, are likely to remain in the traditional political arenas, with complex power dynamics, pressure from private business, and other influences, such as short term thinking based on election cycles and the desire for re-election. Municipalities with differing degrees of capacity for planning will bear much of the responsibility for making SWP plans a reality, and the mechanisms to hold municipalities accountable to provincial goals and expectations is unclear.

A further challenge is that of legitimacy, where the rules of representation on Source Protection Committees result in indirect representation for municipalities (e.g., only three representatives legally allowed on a committee even though there may be more than three municipalities in a region). Given the large variability between municipalities, whether due to geography, population density or industrial context, the plans that are produced by the committees may not be taken to be legitimately applicable across all cities in a source protection region.

3.5. Actors, Roles and Relationships

Some of the most important questions that emerge in the creation of new governance approaches are concerned with representation, inclusion and the definition of roles within a decision-making process. The introduction of new management strategies in Alberta provides an example (see Box 2). Because water is a fundamental part of livelihoods, ecosystems and industrial activities, there are many people and organizations who desire to have a stake in its management. Establishing a governance process that recognizes and accommodates diverse and often conflicting perspectives is a difficult and continuously evolving task^[43].

Box 2: Watershed Planning Through Water for Life in Alberta

The two key tools for water governance in Alberta are the Water for Life Strategy (2003) and the Land Use Planning Framework (2009). Both of these governance mechanisms represent hybrid management strategies involving government regulation, multi-stakeholder planning and market instruments.

In 2008, the Alberta Water Council reviewed the progress of the WFL and determined that “success will depend on focus, innovation, balanced social values and a growing appreciation of the value of water as a scarce resource.” In this regard, the Council recommended renewing the Strategy around three key themes: safeguarding water sources, including addressing aquatic ecosystem degradation; more fully integrating water and land management; and continuing to create, enhance and use innovative tools and best practices^[2]. The Alberta Water Council also recognized the need to be proactive and to accelerate actions to protect water sources, including the clarification of roles and accountabilities among the many different actors, improving data collection and analysis, and increasing public awareness about water resources.

The following year saw the release of the new Land-Use Framework (LUF) and the enabling legislation, the *Alberta Land Stewardship Act* (2009). This new framework essentially trumps all other legislation and policy. For example, under the new framework, cumulative effects management must be implemented on a regional level and assessing environmental impacts of new developments on a project-by-project basis will no longer be acceptable. As observed in a recent report by Water Matters^[69], the LUF can enable source water protection through such tools as setting targets for total landscape disturbed, creating land designations, and implementing transferable development credit schemes to direct development away from water sources. It is a powerful and potentially influential tool for water governance in Alberta. The challenge inherent in this new set of tools is to align the goals, activities and partnerships associated with WFL with efforts under the LUF.

However, because there are now two management frameworks for land and water that are separate (but obviously related), much effort will be required to resolve how different groups will share responsibilities and how communication strategies can be effectively created given the complexity of the actor network. For example, the Watershed Planning and Advisory Councils, which had the responsibility of watershed reporting and development watershed management plans under WFL, must now liaise with the Regional Planning Councils that have power under the LUF in order to coordinate their information and knowledge, decision-making priorities and other activities. Gaining clarity, both within each strategy and among them, will be a significant challenge in Alberta as the scale of coordination and integration is vast.

A top-down, command-control approach to governance creates relatively clear sets of actors: regulators and those whose activities are regulated. In contrast, collaborative approaches that seek to include broader perspectives and to create opportunities for the development of new relationships among groups that would not traditionally work together are far more complex. Collaborative governance can replace adversarial approaches to decision-making with processes that are based on cooperative problem-solving and consensus building^[4] and act to bring multiple stakeholders together across many different scales and sectors^[3]. Watershed partnerships illustrate these principles and have been used in practice to manage conflict, to foster negotiation, and to incorporate the viewpoints of interrelated stakeholders and interest groups^[9].

The construction of clear relationships among multiple actors is important in governance^{[22][75][80]}, but it can be challenging to achieve a balance between inclusivity and the efficiency of a process^[12]. Failed attempts at governance can also hinder new efforts (e.g., gaining meaningful participation from First Nations groups who have been excluded or who have chosen not to participate in the past). Additionally, a rigid structure of roles and responsibilities does not always work. Successful collaborative activities often are based on the exchanges that take place among participants. Sometimes the best distribution of roles can emerge informally over time as opposed to being formally arranged by a central authority. Often, meeting this governance challenge requires time, experimentation and lesson learning from local experiences.

3.6. Learning

The development of new governance approaches requires that participants be aware of, and open to, learning opportunities. It is increasingly clear that what has been done in recent decades is not sufficient to achieve goals of water security into the future, and that change through learning must occur^[73]. Those who design, implement and participate in complex and messy processes involving dialogue, debate and negotiation must be willing to shift their perspectives, to engage in knowledge sharing and to make trade-offs in their expectations of outcomes^[49].

Many different types of learning can go on within collaborative water governance processes. These include organizational, experiential, progressive, and emotional learning^[11]. Often, in the context of water resource challenges, decision-making processes demand social learning, such as working to understand the interests of others and developing trusting relationships. They also require individual learning, such as improving interactive skills (e.g. negotiation) or interpreting current scientific information (e.g., the state of groundwater resources). While many types of learning are important, both social learning and individual learning are critical to effective governance processes as they help bring cohesiveness to a group and also build the capacity for future decision-making efforts. When people can learn about themselves and one another and develop tolerances, understandings and wider worldviews, this can help to set the stage for future problem solving in a watershed^[39].

It can be challenging to create the types of forums that are necessary for learning to occur (e.g., generating adequate levels of trust and respect). The cost of space, facilitation and participant's time can be barriers and in some cases the conflict that can be present among stakeholders can be a disincentive^[62]. Frustrations, due to short timelines and large workloads or a lack of progress toward observable outcomes, can be significant roadblocks to learning. The use and abuse of power combined with situations of marginalization can also hinder access and levels of engagement that are necessary for learning to occur^[5]. Nevertheless, fostering learning within water governance is necessary in order to create processes that will have meaningful and lasting impacts.

3.7. Knowledge

In governance processes, recognizing and respecting multiple forms of knowledge is critical. In situations of collaboration or co-management, this is one of the fundamental characteristics^[8]. Challenges to doing this effectively relate to inclusivity, ensuring legitimacy and facilitating decision-making forums that allow various forms of knowledge to be shared and incorporated into deliberations.

There are many forms of knowledge and ways of knowing that are informed by diverse experiences and values^[89]. Balancing multiple forms of knowledge remains a challenging component of water governance as many water worldviews exist, sometimes in complete opposition to one another (e.g., sacred water vs. water as an input for industrial processes)^[58]. For many years, Eurocentric or western values have taken precedent over Indigenous water culture^[59], resulting in tensions that make current decision-making processes increasingly complex. The high proportion of water contamination in First Nations communities is a testament to inequities and a lack of respect for alternative knowledge sources in past governance processes^[57].

It is also the case that different forms of knowledge are linked with different degrees of legitimacy and power. Traditional, experiential or cultural knowledge is often difficult to legitimize. Especially in a society that has high expectations for evidence or proof, it is technical, scientific knowledge produced by experts that is often held to be the most trustworthy and reliable source. In some cases, civic science or participatory science that engages citizens in producing knowledge for decision-making is also recognized as having validity^[7]. However, even where scientific knowledge is regarded as a fundamental platform for decision-making, often values and motivations that yield the most economic or political power will hold the ultimate deciding force^[35].

Water is an essential component of all human and natural systems, and to assume perfect understanding of these systems and the potential impacts of certain actions is impossible. However, there is a difference between operating under conditions of uncertainty and operating under conditions of ignorance to certain ways of knowing. Creating opportunities for different knowledge types to be discussed and considered in the context of water governance is a significant challenge, but necessary to encourage decision-making that reflects a holistic awareness of the different ways that water has value. A positive example of knowledge integration is the water use planning for in-stream flows and hydroelectric facilities in British Columbia (see Box 3).

Box 3: Planning for In-Stream Flows and Hydroelectric Facilities in BC

Knowledge management has been and continues to be a key challenge in many current water governance scenarios. Past attempts have had mixed success and lessons can be drawn from these experiences in recent Canadian water governance history. In 1996, the province of British Columbia initiated a re-examination of water allocation practices at 22 major hydroelectric sites. Since construction in the 1950s, the dams had operated almost exclusively for the purposes of generating hydroelectric power. Given new knowledge regarding their impact on other interests such as salmon populations, wildlife food sources, flood protection, recreation and Aboriginal heritage, a process of Structured Water Use Planning (WUP) was initiated. One of the sites was the Lower Bridge River.

The Lower Bridge River is a tributary of the Fraser River. Along the river, there are three impoundment dams, three reservoirs and four generating stations. The management of this infrastructure in the past had resulted in major impacts to the river and its natural flow cycles. The Terzaghi Dam, for example, was not operated according to a policy of continuous release, and therefore a reach of approximately 4 km of the river became dry and a reach of about 15 km experienced a significant reduction in flow. The WUP process involved site-specific consultations with a diverse cross-section of civil society interests (e.g., local citizens, environmental groups, aboriginal representatives, resource users, governments and regulatory agencies). Technical sub-committees were made up of interested citizens who were willing to learn and participate alongside expert scientists. These consultative committees ranged in size from 15 to 35 members and were engaged in all aspects of decision-making.

Given the diversity of legitimate perspectives on the committees, a way to examine, understand and justify different knowledge claims was needed. Two clear ways of knowing were evident in this process: fact-based, technical information regarding anticipated consequences of different water use options; and value-based, lived experience and concern for the integrity of sacred spaces. The tasks of identifying key variables for consideration as well as exposing trade-offs had multiple dimensions including fish habitat, energy production and demand, river integrity and public health. The strategy to deal with this was to explicitly recognize the existence of different knowledge types and to create a scenario that allowed for the discussion of trade-offs, discrepancies, weighting of knowledge types, and how to integrate different knowledge types into hypotheses about possible impacts of activities.

Years later, the WUP program has been reviewed as extraordinarily successful with respect to “delivering consensus agreements based on multi-stakeholder deliberations”^[34]. Significant environmental and social improvements have been noted. For example, a recent survey of participants indicated good participant learning results with respect to gaining a better understanding of risks and uncertainties, options and trade-offs, the values of others and clearer personal values^[29]. As of 2007, the program was supporting ecosystem monitoring studies as recommended by the committee. It was intended that this monitoring data be used to examine the hypotheses that formed the basis of decisions made during the WUP process, and creates the possibility for adaptive co-management as the needs of the river and hydropower continuously evolve. However, evidence of ongoing program activities is not readily available.

3.8. Adaptation

Adaptive approaches to water governance recognize uncertainty and complexity, and allow for changes in light of new or better information. An approach to governance that is adaptive requires consistent monitoring and active data collection, the assessment of feedback, and ways to effectively incorporate feedback and learning^[77]. To practice adaptation means that modification to existing processes and programs is viewed as a normal part of doing business, and that flexibility is an inherent characteristic of the institutional arrangements that structure the process as well as the attitudes of those who provide oversight and authority.

While adaptation is important, implementation of adaptive approaches to water governance is challenging. It can be difficult to consistently collect data and feedback due to resource restrictions, and even when good feedback is available, there can be resistance to change and barriers to learning^[5]. Despite good intentions to adapt, environmental change can happen quickly, but in many cases changes to water governance processes do not. Whether due to inflexible legislation, complex actor networks, incomplete information and/or a host of other compounding challenges linked to capacity, establishing a successful practice of adaptation can be daunting^{[21][47]}. Additionally, the life cycle of decision-making processes can be long, and it is not always easy to assume or allocate responsibility for something that requires ongoing attention, for many years after the initial decision-making process finished. A further challenge is the degree of risk involved in admitting to experimental policy platforms and a lack of certainty, especially with respect to government-led processes^{[72][81]}.

3.9. Integrating Institutions

One of the most elusive ideals for effective governance is integration. With respect to water, integration refers to the need to coordinate activities at spatial and temporal scales that are appropriate to biophysical systems^{[64][84]}. This holistic approach considers a broad possible range of forms of water (e.g. surface and groundwater) as well as diverse types of water use in decision-making processes.

Hydrologic systems are inherently unbounded, complex and difficult to predict with certainty. These characteristics complicate the development of governance approaches as the scale of coordination among actors must reflect natural boundaries, such as watersheds or river basins, rather than independent municipalities. As discussed in Section 2, the usefulness and feasibility of using watershed boundaries to organize water *governance* is debated^{[36][93]}. Nonetheless, it is often necessary to work through these challenges to create an ethic of water management that reflects greater respect for the needs and characteristics of natural systems.

There are many ways of defining scale (e.g., community, local, regional, watershed, provincial) and true integration is achieved when institutions for governance create linkages among and across scales^[71]. Integration also requires the consideration of water management decisions in the broad context of other activities such as energy production, agriculture, urban development and forestry, where institutions for the management of land use reflect consideration of water quality and quantity concerns^[44].

The prerequisites for integration from a capacity perspective are immense, as integration requires extensive communication systems and opportunities to coordinate activities across multiple sectors of the economy^{[25][56]}. A critical challenge to integration is the discrepancy between the time and energy that it takes to gather the necessary knowledge and then develop and implement contextually appropriate systems of coordination, compared to the rapid pace of technological change, business investment and economic development that impact water resources^[46]. To truly balance social, economic and ecological values in governance for water is an ongoing dilemma that will require consistent investments toward building linkages, creating nested systems and developing an ethic of interdependent decision-making.

3.10. Evaluation

Evaluation is an important prerequisite for success in governance. With regular evaluation that is grounded in appropriate criteria and indicators, problems can be addressed and successes can be highlighted^[24]. However, in the context of water governance, determining what to measure, and how measurement should occur, is a highly complex task because that requires the clear definition of desired outputs and outcomes against which to measure progress^[60]. To illustrate, the Government of Alberta's Cumulative Effects Management system sets an important precedent for the holistic consideration of impacts to the environment. However, how to accurately and usefully evaluate cumulative effects remains a key challenge for practitioners^[13].

In addition, with regard to a collaborative approach to governance, there is also the question of how best to measure and evaluate the contributions from a participatory approach to governance^[91]. Certain outcomes of collaborative governance, such as the ability to make joint decisions (a process outcome) and increases in trust among participants (a social outcome), are relatively well understood in the literature. However, collaborative governance processes also have to be evaluated in terms of their ability to achieve environmental outcomes^[54]. Despite these challenges, effective evaluation is essential because without satisfactory understanding of the full range of outcomes of collaborative governance process, adaptation (and therefore learning) cannot occur.

3.11. Summary: Key Questions

This brief review of major challenges associated with water governance in Canada points to a series of key questions (Box 4). These are the kinds of questions that can be posed by those involved in designing and implementing water governance processes as a way of drawing attention to, and then evaluating, current and future challenges. Unfortunately, there are no one-size-fits-all answers to these questions. Context is critical in water governance. Therefore, while best practices and generally successful tactics can be identified, every governance problem will require place-specific and context-sensitive solutions.

Box 4: Questions that Highlight Key Governance Challenges

Leadership and Commitment: People and organizations that sustainably champion a project or plan with ongoing dedication to its successful implementation

- Who will champion new water values? How is this determined?
- How can commitment to long term water management strategies be sustained?
- What is needed to reduce fragmentation and make water a top political priority?

Resources and Capacity: The means and abilities that are required to accomplish goals and objectives

- How can water management activities be financially sustained?
- What does it take to build capacity in order to implement water governance processes?
- Why is capacity such a persistent problem?

Legitimacy: The genuine approval of institutions or actors by those subject to its actions

- How did actors come to be involved in the process? Are all stakeholders legitimate?
- How were institutions designed?
- How were plans created? With whose input and through what process?

Accountability: The acknowledgement and assumption of responsibility

- How to create the mechanisms necessary for the successful operation of new governance modes?
- How to guarantee policy outcomes while also accepting the risks of delegating responsibility?
- What is needed to ensure performance while allowing for flexibility in implementation?

Actors, Roles and Relationships: The people who are involved, their responsibilities and the qualities and characteristics of their interactions

- How are roles and responsibilities established?
- Who decides on the limits of inclusion and participation?
- How can conflict be navigated among stakeholders with different livelihoods and values?
- What does it take to build trust and respect that lasts?

Learning: The acknowledgement that participants must engage in a process of self, social and organizational learning in order to participate effectively in governance

- How can different types of learning be effectively facilitated?
- What resources are needed and how should they be administered?
- What spaces/forums are needed to create to encourage learning?

Knowledge: Recognizing and considering the different ways of knowing and interpreting the environment

- How can fact-based knowledge and value-based knowledge be considered in conjunction?
- What is the balance between expert science and lived experience?
- What information is most relevant and important? How are knowledge priorities determined?

Adaptation: Consistently monitoring change and using new information and knowledge to improve plans and decisions

- How can decision-making be both reliable and flexible?
- What should be monitored and how should data be stored, communicated, accessed?
- How can outcomes be linked to distinct efforts and plans?

Integrating Institutions: Achieving coordination among different policy tools at different scales

- How much integration is possible? Can operations be effective at a watershed scale?
- How can land and water management policies be developed in collaboration?
- How can multiple policy goals, that address economic, social and environmental values, be acceptably balanced?

Evaluation: Learning from previous approaches and evaluating success

- How should evaluation take place?
- Which outputs and outcomes should be evaluated?
- Who should be responsible for evaluation?

4. Conclusions

Across Canada, recognition is growing that governments, acting on their own and using conventional command and control policy tools, will not be able to solve the complex water challenges we face. Therefore, alternative approaches to governance are being pursued that involve new ways of governing, and which involve diverse combinations of people and organizations outside of governments. The introduction of multiple actors to decision-making forums is a departure from traditional ideas of government responsibility for water. In many cases, longstanding relationships between government and civil society are being altered.

New ways of governing water present both challenges and opportunities. They can be thought of as experiments in new ways of sharing responsibilities and making decisions about water. Because they are experiments, considerable uncertainty exists regarding how well they can address current and emerging water problems.

In this discussion paper, we identified a series of governance challenges relating to concerns such as legitimacy, adaptation and knowledge. How important these challenges are in any particular place or situation depends entirely on context. At the same time, how best to address the challenges that exist in a particular place or situation depends on local circumstances. While it is possible to identify best practices – and indeed this is the goal of future work in our project – it is not possible to create simplistic, one-size-fits-all solutions to the governance problems discussed here.

A goal in the *Governance for Source Water Protection in Canada* project is to encourage innovation by providing insights into collaborative governance approaches that are taking place across Canada and around the world. As different provinces and territories seek to address the concerns associated with water governance, many lessons can be learned from the experiences of others. However, it is vital to recognize that each solution will require context-specific measures and sensitivities that reflect local needs.

The challenges addressed here are difficult. However, in addressing them, innovative solutions can emerge. The key is to understand the challenges and then engage with them to shape more effective approaches to water governance. As illustrated by the examples presented throughout this discussion paper, there are numerous ways in which innovation can be expressed. The examples provided here are just a few of the many instances of innovation in Canada.

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Water Policy and Governance Group: About Us

The Water Policy and Governance Group (www.wpgg.ca) is a multi-university research collaborative. Our focus is water governance and water policy, primarily – but not exclusively – in Canada. Major themes in our research program include water security, source-water protection, water allocation, and adaptation to climate change. We conduct practical, policy-relevant research that contributes solutions to these problems.

Our success is grounded in our network of researchers and partners across Canada and around the world.

Graduate training is a central part of our mission. We accomplish our goals in large part because of the excellence of our graduate students, post-doctoral fellows, and research associates.

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