



Large Area Planning in the Nelson-Churchill River Basin (NCRB):

Laying a foundation in northern Manitoba

SUMMARY



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November 2016

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1.0 Introduction

In recent decades, a global trend in large basins is the development of integrated, large-scale planning efforts to manage these ecosystems for key environmental and socioeconomic priorities. These efforts are often in reaction to environmental problems and crises, such as water shortages, declines in water quality, lack of water for agricultural needs, industrial impacts on water, flooding, etc. In addition, due to a growing recognition that watershed ecosystems provide a host of benefits (e.g., nutrient capture, flood mitigation, food provision) that support both human and environmental well-being, the need to recognize and prioritize these ecosystem benefits in basin planning is increasing (Roy, Barr, & Venema, 2011). This concept of “ecosystem benefits” was popularized in the 2005 Millennium Ecosystem Assessment and has gained significant traction and influenced decisions in watersheds and ecosystem worldwide.

This document summarizes a more extensive research report (Zubrycki et al., 2016) that considers these two (we argue positive) trends—the growing tendency towards large basin management and consideration of ecosystem services in decision making—for the case of the northern portion of the Nelson–Churchill River Basin (NCRB) in Canada. This section of the basin has already undergone significant physical change through the diversion of a portion of the Churchill River flowing into the Nelson River, and the development of hydroelectric facilities altering the hydrologic flow of the rivers. Other development pressures include mines, forestry, tourism, changing community needs, infrastructure development and climate change.

1.1 A Sense of Urgency

Increases in resource development, including the potential for mining, forestry, hydroelectric development, as well as potential growth in the already sizeable tourism industry in the region, could add new stresses to the environment. However, new development planning also presents opportunities to reduce impacts on the environment, reduce risks to long-term economic development and in turn increase socioeconomic resilience in northern communities.

Urgency for large area planning in the northern NCRB comes from several sources, including recent economic challenges (e.g., closure of the Port of Churchill, reduced rail service and Tolko’s withdrawal from forestry operations in the region)¹ and current political priorities. At the provincial level, the government has announced several relevant initiatives in the region, including increased funding for tourism development in northern Manitoba (Government of Manitoba, 2016a) and the creation of a task force to develop a new Northern Economic Development Strategy (Government of Manitoba, 2016d).

¹ In November 2016 Tolko Industries Ltd.’s Manitoba operations and assets were sold to American Industrial Acquisition/Canadian Kraft Industries Limited (Government of Manitoba, 2016e).

Box 1. Recommendations for initiating ecosystem management in northern Manitoba

1. Prioritize a northern NCRB initiative.
2. Identify, quantify and prioritize ecosystem services in the northern NCRB, ideally through a combination of analytical and deliberative approaches.
3. Form a multi-party, basin-level organization to consider northern NCRB management and fund it and its activities adequately and consistently. Include shared decision-making with Indigenous Peoples.
4. Access traditional and innovative sources to adequately fund a long-term initiative.
5. Use existing entities and processes to build basin-level thinking, operating at multiple scales.
6. Enhance monitoring, data sharing and reporting.



At the federal level, the 2016 Government of Canada budget announced CAD 8.4 billion in funding over five years “to improve the socio-economic conditions of Indigenous peoples and their communities and bring about transformational change” (Indigenous and Northern Affairs Canada, 2016). These initiatives present some opportunities for addressing this need for strategic watershed-based management. In addition, the situation of the NCRB at high latitudes exposes its climate to the polar amplification of warming—expected to occur with greater speed and magnitude than temperate regions (IPCC AR5 Working Group 1, 2013).

The notion of large area planning for optimizing benefits is not new to Manitoba or Canada. In 1997, the premier of Manitoba launched a multi-interest consultation (Government of Manitoba, 1999) to “consider and make recommendations to government on how Manitoba can best implement sustainable development principles and guidelines into decision-making, including environmental management, licensing, land use planning and regulatory processes.” Most recently, the Clean Environment Commission (2015) conducted hearings on the regulation of water in Lake Winnipeg, a major reservoir and sub-basin in the NCRB, and stated:

The commission considers that all activities affecting the Lake Winnipeg–Nelson River watershed should be assessed in light of all impacts, taking into account the three pillars of sustainable development: social, economic and environmental sustainability. (p. 19)

1.2 The Opportunity

In light of these trends and the proven benefits of watershed management approaches (e.g., Bach et al., 2011; Blomquist, Dinar, & Kemper, 2005; Brandes & O’Riordan, 2014), we present research elaborating on integrated management of the NCRB system, and demonstrating how existing initiatives, policies and institutions can play a role in building towards this purpose. Large-scale basin planning that anticipates negative effects and proactively prevents or mitigates them could support sustainable development in the region.

This report begins to consider these intertwined and complex socioeconomic and environmental factors for integrated management of the NCRB. The ultimate goal of this research is to inform a process for implementation of ecosystem management in the NCRB. We focused first on the northern Manitoba portion of this basin (see Figure 1) to clarify concepts before beginning the more complicated trans-provincial and transboundary aspects of basin policy and management. Therefore, we refer to the “northern NCRB” to differentiate this region from the full basin. The full research report reviews the biophysical, social and economic characteristics of this prioritized portion of the basin in combination with appropriate governance and management systems to help provide recommendations (Box 1), and to lay the foundation for strategic, place-based and sustainable management in the entire NCRB.



2.0 Methods

For this research, we used literature reviews, case studies and policy analyses in order to initiate targeted discussion on the potential for strategic basin-level planning and the development of an integrated ecosystem management framework in the northern NCRB. For initial discussion and implementation, we have prioritized the northern Manitoba portion of the NCRB (see Figure 1).

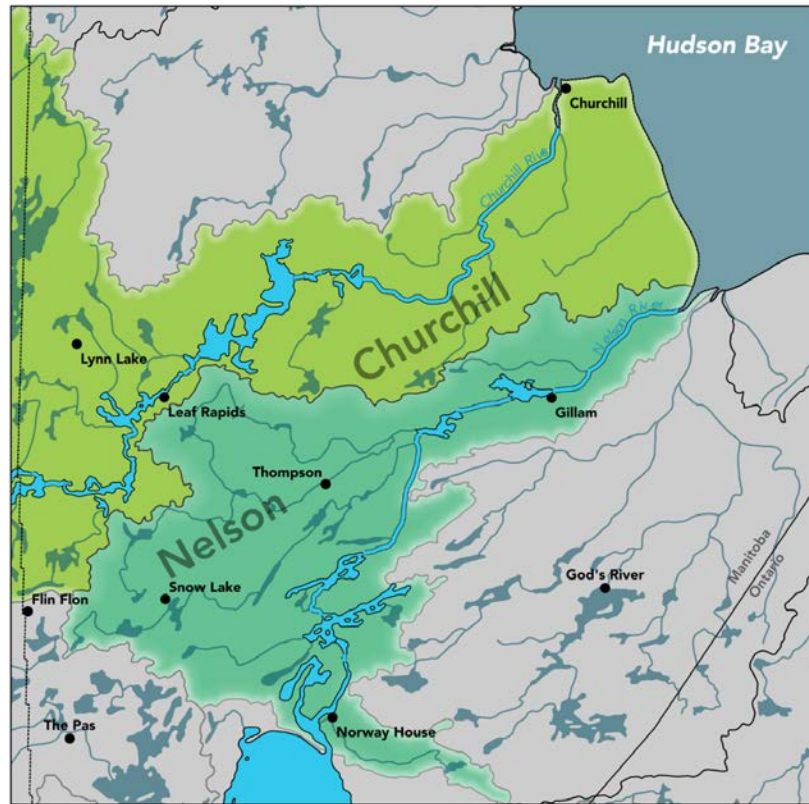


Figure 1. Research Area: Northern Manitoba portion of the NCRB

To develop a summary of the basin, and to elaborate on its physical, social and economic characteristics, we relied on literature and reviewed major studies from multiple sources (academic, peer-reviewed literature; governmental agencies; and non-governmental organization [NGO] research) describing the biophysical characteristics of the basin and exploring environmental impacts on the Nelson and Churchill rivers. In addition, socioeconomic descriptions related to the communities and economic sectors were gathered from government reports and websites, and connected with GIS-based studies of land cover, land use, etc., to provide visual and synthetic overviews of the northern portion of the basin.

In order to identify beneficial principles for successful watershed management, we conducted a review of Canadian and international literature synthesizing elements of effective place-based management, including natural resource and watershed management. We extracted recurring principles from meta-analyses where other researchers had reviewed multiple cases and compiled lessons necessary for good, adaptive management while considering relevance to the northern NCRB. We then applied these principles in the context of the northern NCRB to inform a policy and programming analysis. Our research on the current state of policy and governance in the northern NCRB drew from academic literature, government reports, NGO reports, websites, media releases and news media.



3.0 An Overview of the NCRB in Northern Manitoba

3.1 Ecosystem Services from the Northern NCRB

We approached management and governance of the northern NCRB from the perspective of ecosystem services, recognizing that the basin's lands and waters are the lifeblood of its socioeconomic and environmental well-being. They are drivers of sector-based economic development (e.g., mining, forestry, hydro, tourism), but they also provide important value in less tangible ways, such as habitat provision, water purification and spiritual enrichment. A synthesis of the climate, geography, ecology, land, water and socioeconomic features of the research region informed our ecosystem services analysis.

The concept of ecosystem-based goods and services was popularized by the Millennium Ecosystem Assessment (2005) as a means to link ecosystem management and human well-being. It presented four now widely accepted categories of ecosystem benefits: provisioning services (e.g., food, raw materials, freshwater, biomass); regulating services (e.g., climate regulation, erosion control, water flow management, carbon storage); cultural services (e.g., recreation, mental health benefits, spiritual enrichment); and supporting services (e.g., habitat, biodiversity).

A review of the ecology, land use and socioeconomic systems in the northern NCRB helps identify existing ecosystem services in the study region. It also helps to establish these services as goals for ecosystem management and their potential economic value as contributing topics to understanding priorities for this region.

Provisioning services in the northern NCRB include food, fresh water, hydroelectricity, forest products, biomass fuel, minerals and metals. The value of commercial fisheries in northern Manitoba lakes was CAD 1.77 million in 2011–12 (down from CAD 6.9 million in 2002–03) (Manitoba Sustainable Development, 2013). In 2014, the value of mining in Manitoba was approximately CAD 1.4 billion (metallic and industrial minerals) with five producing mines in or near the northern NCRB as well as significant ongoing exploration (Manitoba Growth, Enterprise and Trade, 2016). In 2016 Manitoba Hydro produced hydroelectricity worth roughly CAD 1,800 million (Manitoba Hydro, 2016). In 2015 forestry in Manitoba (some of it in the northern NCRB) contributed CAD 387 million to provincial forestry exports (Natural Resources Canada, 2015).

Regulating services in the basin include flood and drought management, water quality regulation, erosion control and other services. Globally, the boreal is estimated to store “more than 700 billion tonnes of carbon in its trees, wetlands and soils” (Badiou, 2015).

Cultural services include a wide range of recreational and aesthetic services, as well as various services used by Indigenous communities in the north, such as medicines and spiritual benefits. To illustrate the magnitude, the northern region of the province contributed CAD 116 million to the economy from tourism—equivalent to 8 per cent of tourism spending in the province (Travel Manitoba, 2016).

Supporting services in the study region include habitat for fish, waterfowl, wildlife and biodiversity in general.

Essentially, the northern NCRB provides a wide range of vital ecosystem services that are a mainstay of the region's economy and contribute considerably to regional, national and global economies. The basin is a complex system that supplies numerous ecosystem services through its diverse and rich land cover,



and land uses ranging from forests and mining to large-scale hydropower generation. Therefore, it is necessary to understand these ecosystem services as a function of integrated watershed management to optimize benefits and minimize unintended negative impacts for long-term management of this region.

3.2 Physical Characteristics of the Northern NCRB

The entire NCRB is the third largest watershed in North America, with a drainage area of more than 1.4 million km² (Shiklomanov & Rodda, 2004). It includes portions of four Canadian provinces and four U.S. states (see Figure 2). Waterways in the basin flow through a variety of terrains (e.g., prairie, boreal plain, boreal shield, taiga shield, low relief Hudson plain etc.) (Rosenberg et al., 2005).

The hydrologic regime of the northern NCRB is very complex and is heavily influenced by hydroelectricity generation and related development in the region, as well as the potential impacts of climate change. The two river systems are connected by a diversion channel, which diverts water from the Churchill into the Nelson basin (Hecky et al., 1984). This diversion reduced the average flow of the Churchill River by about 58 per cent (Lake Winnipeg, Churchill and Nelson Rivers Study Board, 1975). Numerous studies have been carried out to identify the specific impacts of the alteration on the regime to the ecosystem. However, most of these studies have been carried out at smaller scales without looking at cumulative impacts or implications for the whole basin as an interconnected system; this is a foundation for developing effective basin management strategies. The full report from this study (Zubrycki et al., 2016) provides further description of the water regime and its implications.

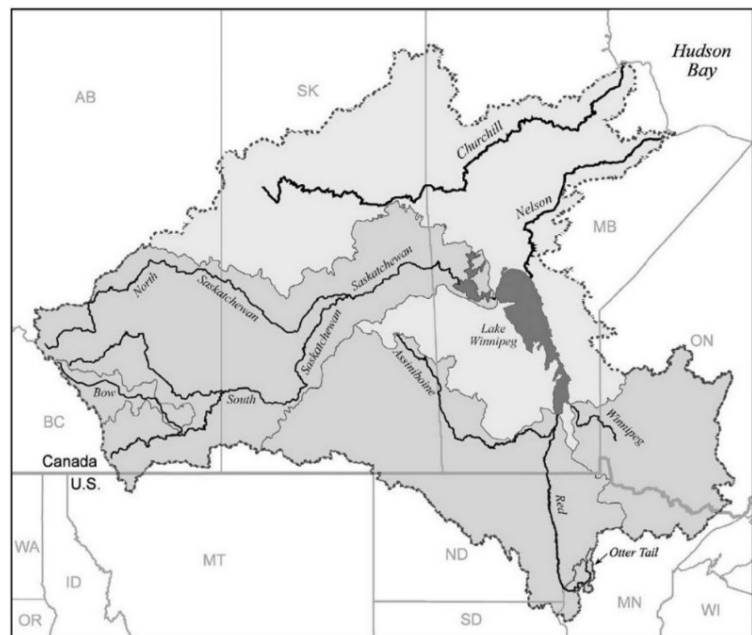


Figure 2. Nelson–Churchill River Basin

Source: Rosenberg et al., 2005

In addition to human-induced alterations, climate change is predicted to have significant effects in the basin, particularly the northern-most regions. Recent climate models show that the NCRB will experience warming primarily during the winter months (October to April). Predictions of impacts in the region include reduced soil moisture, increased carbon dioxide fluxes from the soil and contributions to a climate feedback effect (Arctic Climate Impact Assessment, 2005).

3.3 Socioeconomic Characteristics of the Northern NCRB

Indigenous Peoples have occupied the northern NCRB for thousands of years and have a strong attachment to the land and water, with many of their cultural and spiritual traditions revolving around it. The long history of Indigenous Peoples in the NCRB provides a compelling reason to include them



in integrated, watershed-based planning efforts, as well as to learn from their efforts at managing these landscapes. Figure 3 outlines these and other developments in the region in past centuries.

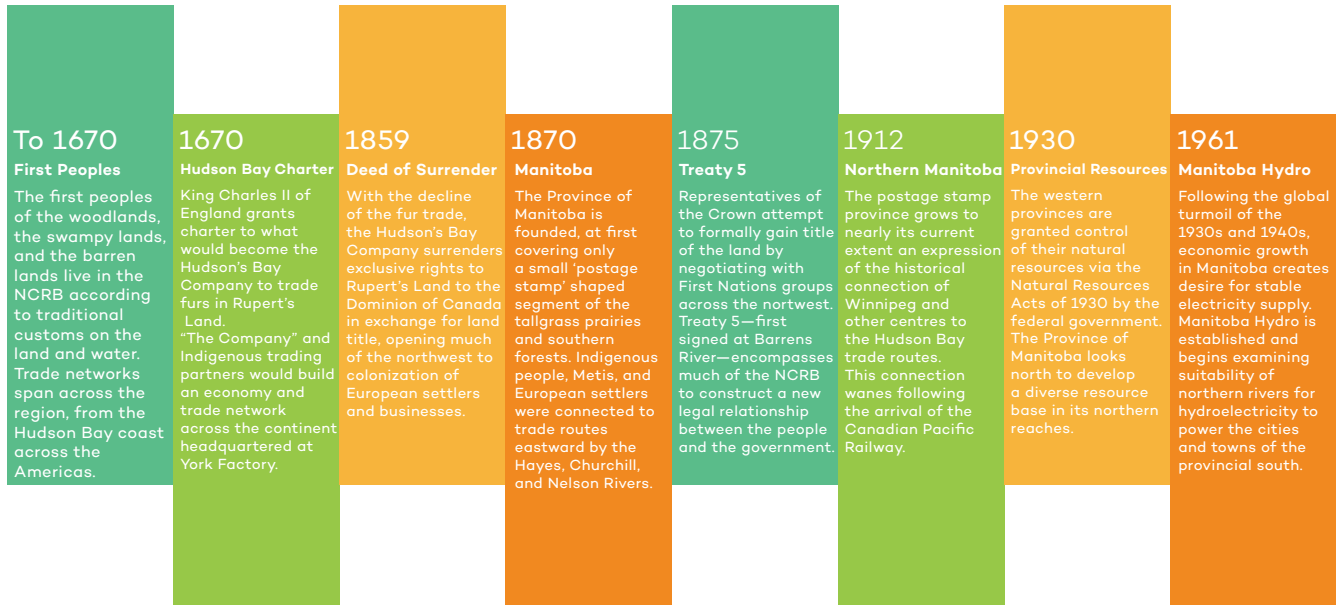


Figure 3. Broad timeline of significant events in the northern NCRB

According to the 2011 population census, the northern Manitoba portion of the NCRB is inhabited by 37,215 people, with a majority identifying as Indigenous. Distribution of the population is sparse and discontinuous, with people concentrated in a small number of towns, communities and reserves (see Figure 4). Large swaths of the northern NCRB reported zero residents in the 2011 census. Issues surrounding transportation and remoteness from major centres will have implications for integrated planning and management in the region.

Natural resources support socioeconomic development of the northern Manitoba portion of the NCRB. Mining, forestry and hydroelectric development are the major drivers in the region, as illustrated by the estimated magnitudes of economic returns provided in the previous section on ecosystem services in northern NCRB. Furthermore, mining and forestry collectively provide direct and indirect job opportunities to an estimated 20,900 people (Northern Development Ministers Forum, 2012)—though as the economy changes in the region (e.g., with Tolko leaving the region and future ownership of operations still unclear), these numbers could change. Manitoba Hydro employs a large number of people province-wide and almost 20 per cent of their workforce is Indigenous (Manitoba Hydro, 2015). In addition, Manitoba Sustainable Development (2013) emphasizes the importance of fisheries in northern Manitoba: “with the decline of the fur industry, commercial fishing is often one of the few economic opportunities available for many communities” (pp. 2–3).

3.4 Principles for Watershed Management Success

Researchers, policy-makers and managers have grappled with the complexities of ecosystem management for decades. A robust body of literature highlights challenges and solutions around successful ecosystem



management (Grumbine, 1994). With a growing understanding of the links between ecosystem services and human well-being, there are examples of basins throughout Canada and the world where management is occurring to deliberately prioritize certain benefits, while also being conscious of trade-offs that might occur as a result. This report reviewed literature and case studies of effective ecosystem and place-based management and identified seven principles for successful large area management.

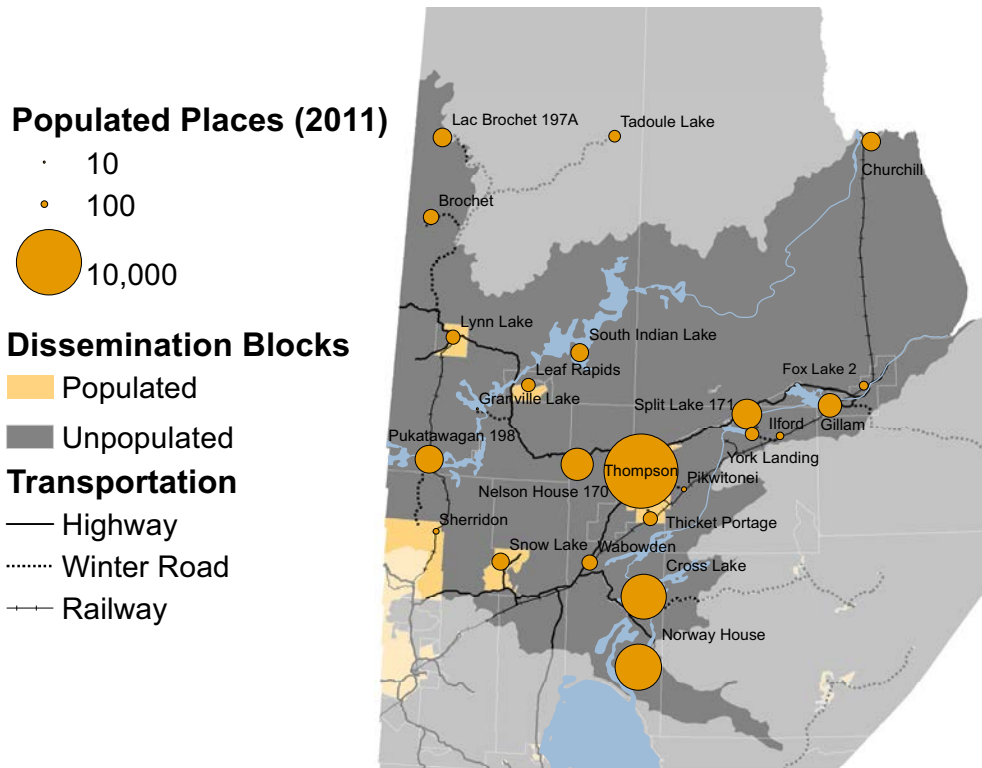


Figure 4. Populated areas of the northern NCRB in Manitoba

Principle 1: Basin Planning

An overarching principle found in all documents reviewed is that a good blueprint is essential for effective basin management (e.g., Blomquist et al., 2005; Government of Alberta, 2015; Roy, Barr, & Venema, 2011). Once the need for basin-level governance is recognized, key planning steps include defining which groups should be involved in planning; setting goals, targets and objectives; defining actions to meet targets and objectives; identifying monitoring systems to measure and report on progress; and asking key questions about factors that could hinder success if not considered. These considerations include social acceptability of proposed actions, costs and benefits, trade-offs and whether or not programs exist to inform and include interested groups (Government of Alberta, 2015).

Basin Planning in the Northern NCRB

There is currently very little consideration of integrated basin-level planning the northern NCRB. While large-scale planning and management for many other watersheds in Manitoba exists, such as for the Red, Saskatchewan and Assiniboine Rivers (and efforts on the larger Lake Winnipeg watershed are growing), there is little evidence of this type of planning in the northern Nelson–Churchill region. Rather, planning in the area focuses more on political and institutional boundaries (e.g., census divisions; regional health



authorities; treaty lands); industry and development (e.g., Manitoba’s Hydro’s focus area for the Regional Cumulative Effects Assessment, which were determined largely based on Resource Management Areas); and economic considerations (e.g., the Thompson Economic Diversification Plan’s “Thompson Region”). One example of a more ecosystem-centred approach is the Canadian Boreal Forest Agreement, which considers sustainable management of Canada’s boreal lands and includes portions of the NCRB.

In addition, the 1999 Report of the Consultation on Sustainable Development Implementation (COSDI) warrants recognition for asserting that large area level planning was needed in Manitoba, and strongly recommending that these areas “maximize the use of natural boundaries such as watersheds for defining the large planning areas” (Government of Manitoba, 1999). COSDI was a multi-party consultation initiative meant to guide government in how to integrate sustainable development principles into decision making. The COSDI vision statement—“Manitobans working together to develop an integrated framework for large area and municipal planning, significant resource allocations and environmental management decisions to ensure sustainable development in Manitoba” (Government of Manitoba, 1999)—further reinforces this focus on planning. It is this level of thinking, integrating socioeconomic and environmental factors, that we recommend in the NCRB.

Principle 2: Leadership

A good basin management plan needs a good leader—an organization that ensures the plan is followed and manages resources, relationships, scope and the parties involved. While the organizational nature of basin leadership varies (e.g., government, consortium, non-profit, multilateral organization, etc.), the documents reviewed (Blomquist, 2005; Brandes & O’Riordan, 2014; Roy, Barr, & Venema, 2011; Schmeier, 2012; Sheelanere et al., 2014) revealed some common characteristics found in many leadership entities. Some examples of these include the ability and widely accepted mandate to: provide strategic direction and vision to watershed planning; convene interested parties; coordinate planning and activities; make decisions; ensure implementation and compliance; obtain or provide human and financial resources; secure social license/support from Indigenous communities and other interests; manage various interests; guide the initiative through challenges; and help develop standardized methodologies and data.

Leadership in the Northern NCRB

Currently, no entity is leading watershed management in the northern NCRB. However, it is promising that numerous initiatives exist that provide leadership for and structure to natural resources management in the area. For instance, significant regional thinking has developed around the boreal forests of Manitoba and Canada as a whole. Examples include the Canadian Boreal Conservation Framework, the Boreal Songbird Initiative and the Boreal Woodland Caribou Recovery Strategy, which includes a large portion of the northern NCRB. These initiatives show that large-scale sustainability thinking is already present in the region in various forms and involving many groups.

Since 2000, Manitoba has also had a Northern Development Strategy, focused on transportation, health, employment and training, housing and economic development. In November 2016, the provincial government announced the creation of a task force, co-chaired by Onekanew (Chief) Christian Sinclair of the Opaskwayak Cree Nation and Chuck Davidson, president and CEO of the Manitoba Chambers of Commerce, “to lead the process of implementing the Manitoba government’s Northern Economic Development Strategy” (Government of Canada 2016d). In addition, the Communities Economic Development Fund (CEDF) issued a request for proposals to help develop this strategy, a task that would involve working with the task force and other interests (MERX 2016).



Box 2. Leadership, planning and multi-party initiatives in the Fraser Basin

The Fraser Basin watershed is British Columbia's largest watershed, containing two thirds of the province's population. The Fraser Basin Council (FBC) was established in 1997 and is a collaboration of four orders of government—federal, provincial, local and Indigenous—and multiple private sector and civil society stakeholders. This NGO aims to create collaborative, sustainable solutions to social, economic and environmental issues and encourages resilience within the watershed and community. The FBC plays multiple roles, including:

- Secretariat: providing leadership, administration, organizational and management support
- Monitoring and reporting: measuring the progress of sustainability initiatives and sharing information
- Institutional coordinator
- Conflict and inter-jurisdictional resolution agent
- Research and analysis: undertaking research, ensuring access to information and data
- Implementation of the strategic plan

The FBC presents an example of a non-governmental overarching agency with the authority, mandate and capacity to develop a management strategy, monitoring programs and influence decisions on project development. The FBC acts as a secretariat to enable the coordination between governments, research institutes, Indigenous Peoples, the public and industry within the watershed. The roles and interests of watersheds are well defined within the FBC, and strategic representation from all interests is established in the Fraser River Basin Strategic Plan framework.

Different interests—arising from governments (provincial and federal), Indigenous Peoples and industry—all possess the leadership characteristics identified by the literature review in different combinations. In some sense, provincial and federal governments have the clearest legal mandates (e.g., through laws such as the Water Protection Act, the Canadian Constitution and the federal Environment Act) and are most likely to have resources for watershed management in the NCRB. However, given significant legacy issues with Indigenous communities, they may not have full social license, support and social capital. Therefore, in determining potential leadership, we suggest it might be useful to consider collaborative leadership structures identified in the literature review, including NGOs, central government agencies and intergovernmental bodies.

Principle 3: Multi-Party and Multi-Scale Approaches

Securing significant involvement from different groups throughout a watershed helps ensure broad support, incorporate different perspectives and ultimately increase the chance of management success. Groups that should be involved in an inclusive multi-party approach include utilities, industry, civil society organizations, national and provincial governments, Indigenous governments, local governments, landowners and the scientific community. These groups should have roles commensurate with their skills and interests. For example, development project proponents could help fulfill monitoring and reporting requirements, while the science community has an important role to play in helping to develop basin and sub-basin indicators and models (Sheelanere et al., 2013).

In multi-party approaches, the basin should be considered at multiple scales, such as basin, sub-watershed and project or community-level scales. At each scale, different constellations of groups will be involved. Coordination between scales, including information sharing, communication and harmonization of monitoring approaches, is essential (Bach et al., 2011; Sheelanere et al., 2013).



Multi-Party and Multi-Scale Approaches in the Northern NCRB

Achieving multi-party approaches in any watershed can be a challenge, but the northern NCRB faces an additional geographic challenge not experienced by most other watersheds: a highly dispersed population with sometimes limited connectivity. The abilities of some of these communities to participate in multi-party engagements may be limited by travel options (some communities are only accessible by winter road, plane or rail) and Internet access.

To build a watershed-based, multi-party engagement process for the northern NCRB, there needs to be a clearly articulated plan that brings watershed interests together. It is important to consider a range of options in involving rights holders and stakeholders; while it would be unwieldy to have all interests directly involved in planning and decision-making, less intensive options should be open to all. Methods should be used to ensure all interests have a voice in the direction the watershed takes; some options include roundtables, forums, consultations, written/phone submissions and mutually agreed-upon methods for representation. The examples of existing multi-party initiatives in the region, such as the former Thompson Economic Development Working Group and the provincial government's planned Northern Economic Development Strategy, incorporate some of these options. These approaches could contribute to initial discussions and/or evolve into watershed-focused engagement.

Principle 4: Shared Decision Making with Indigenous Communities

In northern Canada, where a large portion of the population is Indigenous, it is critical to involve the Indigenous communities and groups in any regional planning. They are important partners with legal rights of their own, with knowledge and skills to offer—and also with a significant amount to lose if they do not have a say in planning and management. Brandes and O’Riordan (2014) identify co-governance with Indigenous Peoples as one of their nine conditions for watershed governance success, writing that Indigenous Peoples and their governments “must be properly acknowledged and hold an important place in any efforts to improve the governing of watersheds to ensure more ecological and socially sustainable outcomes” (p. 8).

Shared Decision-Making with Indigenous Communities in the Northern NCRB

The land in the NCRB falls under Treaty 5 (Manitoba) and Treaty 10 (Saskatchewan). An estimated 65 per cent of people in northern Manitoba are Indigenous (Government of Manitoba, n.d.a), and many participate in traditional activities such as hunting, fishing and gathering. Indigenous Peoples have by far the longest history on the land of any population in the region. They rely heavily on a healthy watershed for their well-being and traditional knowledge can strengthen planning, so their involvement is essential in creating a sustainable path forwards.

In terms of natural resources management, northern Manitoba's resource management boards (RMBs) present one approach to co-management with Indigenous Peoples. RMBs manage such things as “land and resources use planning; water management; commercial and domestic harvesting activities; mineral development activities; forestry; and wildlife management” (Government of Manitoba, n.d.b). A 2016 Memorandum of Understanding (MOU) signed between Nisichawayasihk Cree Nation (NCN) and the Province of Manitoba to enhance the NCN RMB's land-use planning exemplifies the role that the boards can play (Nisichawayasihk Cree Nation, 2016). The MOU includes the following objectives: “the co-operative development and implementation of a land-use plan, the development of work plans associated with the management plan, and the acknowledgement that NCN should be provided with opportunities for economic development” (Antoszewski, 2016).



Box 3. Multi-party planning and recognition of Indigenous Peoples in northern Quebec

Plan Nord is a development strategy led by the Government of Quebec that aims to develop and diversify the economic potential of northern Quebec. The plan aims to support development of all communities in the Plan Nord region, as well as protect the environment and preserve the distinctive biodiversity of northern Quebec by establishing mechanisms to dedicate 50 per cent of the area, by 2035, to non-industrial purposes (such as recreation or conservation), to protect the environment and to safeguard biodiversity (Government of Quebec, 2015).

Four basic principles have been established for Plan Nord, on the basis of shared values and maximized economic benefit to the region, to guide the government's development strategy (Government of Quebec, 2016):

- A planned, coordinated project based on partnership, private sector investment and support for communities, in particular through the creation of the Société du Plan Nord.
- A focus on sustainable development that integrates the economic, social and environmental dimensions.
- Government actions adapted to the realities of local and Indigenous communities and to northern areas in general.
- A harmonious and ethical approach to development that remains respectful of Indigenous and non-Indigenous communities that is consistent with gender equality.

The FBC presents an example of a non-governmental overarching agency with the authority, mandate and capacity to develop a management strategy, monitoring programs and influence decisions on project development. The FBC acts as a secretariat to enable the coordination between governments, research institutes, Indigenous Peoples, the public and industry within the watershed. The roles and interests of watersheds are well defined within the FBC, and strategic representation from all interests is established in the Fraser River Basin Strategic Plan framework.

There are several other promising developments in the northern NCRB related to shared decision making with Indigenous Peoples. Collaborations between Manitoba Hydro and various Indigenous communities, such as for the Wuskwatim and Keeyask projects, indicate increased meaningful engagement (Nisichawayasihk Cree Nation, n.d.) On a regional scale, the Province of Manitoba's planned Northern Economic Development Strategy could provide opportunities for increased shared decision making in the region. The inclusion of Opaskwayak Cree Nation Onekanew (Chief) Christian Sinclair as a co-chair on the task force for the development of this strategy seems a positive step (Government of Manitoba, 2016d). We recommend that this process and the resulting strategy be viewed as one possible way to integrate and implement the principles discussed in this paper—and that it could be deliberately designed to further watershed thinking, Indigenous empowerment and sustainable development.

Principle 5: Monitoring and Reporting

This review found that not only is robust monitoring of watersheds important, but so too is reporting on findings. Collecting data through monitoring helps scientists and managers understand the state of the watershed, while reporting disseminates those findings more broadly and ensures all parties have the opportunity to consider findings and use the knowledge in a variety of ways.

Monitoring involves the collection of data over time in order to increase knowledge of watershed processes, study trends and understand how different management practices may be affecting trends. Often, monitoring is linked to goals, targets and objectives detailed in a watershed management plan.



The literature recommends several features for inclusion in a monitoring program, including consistent data collection methods, multi-scale data collection, incorporation of traditional knowledge and other aspects described more fully in the research report (Bach et al., 2011; Blomquist et al., 2005; Brandes & O’Riordan, 2014; Sheelanere et al., 2013; Schmeier, 2012).

Reporting involves sharing monitoring findings, presented in formats that are suitable to different target audiences (Roy et al., 2011; Sheelanere et al., 2013). Reporting is important not only to share essential information, but also to provide transparency and accountability (Brandes & O’Riordan, 2014).

Monitoring and Reporting in the Northern NCRB

Monitoring and reporting is carried out in the northern NCRB by a variety of entities (e.g., Manitoba Hydro, the Government of Manitoba, the Government of Canada, North/South Consultants, mining companies [Vale and Hudbay], forestry [Tolko] and, on smaller scales, various communities) as detailed in the full report (Zubrycki et al., 2016). However, significant improvements could still be made that could go far in increasing broader understanding and available information on the region. Key elements to consider include increasing coordination between data collectors; centralizing data and reporting; examining roles and responsibilities; enhancing interpretation and availability of data, including trends and issues; and combining traditional and Western knowledge.

Principle 6: A Role for Legislation

Legislation emerged from the review as having a variety of potential roles in watershed management. These roles included:

- Bringing a watershed organization into existence through an act of legislation (Brandes & O’Riordan, 2014).
- Defining its composition and mandate (e.g., Columbia Basin Trust Act [British Columbia]; Conservation Districts Act [Manitoba]) (Brandes & O’Riordan, 2014; Schmeier, 2012).
- Protecting organizations from changes in policy and government (e.g., Mackenzie Valley Resources Management Act) (Blomquist et al., 2005).
- Establishing environmental standards and setting minimum requirements for resource protection (Lewtas, Gerrard, & Roy, 2015).

Opinions of the ideal role of legislation varied in the literature. Some authors supported legislation playing an active and constant role, while others suggested that incentive and collaboration-based systems are more effective mechanisms. Others recommended a balanced approach between strict legislation and more incentive-based perspectives (Blomquist et al., 2005; Brandes & O’Riordan, 2014; Schmeier, 2012).

Legislation and the Northern NCRB

A review of existing federal and provincial legislation suggested that legislation already enables planning and management to a significant degree in the northern NCRB, with voluntary guidelines providing additional direction. Box 5 highlights numerous relevant acts. While this research did not assess whether or not existing legislation is currently adequately applied, it was positive to find a fairly strong legislative foundation already protecting and enhancing the basin.



As noted in the literature review, legislation is commonly used to create watershed- or basin-level entities. An example in Manitoba is the Conservation Districts Act, which enables the province to create conservation districts. Though no conservation districts exist in the northern NCRB, the potential to create such an entity is available through this act. The literature also discussed larger basin organizations created by legislation (e.g., Mackenzie Valley Land and Water Board), an approach that we suggest could be considered.

Box 4. Integrated Basin Management Safeguarded by Legislation

Mekong River Basin and Commission

In 1957 the United Nations (UN) established the Mekong Committee through coordination with Cambodia, Laos, Thailand and South Vietnam. With cooperation among the riparian countries, the Mekong Committee then became the Mekong River Commission (MRC) in 1995 among the countries in the Lower Mekong Basin (without China and Myanmar). The 1995 Mekong Agreement, which established the MRC, provides its legal mandate and defines the scope of work and cooperation related to coordinated planning for economic and social development in the Mekong River Basin, while protecting the environment. The MRC, as an intergovernmental river basin organization, relies on the endorsement of its approaches by its member countries. The cooperation among member countries is to promote inclusive and balanced development of the basin while ensuring the equitable sharing of benefits among all users of the basin water and related resources (MRC, 2011).

Box 5. Selected federal and provincial regulations relevant to NCRB management

Federal:

- The Fisheries Act (under which regulations such as the Metal Mining Effluent Regulations, Wastewater Systems Effluent Regulations and Pulp and Paper Effluent Regulations are enabled)
- The Canadian Environmental Protection Act, 1999 (CEPA, 1999)
- The Canadian Environmental Assessment Act
- The Canada Water Act, which “contains provisions for formal consultation and agreements with the provinces” (Environment and Climate Change Canada, 2016)
- The Department of the Environment Act, which “assigns the national leadership for water management to the Minister of the Environment” (Environment and Climate Change Canada, 2016)

Provincial:

- The Forest Act, under which Tolko has its Forest Management License
- The Water Power Act, under which hydroelectric developments are licensed
- The Sustainable Development Act
- The Water Protection Act
- The Drinking Water Safety Act, which sets requirements for drinking water systems within provincial jurisdiction
- The Contaminated Sites Remediation Act, through which numerous sites in the watershed have been designated as impacted (Government of Manitoba, 2016b)
- The Provincial Parks Act, which has been used to create numerous parks in the Nelson–Churchill region, and which sets restrictions on development and extraction activities in the park areas (Government of Manitoba, 2016c)
- Conservation Districts Act



Principle 7: Consistent and Long-Term Funding

While the need for watershed management and planning is widely recognized, one common barrier to effective implementation is a lack of sufficient and sustainable funding. Funding is needed not only to create watershed plans, but also to effectively implement them, conduct monitoring and periodically review and improve the plans. No one source is likely to provide sufficient funding for long-term watershed management and planning. As a result, many authors recommend finding diverse funding sources to increase the sustainability of an organization. Sources identified range from traditional, such as government funding, to more innovative sources such as user fees, payments for ecosystem services and trust funds (Bach et al., 2011; Brandes & O’Riordan, 2014; Lewtas et al., 2015). Table 1 identifies funding options and where each has been used.

Funding and the Northern NCRB

The review found no watershed-specific funding in the northern NCRB. However, it did find a patchwork of financing that supports water and land management and that could provide a foundation for scaled-up activities. For example, significant government and industry funding flows into water and land-related management. Much of this is funding related to government services and legislative expectations (e.g., water and wastewater treatment; enforcement of environmental legislation; conservation programming) and industry requirements (e.g., mitigation for environmental effects).

Box 6. The BC Living Rivers Trust Fund

The BC Living Rivers Trust Fund, created in 2002, is a provincial legacy fund to invest in the health and sustainability of British Columbia’s watershed. Between 2006 and 2012, the fund invested CAD 21 million in 450 priority watershed projects (FBC, 2016). Investments were focused in the Fraser Basin, specifically the Fraser Salmon and Watershed Program, Georgia Basin-Vancouver Island and Skeena Basin. Overall, the fund has invested capital in work that is focused on:

- Watershed planning and management
- Stewardship and restoration of freshwater/estuary habitat
- Sustainable fisheries management
- Education and engagement of the public

Less traditional funding, such as the Nisichawayasihk Trust, funded through the Northern Flood Implementation Agreements, has used funds for a range of land and water-related initiatives such as a resource and land-use planning program, a water treatment plant and ecotourism development (Nisichawayasihk Trust Office, 2015). The full report highlights further funding sources, and also illustrates that some of the innovative funding mechanisms identified in the literature review, such as payments for ecosystem services, do not yet exist in the northern NCRB, but have potential given emerging carbon markets in Canada.



Table 1. Funding Options for Watershed Management

| Funding Source | Examples |
|--|---|
| Local taxation, levies, fees | <ul style="list-style-type: none"> • Okanagan Basin Water Board: levies on member regional districts • Regional District of Nanaimo: parcel levy to fund Drinking Water Protection Action Plan • Portland: manages stormwater runoff and water quality/quantity concerns using stormwater utility fees |
| Water license fees, resource royalties, pollution permits | <ul style="list-style-type: none"> • France: user-pay approach in relation to the Water Framework Directive |
| Philanthropy (e.g., foundations), charitable trusts, benefit-sharing agreements | <ul style="list-style-type: none"> • British Columbia: Columbia Basin Trust • Norway: Government Pension Fund Global (oil and gas context) |
| Recreation user fees | <ul style="list-style-type: none"> • Ontario: fees collected by conservation authorities at sites |
| Payment for ecosystem services (PES), watershed bonds, offsets (carbon and water quality trading), banking | <ul style="list-style-type: none"> • PES: Costa Rica’s PSA Program • Water quality trading: Chesapeake Bay Watershed Program (U.S.); Ohio River Basin Trading Project (U.S.); South Nation Total Phosphorus Management Program (Canada) • Carbon trading: Chicago Climate Exchange • New York: investment by NYC Authority in upstream ecosystem services in the Catskill/Delaware watershed to improve water quality |
| Community co-ops | <ul style="list-style-type: none"> • Social enterprise that creates a “self-sustaining revenue stream,” such as from turning waste by-products into bioenergy |
| Crowdsourcing, social/ environmental impact bond | <ul style="list-style-type: none"> • South Dakota, U.S.: nearly USD 390,000 raised on the Indiegogo crowdfunding site by seven bands of the Oceti Sakowin (Great Sioux Nation) to buy land that includes the sacred site Pe’ Sla and thus prevent development (Nienaber, 2012). |

Sources: Brandes & O’Riordan (2014); Lewtas et al. (2015)





4.0 Recommendations

The need and logic for ecosystem management has been clearly articulated for decades, but a key challenge identified is the weak institutional and financial capacity for its implementation. The Millennium Ecosystem Assessment (2005) highlighted ecosystem services as a way to understand and assign an economic value to the tangible benefits from ecosystems and promoted their valuation and the use of markets and other policy instruments as ways to finance their management. Based on this, we provide the following specific recommendations.

1. Prioritize a northern NCRB initiative

The northern NCRB needs our attention due to a variety of factors. A basin-planning effort is required to ensure that development in the northern portion of Manitoba is sustainable and that decision making is informed by integrated thinking and long-term objectives. This need should be prioritized at political, policy and operational levels to ensure that social, environmental and economic objectives for the region are understood and managed. We recommend early action to mitigate crises by acting now on basin management.

2. Identify, quantify and prioritize ecosystem services in the northern NCRB

A more complete understanding of the ecosystem service benefits provided by the northern NCRB is important so that the land and waters can be managed with full knowledge of opportunities and possible trade-offs. This knowledge can be gained through a combination of analytical and deliberative processes to ensure coordination on efforts to address biodiversity, flood/drought control, nutrient capture, hydroelectricity generation, carbon sequestration, rural revitalization, tourism, etc. Systematically identifying, quantifying and analyzing these services and getting inputs to help prioritize these for basin management would help governments and agencies align efforts at various levels.

3. Form a multi-party, basin-level organization with inclusion of Indigenous communities

An essential step towards large basin management would involve the creation of a multi-party body at the basin scale that could coordinate, fund and manage basin planning and management activities. An important feature of this basin organization would be to ensure meaningful inclusion of Indigenous Peoples from the region.

4. Ensure adequate funding for an NCRB initiative

One of the biggest barriers to watershed management success identified in the extant literature is lack of adequate and consistent funding. We recommend that any initiative access diverse traditional and innovative sources to help create adequate and consistent funding. Development of regional markets for strategic private and public benefits would need to be carefully managed in the context of ensuring well-being and security for all communities.

5. Use existing entities and processes to build basin-level thinking

In a northern NCRB initiative, leadership could be provided by a multi-party steering committee, building on current institutional roles and programming. Those to draw on to build basin-level thinking include resource management boards, the planned Northern Economic Development Strategy,



Government of Canada’s support and recognition of the role of Indigenous communities, as well as laws such as the Canadian Environmental Assessment Act and the Manitoba Environment Act.

6. Enhance monitoring, data sharing and reporting

Without sufficient data on environmental, social and economic considerations—including of baseline conditions—management targets and goals (important parts of basin plans) cannot be created. We recommend baselines be systematically established, understanding of temporal and spatial trends be strengthened and priority regions be identified. Importantly, monitoring can help identify the most effective (and ineffective) management actions; this information can then feed back into decision making. In addition, these efforts can be used to enable transparency and trust among watershed interests.





5.0 Conclusion and Next Steps

In order to implement many of our recommendations, clarifying objectives, building broad-based support and establishing leadership are critical. IISD’s research on the NCRB will continue to clarify and reinforce the urgency and need for these and provide analysis on specific components of our vision for a northern NCRB initiative and, subsequently, integrated ecosystem management in the entire NCRB basin. Having articulated a strong case for ecosystem management in the region, some potential next steps for our research will include:

- Analysis of specific ecosystem services in the northern NCRB (e.g., based on land use and land cover), with inputs from relevant rights holders and other interests.
- Initial discussions with key government and non-governmental entities to make the case for basin management and build towards a multi-party process.
- Development of key indicators of well-being for the northern Manitoba part of the basin to articulate some regional priorities.
- Detailed policy analyses to clarify what mechanisms exist and how these could play a role in ecosystem management.

Increases in resource development (e.g., mining, forestry, hydroelectric development), as well as potential growth in the already sizeable tourism industry in the region could add new stresses to the environment, but they also present opportunities, particularly to improve socioeconomic conditions in northern communities. Proposed elements of large-scale basin planning that anticipate negative effects and proactively prevent or mitigate them could support sustainable development in the region.

This summary report synthesizes major research points and highlights of the research report. Further details of this work is available in the full research report titled, *Large Area Planning in the Nelson Churchill River Basin (NCRB): Laying a Foundation in Northern Manitoba* (Zubrycki et. al., 2016).





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