

# **TRANSBOUNDARY WATER GOVERNANCE IN THE MACKENZIE RIVER BASIN, CANADA**

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## *Abstract*

The Mackenzie River Basin (MRB) in northern Canada is a vast, nationally significant resource. Shared by three provinces and two territories, the basin also falls within the traditional and legally-defined territories of Aboriginal peoples. The MRB is under pressure from industrial development, but the majority has not yet been despoiled. The need for effective transboundary water management in the basin has been recognized, and progress is being made. However, the ultimate form that arrangements will take is currently uncertain. One possible outcome of current negotiations is a narrow approach based on little more than simply measuring the flows of rivers at jurisdictional boundaries, and then dividing them according to a negotiated formula. This would be a significant missed opportunity for all parties, which stand to be significantly better off through pursuing a collaborative approach to transboundary water governance in the MRB. Collaborative transboundary water governance in the MRB should recognize accepted international norms and best practices, and should fully account for the rights that are held by Aboriginal peoples under Canada's Constitution. Relevant international norms that should guide negotiations include commitments to equitable and reasonable utilization of water by parties sharing the resource, not causing harm to other jurisdictions, and cooperating with other jurisdictions to achieve optimal outcomes. Key benchmarks that should shape decisions and actions include integration, ecosystem protection, public involvement, collaborative, multi-level governance, and flexibility and adaptation. A broad outline for collaborative transboundary water governance in the Mackenzie River Basin based on these norms and benchmarks is outlined in the paper.

## ***Introduction***

In an increasingly interconnected world, the management of transboundary water resources has emerged as a critical challenge. It is estimated that 145 countries currently share 263 international water courses that cover approximately half of the earth's land surface. Generating around 60 percent of the global flow of fresh water, these basins are home to roughly 40 percent of the world's population (Loures, *et al.* 2008).

Shared international basins have been a focus for both disputes and cooperation for millennia. In 1984 the United Nations Food and Agriculture Organization identified more than 3,600 treaties that were created between 805 AD and 1894 AD, most focused on resolving issues relating to navigation (Food and Agriculture Organization of the United Nations 1984). Modern agreements address a broader range of concerns, and reflect a trend towards normalization of basic principles for water transboundary water governance. To illustrate, the 1997 *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses* (the "UN Water Convention") is based on a broad consensus regarding how water resources that cross international boundaries should be shared (McCaffrey 2008). Chief among the principles espoused by the Convention are the following:

- equitable and reasonable utilization and participation
- not causing significant harm to other watercourse states
- cooperating with other watercourse states to achieve optimal utilization and protection of international watercourses
- regular exchanges of data and information, and
- equality among types of uses.

The UN Water Convention reflects a growing global consensus that international transboundary watercourses must be managed *cooperatively* to maximize joint benefits, rather than *unilaterally* and competitively (Grey and Sadoff 2003; Tarlock and Wouters 2007; Phillips, *et al.* 2008). Importantly, however, the need for cooperative management of transboundary watercourses *within* countries can be just as strong (Box 1). This is especially true in federations that are divided into jurisdictions that have some degree of sovereignty over water resources. Examples include Australia, the United States and Canada, where sub-national jurisdictions share legal authority over water with their respective federal governments and with each other.

**Box 1: The Tri-State Water Wars**

The Tri-State Water Wars involving Georgia, Florida and Alabama reinforce the importance of effective transboundary water governance within a country. In 1990, Georgia sought additional water for the City of Atlanta from Lake Lanier, a reservoir on the Chattahoochee River in the upstream part of the basin. Negotiations over equitable apportionment of the watercourses that Georgia shared with Alabama and Florida failed, and thus the parties turned to the courts. On January 12, 2009, the Supreme Court ruled against Georgia. As a result, an agreement between Georgia and the US Army Corps of Engineers to take additional water out of Lake Lanier to supply Atlanta was declared illegal. After almost two decades of acrimony and uncertainty, the parties have had to turn again to negotiation to resolve the dispute.

(Draper 2006; Jordan and Wolf 2006; DeButts 2009)

The need for cooperative management of transboundary water resources certainly exists in Canada, a country whose vast territory covers almost 10 million km<sup>2</sup> and is divided into 10 provinces and three territories. Given that approximately seven percent of the world's renewable

freshwater resources are found within Canada's land area (Environment Canada 2006), it is not surprising that thousands of water bodies are shared by Canada's provinces and territories.

Governance of these water resources is complex.

Canada's constitution assigns specific authority to the federal government and the provinces (Saunders and Wenig 2006). Water bodies that fall solely within provinces fall primarily within the constitutional authority of provinces. The federal government's authority relates to specific concerns identified in the Constitution, notably 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. Other actors also play key roles. Under the authority of provincial statutes, municipalities have important water-related responsibilities. In northern Canada, territories also play key roles. In the Northwest Territories and Nunavut, the federal government is responsible for water except where Aboriginal governments have authority under self-government agreements. Responsibility for water management in the Yukon was transferred to that territory's government in 2003. Finally, as Phare (2009) notes, 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, Aboriginal peoples in Canada have unique rights, both as governments and as individual rights-holders, to be active participants in water-related decision-making.

Examples of successful inter-jurisdictional cooperation over shared water resources in Canada exist. For instance, the 1969 Master Agreement on Apportionment established a framework for sharing transboundary water resources among the federal government and the three prairie provinces of Alberta, Saskatchewan and Manitoba (Osborne 2005). The equitable

approach to sharing transboundary water resources established by this Agreement continues to this day.

Pressure on Canada's water resources is increasing due to industrial development, urban growth, and climate change (Kreutzwiser and de Loë 2010). As a result, the need for effective shared management of water resources is growing. One basin in which this need is particularly pressing is the Mackenzie River Basin (MRB) in northern Canada. This paper outlines a rationale and vision for transboundary water governance in the MRB. This crucial basin is shared by three provinces (British Columbia, Alberta and Saskatchewan) and by two territories (the Yukon and Northwest Territories), and falls within the area covered by treaties and land claim agreements that have been negotiated with Canada's Aboriginal peoples. The MRB is under pressure from industrial development, but the majority has not yet been despoiled. Governments have committed themselves to a cooperative approach – but the form of that cooperation has yet to be determined. Thus, there is still time to establish an effective transboundary water governance regime for the MRB that can address current and future threats and challenges.

A central argument in this paper is that a limited, narrow form of transboundary cooperation focused simply on apportionment of available flows in the basin will not be sufficient to meet current and future challenges. Instead, reflecting constitutional obligations and the differing policies in each jurisdiction, transboundary water governance should be based on emerging international norms and best practices that call for deeper cooperation and a more comprehensive perspective. In the next section, a brief overview of the MRB's physical and socio-economic setting is provided. Key norms and benchmarks for transboundary water governance are then discussed. These provide the basis for the broad outline of a vision for transboundary water governance in the MRB that is presented at the end of the paper.

## ***Mackenzie River Basin***

The MRB (Figure 1) is an incredibly complex social-ecological system. Understanding the prospects for transboundary water governance in this system requires consideration of the basin's hydrology, ecology, population and economy, along with the characteristics of key elements of the governance system, including constitutional, treaty and land claim obligations. This section provides a brief overview of considerations that are particularly relevant for transboundary water governance in the MRB.

### *Hydrology, Ecology, Population and Economy*

With an area of approximately 1.8 million km<sup>2</sup>, the Mackenzie River Basin (MRB) drains approximately 20 percent of Canada's land area and, at 4,241 km, contains Canada's longest river system (Mackenzie River Basin Board [MRBB] 2003). The basin is shared by the provinces of Alberta, Saskatchewan, and British Columbia (BC), and by two territories: the Yukon and Northwest (NWT) Territories. A small portion of the basin is found within Nunavut (Figure 1); nonetheless, Nunavut is not normally treated as a basin jurisdiction. Importantly, the basin also includes the traditional territories, treaty areas and land claim settlement regions of Aboriginal peoples: First Nations, Métis and Inuvialuit.

The headwaters of the basin are found in the Peace and Athabasca rivers, which originate in BC and Alberta, respectively (Figure 1). These rivers flow into the ecologically critical Peace-Athabasca Delta, a Ramsar wetland of international importance that is located in Alberta. Flows in this delta are complex. When water levels in Lake Athabasca are lower than the Peace River, water flows into the Delta and Lake Athabasca. More commonly, high water levels on Lake Athabasca cause flows through Delta channels to meet the Peace River and then flow north in the Slave River into the NWT, which drains into Great Slave Lake.

**Figure 1: The Mackenzie River Basin, Canada**



The Mackenzie River itself runs north from Great Slave Lake, and is joined by the Liard, Great Bear and Peel rivers before emptying into the Beaufort Sea (Figure 1). The various sub-basins that comprise the MRB create distinct settings for transboundary water governance. For example, even though the Slave sub-basin is a critical part of the larger Mackenzie River Basin, concerns relating to water quality and quantity on the Slave River are relevant primarily to



Alberta, as the upstream jurisdiction, and to the Northwest Territories, as the downstream jurisdiction.

The basin is sparsely populated. Its total population in 2001 was estimated to be 397,000 people, with the majority residing in the Alberta portion, in communities such as Fort McMurray, Peace River and Hinton (MRBB 2003). The basin is extremely important to Aboriginal peoples, who comprised 15 percent of the total population in 2001. Where population density is the lowest – in the northern parts of the basin – the proportion of the population that is Aboriginal tends to be highest. To illustrate, the region along the Mackenzie River from Great Slave Lake to the Mackenzie Delta is home to approximately 7,800 people in 13 communities, 70% of whom are Aboriginal (MRBB 2003).

The basin's current and potential future economic significance for Canada is enormous. However, economic considerations must be considered alongside the fact that the basin contains one of North America's great river systems. The MRB has some of the last remaining expanses of nearly pristine wilderness on the continent, and contains globally important forests, tundra and wetland ecosystems that provide habitat for a host of species. For instance, breeding and staging areas for millions of migratory birds such as geese and tundra swans are located within the basin (Nature Canada 2008). The Peace-Athabasca Delta on Lake Athabasca is one the most important waterfowl nesting and staging areas in North America; up to 400,000 birds are known to use the Delta in the spring, and more than one million in the autumn (Schindler, *et al.* 2007). The basin's other major delta – the Mackenzie Delta on the Beaufort Sea – supports important wildlife species (including muskrat, beaver, moose, mink, lynx, beluga whales), fish species such as whitefish, inconnu and arctic char, and numerous bird species (MRBB 2003). Alongside their ecological significance, the fish and wildlife of the basin are a critical source of food for a

significant portion of the basin's people (Government of the Northwest Territories [GNWT] 2010b).

To describe the basin's relatively unspoiled ecosystems as "priceless" is not an overstatement. Unfortunately, things that are not priced tend to be undervalued in contemporary economic and political decision making processes. Recognizing this fact, various organizations have attempted to establish the economic value of the ecological goods and services of the MRB. The Canadian Boreal Initiative has estimated that the market value of the MRB, assessed as the region's GDP, is \$41.9 billion per year. The non-market value of the basin, assessed as the potential value of 17 ecosystem services produced by the region (e.g., carbon storage, water filtration, water supply), is estimated at \$570.6 billion per year – 13.5 times the societal economic value of the extractive industries such as oil and gas development (Anielski and Wilson 2007).

Few would argue that carbon storage, water filtration and water supply, three of the critical ecosystem goods and services that the Canadian Boreal Initiative valued in economic terms, are not critical to the economy and society of the basin – let alone of Canada. Nonetheless, the basin's traditional natural resources (oil, gas, hydroelectric power, forestry and minerals) unquestionably are valued much more highly by industry and governments. In the context of this paper, oil and gas developments and hydro-electric power generation are especially important economic activities that have implications for transboundary water governance in the basin.

Oil and gas development is already extensive in the basin, primarily in the Alberta and BC portions, and much more is expected in the future. For example, a proposal to develop the vast natural gas reserves that are found in the Mackenzie Delta is currently being evaluated. This will require the development of a pipeline along the Mackenzie, which will also facilitate

development of gas resources in NWT (GNWT 2007). Perhaps the most significant current fossil energy development at this time is the oil sands (also known as the “tar sands”) in Alberta, near the City of Fort McMurray (Figure 1). An estimated 300 billion barrels of recoverable fossil energy is found in these deposits (MRBB 2003). Development is proceeding rapidly. At the end of 2009, four mines were in operation, with three additional mines approved or under development. In 2008, these projects were producing 1.3 million barrels/day. Production of 3 million barrels/day is expected by 2018, with 2030 production levels reaching 5 million barrels/day by 2030 (Holroyd and Simieritsch 2009; Government of Alberta 2010).

The economic benefits of oil sands development to Alberta and Canada are enormous, but they are matched by their environmental and social impacts. Bitumen is extracted through two different processes: surface mining and in situ developments involving, for example, the injection of steam that melts the bitumen and allows it to flow (known as Steam Assisted Gravity Drainage). The magnitude and scale of oil sands developments is enormous. As of 2008, 530 km<sup>2</sup> of boreal landscape has been disturbed; tailing ponds alone cover 130 km<sup>2</sup> (Kelly, *et al.* 2010). Environmental impacts associated with oil sands projects include (to varying extents) emissions of greenhouse gasses, particulates, metals and polycyclic aromatic compounds (PACs); impacts on water quality and quantity; and loss of habitat due to land clearing for mine pits, roads, well sites and pipelines (Holroyd and Simieritsch 2009; Kelly, *et al.* 2009). Concerns exist regarding the effects of oil sands development on the health of downstream communities, particularly those where people consume water, fish and wildlife from the Athabasca River watershed. Aboriginal peoples maintaining traditional lifestyles are at particular risk in this context. For example, Kelly, *et al.* (2010) demonstrated that 13 elements considered priority pollutions under the United States Environmental Protection Agency’s *Clean Water Act* were

released via air and water to the Athabasca River and its watershed. An earlier study by these authors measured levels of PACs in snowpack within 50 km of oil sands upgraders, and in water downstream of new oil sands development (Kelly, *et al.* 2009). These findings, the authors suggest, is cause for serious concern because of the impacts of these substances on fish, wildlife and human health.

Hydro-electric power generation is important to the provinces of BC and AB, and to the NWT. Approximately 30 percent of BC Hydro's generating capacity is created by two stations located on the Peace River that are supplied by the Bennett Dam (Figure 1) (MRBB 2003). Seasonal patterns of stream flow on the Peace River have been changed by this development, and the ecology of the Peace-Athabasca Delta has been affected (Prowse and Conly 2000). The BC government currently is planning the development of another project on the Peace River: the "Site C" project, downstream of the Bennett Dam. This project is expected to generate a further 900 MW of capacity (BC Hydro 2010); further changes to the ecology of the Peace-Athabasca Delta may be expected. Additional major hydro-electric power generation projects also are being considered in the basin by industries and governments. For example, TransCanada Corporation has proposed a \$5 billion dam project on the Slave River, just south of the Alberta-NWT boundary, which would generate an estimated 1,200 to 1,300 MW of power (Calgary Herald 2008). The NWT government also views hydroelectric power development as an important part of the territories' energy future. Small scale projects will be used to provide the energy needs of communities, while larger projects may supply industries such as diamond mines. In its analysis the government identified 11,520 MW of undeveloped potential, including an estimated 10,450 MW of potential hydroelectric power on the main stem of the Mackenzie (GNWT 2007).

Pressure on the basin's water resources and ecosystems, and on the people who depend on them, is increasing due to the economic developments discussed above. However, climate change is another important stressor in the basin. Studies have identified changes in meteorological and hydrological parameters that appear to relate to observed changes in climate (Schindler and Donahue 2006; Abdul Aziz and Burn 2006). For instance, changes in annual precipitation between 1950 and 1998 have been observed in the basin, with the impacts most pronounced in the northern portion. The Athabasca Glacier has lost half its volume and has retreated by more than 1.5 km during the last 125 years. If the patterns identified to date continue into the future, significant effects on aquatic and terrestrial ecosystems are anticipated (MRBB 2003).

By themselves, anticipated changes in the basin's climate and hydrology warrant serious concern. However, their significance is magnified substantially when they are considered alongside the impacts of human developments on both water quality and quantity. For example, stream flow and water quality in the Athabasca River will be affected not only by climate change, but also by increased water withdrawals for oil sands development (MRBB 2003; Bruce 2006). Similarly, the impacts of additional hydro-electric power developments on the Peace-Athabasca Delta will be magnified by impacts of climate change (Prowse and Conly 2000). A more comprehensive, basin-wide perspective clearly is needed to address these interacting sources of change.

### *Governance*

The term "water governance", as used in this paper, refers to the ways in which societies make decisions that affect water (de Loë, *et al.* 2009). Considerations that are important in the context of water governance include the organizations and people involved, the roles they play,

the relationships among the various actors, and the formal and informal institutions that facilitate decision making. The biophysical and socio-economic setting within which governance occurs also is an important concern.

Water governance in the MRB is extremely complex. Key actors include the three provincial governments, which are responsible for water allocation, land-use planning, and energy development; the federal government, whose mandate is triggered in cases where water crosses interprovincial boundaries, and has constitutional responsibilities for Aboriginal peoples in the territories and for water in Nunavut and Northwest Territories; territorial governments, which fulfill some or all (in the case of Yukon) of the water-related functions of provinces; Aboriginal governments in parts of the basin where land claims agreements have been negotiated (e.g., the Gwich'in Tribal Council, for the Gwich'in Settlement Area); Aboriginal peoples, because of their Aboriginal and treaty rights; industry; citizens; and, increasingly, civil society groups such as the World Wildlife Fund (WWF) that have taken an interest in the basin (e.g., WWF 2005; WWF-Canada 2009).

Within each level of government, certain agencies and organizations have specific roles. For example, Indian and Northern Affairs Canada (INAC) is the agency primarily responsible for fulfilling the federal government's responsibilities in NWT and Nunavut, but Environment Canada and Health Canada also have lesser but still important responsibilities relating to water. In the Northwest Territories, the Department of Environment and Natural Resources coordinates GNWT involvement in water management. The five Water Boards (Mackenzie Valley Land and Water Board; Sahtu Land and Water Board; Gwich'in Land and Water Board; Wek'èezhì Land and Water Board; and NWT Water Board) have specific responsibilities relating to water allocation and water quality management.

Laws and policies relating to water that have been created by the various governments are key elements of the governance system. For example, in Alberta, water is allocated under a provincial statute, the *Water Act*. In NWT, water boards issue licenses for water use under the *Northwest Territories Waters Act* and the *Mackenzie Valley Resource Management Act*. Basin governments also have created policy frameworks. Examples include BC's *Living Water Smart* (British Columbia Ministry of Environment 2008), Alberta's *Water for Life* (Alberta Environment 2008), and NWT's *Northern Voices, Northern Waters* stewardship strategy (GNWT 2010a), which is the product of close cooperation between the Government of the Northwest Territories, Aboriginal partners and Indian and Northern Affairs Canada (Box 2). Despite its critical role in NWT, the federal government does not currently have a comprehensive *national* policy framework for water. Importantly, however, INAC has endorsed the NWT's water strategy.

**Box 2: Northern Voices, Northern Waters: NWT Water Stewardship Strategy**

Following a lengthy process involving visioning and detailed public consultation, the Government of the Northwest Territories, along with its Aboriginal partners and Indian and Northern Affairs Canada released *Northern Voices, Northern Waters: NWT Water Stewardship Strategy* in May 2010. The strategy is grounded in an overall vision that mirrors those contained in similar documents: "The waters of the Northwest Territories will remain clean, abundant and productive for all time". However, the strategy is distinctive for a number of important reasons:

- It is built upon a genuine commitment to shared governance with the territory's Aboriginal peoples. This is reflected in a commitment to *engagement* rather than simply *consultation*, the prominence given to Aboriginal traditional knowledge, and, the simple fact that implementation of the strategy so clearly depends upon Aboriginal partners. It clearly defines key concepts such as “ecosystem health” and includes tangible and measurable goals and objectives. Roles and responsibilities are clearly identified, and the foundation for collaborative, multi-level governance of water in NWT is established.
- It recognizes the importance of water to the territory as an economic good and foundation of economic prosperity, while at the same time accepting its significance for the environment and its cultural and spiritual importance to Aboriginal peoples.
- The importance of integrating decisions regarding water with related concerns such as land use planning and economic development, is clearly established.

Importantly, the strategy also emphasizes the extent to which NWT's water resources are vulnerable to decisions made in upstream jurisdictions; thus, it supports the need for effective transboundary water governance in the MRB.

The MRB is an integrated, hydrologic system, yet water governance is fragmented along jurisdictional and agency lines. Recognizing this concern, and accepting that a cooperative approach to transboundary water governance is needed, Canada, British Columbia, Alberta, Saskatchewan, Yukon and the Northwest Territories negotiated the 1977 Mackenzie River Basin Transboundary Waters Master Agreement (MRBTWMA). The Agreement is a concrete step towards the goal of a more coordinated approach that recognizes basin-wide concerns. It commits its signatories to a set of principles, including managing water resources “in a manner consistent with the maintenance of the ecological integrity of the aquatic ecosystem”



(Government of Canada, *et al.* 1997). The Agreement reflects many of the contemporary norms of international transboundary water governance that are discussed in the next section. For instance, the principle of equity is reflected in commitments to manage the use of the basin's water resources in a sustainable manner for present and future generations, and to not cause unreasonable harm to the integrity of aquatic ecosystems in other jurisdictions (Government of Canada, *et al.* 1997).

The MRBTWMA does not undermine the jurisdiction of the signatories. For example, Alberta's ability to develop its natural resources and to allocate water resources within its territory under the *Water Act* is not affected because it signed the Agreement. Nonetheless, the parties have recognized the need for a coordinated approach to implementation of agreed-upon principles and goals. Therefore, the Agreement created the Mackenzie River Basin Board (MRBB). Members of the MRBB include up to three representatives of Canada, and one each of the three provinces and two territories. Additionally, the agreement provides for a total of five board members who represent Aboriginal organizations in BC, Alberta, Saskatchewan, Yukon and the Northwest Territories. The MRBB provides a forum for communication, coordinated action, information exchange and other activities that contribute to a basin-wide orientation (MRBB 2003).

In the context of this paper, a critical function of the Agreement is the provision of mechanisms for the negotiation of "Bilateral Water Management Agreements" among the parties. As noted previously in the case of the Slave River watershed, the interests of the various basin jurisdictions are stronger in some sub-basins than in others. Thus, the Agreement permits negotiation of bilateral agreements for specific transboundary water resources. These should be consistent with the principles established in the Agreement. To date, only one bilateral

agreement has been negotiated (between the Northwest Territories and the Yukon). Memoranda of Understanding that establish the frameworks for detailed negotiations have been signed between BC and Alberta, and between Alberta and Northwest Territories.

Recognizing the need for more progress in negotiating bilateral agreements, the MRBB recently published a guidance document that outlines a detailed implementation plan, including the sequence in which agreements should be negotiated (MRBB 2009). While this document clarifies next steps, considerable uncertainty remains regarding the scope and scale of these agreements, and, more importantly, the extent to which the overall principles for transboundary water governance outlined in the Agreement can be implemented. For instance, bilateral water management agreements negotiated under the MRBTWMA could be little more than apportionment arrangements that divide the flow of key transboundary watercourses. Or, they could provide the foundation for joint management of the MRB according to accepted international principles and best practices.

The latter approach is advocated in this paper. As suggested in the next section, experiences from around the world demonstrate overwhelmingly that parties are significantly better off when they pursue collaborative approaches to transboundary water governance rather than acting independently, or in conflict with each other. In the MRB, for example, collaboration is likely to result in better data bases for decision making, improved monitoring regimes, enhanced cooperation on mutually beneficial developments, better environmental quality, and reduced conflict. The increased certainty that is likely to result from cooperative management and robust institutions for shared governance should be a significant incentive to parties adopting a truly collaborative approach.

## ***Principles and Benchmarks for Transboundary Water Governance***

Despite the ominous title of “water war” that has been attached to the legal and political disputes involving Georgia, Alabama and Florida, genuine wars over water are actually quite rare. Instead, as Wolf (1998) notes, transboundary water resources have – overwhelmingly – brought nations together, rather than leading them into armed conflict. This reflects the fact that unilateral action to address water-related problems in transboundary basins is rarely successful. Instead, evidence from around the world overwhelmingly indicates that negotiated solutions and collaboration produce better results than conflict and competition (Wolf, *et al.* 2005; Loures, *et al.* 2008).

Transboundary basins are incredibly complex social-ecological systems. Hence, even countries with histories of antipathy have found that cooperation typically is needed to maximize their respective environmental, economic and social interests (van der Zaag and Vaz 2003; Wolf, *et al.* 2005). Specific outcomes of cooperative approaches evident from experiences around the world typically include the following (Uitto and Duda 2002; Giordano and Wolf 2003; Wolf, *et al.* 2005; Draper 2006):

- adequate amounts of water, of appropriate quality, for human and environmental needs;
- appropriate sharing of the risks of scarcity;
- reduced uncertainty;
- opportunities for identifying mutual interests and resolving conflicts, thereby permitting new options and solutions to emerge;
- strengthened trust and confidence through collaboration;
- greater probability that decisions made jointly will be accepted by the parties involved; and,
- increased cooperation on other cross-border concerns.

The case for a cooperative approach to the management of transboundary water resources primarily reflects experiences with international watercourses. However, as suggested in the introduction, these benefits are equally relevant at the sub-national scale. While the UN Water Convention clearly has been designed to guide nation states, its core principles – e.g., equitable and reasonable utilization of water by parties sharing the resource, not causing harm to other jurisdictions, cooperating with other jurisdictions to achieve optimal outcomes – can provide a basis for cooperation in basins located within one country but shared by sub-national jurisdictions.

Initiatives such as the UN Water Convention provide a foundation of basic principles for cooperation. However, every shared watercourse is unique. Thus, how these broad principles are implemented depends on local context. Not surprisingly, therefore, the UN Water Convention is silent on several specific issues that are considered critical in the contemporary water governance literature. To illustrate, the Convention does not address the roles of parties other than national governments. This is of course critical *within* countries, where citizens, local governments, industry, indigenous people and others are (or should be) key participants in water governance.

In this section, five benchmarks for effective transboundary water governance drawn from the contemporary water and environmental governance literatures are discussed: integration; ecosystem protection; public involvement; collaborative, multi-level governance; and adaptability and flexibility. Other benchmarks certainly can be added to the list. However, the ones presented here are especially relevant in the context of transboundary water governance (in general) and the Mackenzie River Basin (in particular).

(1) *Integration*. Water connects human activities over time and space because actions in one part of a watershed or aquifer will be felt in others. Thus, integration has emerged as a key

benchmark for effective water governance in shared basins. Decisions and actions regarding the following should be made in an integrated fashion that addresses jurisdictional and administrative boundaries: surface water and groundwater interactions; land use planning and water management; human and environmental water needs; water quality and water quantity; and economic development and water management (Bjornlund 2003; Falkenmark 2003; Giordano and Wolf 2003; Murray, *et al.* 2003; Carter, *et al.* 2005; Phillips, *et al.* 2008).

(2) *Ecosystem Protection.* Earlier agreements relating to transboundary water resources have focused primarily on concerns such as navigation, flood control and apportionment (Giordano and Wolf 2003). In contrast, contemporary agreements increasingly emphasize improving or maintaining environmental conditions (Tarlock and Wouters 2007). Concerns pertinent to ecosystem protection include improving or maintaining flows to protect fish and fish habitat (Dyson, *et al.* 2003; Richter, *et al.* 2003; Sengo, *et al.* 2005); sustaining or improving riparian habitat (Brouwer, *et al.* 2003); and achieving water quality objectives for ecosystem needs (Shmueli 1999). Aquatic ecosystems have specific needs in terms of the timing, volume, temperature and quality of flows (Dyson, *et al.* 2003). Thus, despite the fact that a concern for integration captures some issues pertinent to ecosystem protection, transboundary water governance arrangements should pay particular attention to the kinds of concerns outlined above.

(3) *Public Involvement.* The need for, and desirability of, public involvement in water governance has emerged as a central concern in the contemporary literature (Affeltranger and Otte 2003; Dyson, *et al.* 2003; Bruch 2004; Bruch, *et al.* 2005; Dellapenna 2007). It is difficult to imagine implementing a goal such as equitable sharing of water resources without providing appropriate opportunities for the people who are affected to be involved, for instance, people who live in communities downstream of major water takings. The water management literature

offers a host of additional reasons for public involvement. For example, water management is inherently a political activity (Swatuk 2005; Warner, *et al.* 2008). Thus, effective public involvement is needed to reduce the potential for conflicts and to increase the likelihood of successful policy implementation. At the same time, the literature recognizes the limited capacity of the state, on its own, to manage systems as complex as transboundary watersheds (Karkkainen 2005; Draper 2006). Reflecting these concerns, modern agreements for transboundary water management increasingly include provisions for public involvement (Draper 2006; Muys, *et al.* 2007).

(4) *Collaborative, Multi-level Governance.* In many countries around the world, water governance increasingly is characterized by a sharing or distribution of authority and responsibility beyond the state. Terms such as “collaborative” and “multi-level” governance often are used to describe this more complex environment (Imperial 2005; Armitage 2008). The trend toward collaborative and multi-level water governance has many causes, including practical limitations on the ability of the state to deal with complex social-ecological systems, and a belief that sharing responsibility and power beyond the state can better reflect local circumstances and needs (de Loë, *et al.* 2009). Transboundary water governance based on a desire to achieve basin-wide objectives is a setting where collaborative and multi-level governance are particularly important (Matthews and St.Germain 2007). This reflects the fact that no one actor has the power and authority to manage a system that is shared by many actors.

(5) *Adaptability and Flexibility.* Daily, seasonal, and annual changes in precipitation, streamflow, lake levels and other characteristics of the water cycle are a normal feature of water management (McDonald and Kay 1988; Cech 2003). Unfortunately, due to anticipated changes to the global climate, water managers can no longer assume that future climatic variability will

be consistent with observed variability (Milly, *et al.* 2008). Hence, they have to deal with increased complexity and uncertainty – likely at levels much higher than have previously been experienced (Kashyap 2004; Draper and Kundell 2008). Adding to this challenge is the fact that climate change is only one source of uncertainty. Others include changed demands for water due to population growth and economic development; new actors with different interests, goals and expectations; and new knowledge resulting from scientific advances (Milich and Varady 1998; McCaffrey 2003; Kistin and Ashton 2008; Swatuk and Wirkus 2009). Together, these considerations emphasize the critical importance of designing water management systems – such as arrangements for transboundary water governance – with flexibility and adaptability in mind. For example, provisions for apportionment of shared streamflow should permit responding to circumstances that were not conceived of when rules were drafted, and should accommodate changes in flows, demands and other key considerations such as the needs of the environment (McCaffrey 2003; van der Zaag and Vaz 2003; Fischhendler 2004).

### ***Transboundary Water Governance in the Mackenzie River Basin***

A wealth of experience with transboundary water governance exists around the world. Attention continues to be focused primarily on international transboundary water courses. However, recognition of the importance of effective transboundary governance *within* countries has grown in recent years, as witnessed by the publication of general guidelines (e.g., Draper 2006) and model compacts for interstate water governance (e.g., Muys, *et al.* 2007). These initiatives reflect a desire in the United States to avoid the costly legal disputes that emerge from situations such as the one currently faced by Georgia, Alabama and Florida (Box 1).

This section outlines in broad strokes a vision for transboundary water governance in the Mackenzie River Basin. A basic premise in this section is that a limited, narrow form of

transboundary cooperation focused simply on apportionment of available flows in the basin will not be sufficient to meet the current and future challenges outlined previously, and would be a significant missed opportunity for all the parties. Instead, reflecting the kinds of contextual factors presented in Box 3, transboundary water governance in the MRB should be based on the principles and benchmarks discussed in the previous section.

**Box 3: Contextual Factors Relevant to Transboundary Water Governance in the MRB**

- Hydrological and climatological conditions in the basin (e.g., annual and inter-annual flow patterns in shared rivers and streams, groundwater-surface water interactions, water quality, drought frequency and magnitude, flood risk).
- Federal, provincial and territorial jurisdictions and responsibilities; traditional, treaty and legal rights of Aboriginal peoples.
- Institutions for water governance in the basin, including water allocation systems in each basin jurisdiction, and existing arrangements for transboundary water governance.
- History of cooperation between and among the basin jurisdictions (federal government, provinces, territories, and Aboriginal peoples), and their willingness to collaborate.
- Current and potential ability to regulate surface water flows using reservoirs.
- Financial, social and technical capacity of key actors who will be involved in transboundary water governance (e.g., hydrological modeling capabilities, level of organization, capacity and interest among citizens and non-government organizations).
- Availability and quality of data and information needed for purposes such as understanding the impacts of developments, monitoring cumulative effects, and forecasting of future conditions (socio-economic, hydrological).
- Existing and future pressure on water resources and ecosystems from industrial development, communities and climate change.
- Water needed to ensure aquatic environmental conditions (existing and desired).



The need for transboundary water governance based on internationally-accepted standards of *equity* is critical in the MRB in part because of the significant power imbalance that exists. The Northwest Territories – as the principal downstream jurisdiction – had a 2009 population of 43,400 people, whereas Alberta and BC, the principal upstream jurisdictions, had 2009 populations of 3,687,700 and 4,455,200 people respectively (Statistics Canada 2010). The disparity in population size alone assures BC and Alberta a significant advantage over the Yukon and NWT in financial and technical resources. Equity also is a critical concern in the basin because of its Aboriginal population. Aboriginal peoples in Canada have historically been affected negatively by large water developments (Quinn 1991; Phare 2009). Current and future industrial developments have affected, and unquestionably will affect, the Aboriginal peoples who have made the MRB their home for millennia. Given that their territories do not fall neatly within provincial/territorial boundaries, it is essential that their concerns (and rights) be acknowledged and respected in transboundary water governance.

A commitment to equity in transboundary water governance does not necessarily have negative implications for existing rights holders within basin jurisdictions (Muys, *et al.* 2007). For instance, adopting a basin-wide approach to water governance in the MRB does not require that Alberta, BC and the other jurisdictions that share the basin must abandon their own policy frameworks or legal systems for water management, or that holders of existing water rights in those jurisdictions will lose those rights. Instead, a commitment to equity simply recognizes that the parties sharing a basin should not cause harm to each other. This principle already is contained in the MRBTWMA, which states that the parties are committed to “The right of each to use or manage the use of the Water Resources within its jurisdiction provided such use does

not unreasonably harm the Ecological Integrity of the Aquatic Ecosystem in any other jurisdiction” (Government of Canada, *et al.* 1997).

Integration is essential in any basin-wide approach to transboundary water governance. Sharing of transboundary surface water flows is a key concern in the MRBTWMA. This concern is particularly important in the Athabasca sub-basin in the context of withdrawals associated with oil sands development, and in several other basins in the context of the impacts of current and future hydro-electric power developments. However, integration – or at least coordination – of decision making is also needed in the context of interrelationships among water quality and water quantity; land development and water flows and quality; and energy policies and water policies. In some transboundary contexts, it also may be important to consider groundwater-surface water interactions. Focusing on the cumulative effects associated with water use and development – an approach advocated by several basin jurisdictions – is an appropriate vehicle for identifying and addressing relevant concerns. Finally, integration of sub-agreements is also an important concern. As discussed previously, the MRBTWMA permits the signatories to negotiate separate bilateral agreements. This should occur within a larger organizing framework (whether the MRBTWMA or something else).

Building on the objective of integration, transboundary water governance in the MRB should make protection of aquatic ecosystems a basic requirement. The basin contains nationally and internationally-significant water-dependent ecosystems that have not yet been entirely despoiled. With development pressure increasing throughout the entire basin, it is essential that mechanisms for transboundary water governance pay special attention to environmental water needs. Experiences from around the world demonstrate clearly that the needs of the environment cannot be met effectively once water resources have been committed overwhelmingly to human

purposes (de Loë 2009). Thus, defining environmental water needs (quantity, quality, timing, etc.) and then protecting them through specific mechanisms is essential. While considerable uncertainty remains in the scientific literature regarding appropriate methods for defining environmental water needs, enough is known that a reasonable precautionary approach can be adopted that water is needed both for human uses (including economic developments) and the environment.

Given the Mackenzie River Basin's enormous size and relatively low population density, and in light of its diverse Aboriginal peoples, effective public involvement in transboundary water governance should be a priority. It is difficult to imagine anyone defining a vision for water governance in the MRB without providing extensive public consultation and involvement opportunities; the process used to develop the NWT's water strategy sets a precedent (Box 2). Similarly, successful implementation of a broader vision for transboundary water governance, i.e., one that goes far beyond simply measuring flows at boundaries and dividing them according to a formula, will require the support and active involvement of people who live in the basin's communities and on the land.

The basin is shared by three provinces and two territories, Aboriginal governments and the federal government. Hence, a basin-wide approach to governance will necessarily be collaborative and multi-level. Numerous examples exist around the world that demonstrate that collaborative, multi-level governance is feasible, and that it does not necessarily impinge upon the sovereignty of the various participants. The current Mackenzie River Basin Board is an example of one approach: a specific organization that provides a forum for deliberation rather than joint decision making. Stronger models exist. For example, the Murray-Darling Basin Authority (MDBA) in Australia is responsible for planning the integrated management of this

critical basin (MDBA 2010); the Authority has legally-defined decision making authority for transboundary water governance in the Murray-Darling Basin. Another model is found in the River Basin Commission that is central to the Model Transboundary Water Compact proposed by the Utton Transboundary Resources Center at the University of New Mexico School of Law (Muys, *et al.* 2007).

In the context of the Mackenzie River Basin, a key governance challenge relates to the role of Aboriginal peoples. In the NWT and Yukon portions of the basin, Aboriginal governments exist under land claims agreements (e.g., the Gwich'in Tribal Council, for the Gwich'in Settlement Area). In the portions of the basin that fall within provinces, different arrangements exist. For instance, Treaty 8 covers the portion of northern Alberta that falls within the MRB, along with part of the southern NWT. In light of their rights to be involved in decision making due to treaties, land claims and their traditional Aboriginal rights as enshrined in section 35 of the Canadian Constitution, Aboriginal peoples must be involved in *governance* in the basin, rather than simply consulted as members of the general public. This is not simply a moral argument. The legal landscape relating to water and Aboriginal peoples in Canada is changing (Phare 2009). Failing to acknowledge this fact, and thus failing to view Aboriginal peoples as partners in the governance of the MRB, would be a source of considerable uncertainty and even conflict. This situation is not unique to Canada. For instance, the Utton Model Transboundary Water Compact contains specific provisions for involving tribal governments in the governance of shared basins in the United States (Muys, *et al.* 2007).

Given the lack of high quality data for decision making in many parts of the basin, the enormous uncertainty that exists regarding the cumulative effects of existing and future industrial developments, the water needs of the environment, and the impacts of climate change on water

resources and ecosystems, it is critical that flexibility and adaptability be established as design principles for transboundary water governance in the MRB. For example, it would be entirely inappropriate in the bilateral negotiations that are currently underway for the parties to establish inflexible, volume-based allocations of water. Instead, in considering rules for sharing transboundary flows, mechanisms should be established that permit responding to unforeseen circumstances. This approach is well developed in other countries, e.g., under the Murray-Darling Basin Agreement, provisions exist for flexible apportionment among states based on water resource conditions, special provisions exist for dealing with droughts and low flows, and procedures exist for regular plan revision and amendment (de Loë 2009).

### *Conclusions*

The aim in this paper was to outline a rationale and vision for transboundary water governance in Canada's Mackenzie River Basin. This precious transboundary resource is under pressure from industrial development, and under threat from climate change. Large-scale industrial developments already have left their mark, and in some parts of the basin have created significant negative ecological changes and environmental impacts. Nonetheless, it is not too late for the parties involved in governance in the basin to commit themselves to a truly cooperative, basin wide approach to dealing with transboundary concerns. The benefits of such an approach are numerous, and include a stronger shared knowledge base, reduced uncertainty for industry, and healthier aquatic ecosystems, to name a few.

Challenges certainly exist. These include the low population of the basin relative to its large size, limitations on the capacities of key actors to implement decisions (especially in the territories), and the rapid pace and scale of energy development. Clarifying the role of Aboriginal peoples in the governance of the basin as a whole also is a distinct challenge not faced by many

other transboundary basins. Despite these challenges, the vision articulated in this paper is within reach. A vast foundation of experience exists around the world for dealing with the challenges of transboundary water governance, as do concrete models. Achieving the kind of transboundary water governance advocated in this paper certainly is a mammoth task. However, those favouring this approach can take heart from the fact that in basins around the world where the challenges are even more profound, people committed to cooperation in shared basins have found ways to govern them successfully. At the same time, addressing the challenges faced in the MRB – and achieving the vision articulated in this paper, especially in terms of the roles of Aboriginal peoples – could offer a model for the rest of the world.

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