FIRST NATION CAPACITY IN QUEBEC TO PRACTICE INTEGRATED WATER RESOURCE MANAGEMENT

By

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ABSTRACT

Master of Science Hijab Zehra Rizvi **Bioresource Engineering**

First Nation Capacity in Quebec to Practice Integrated Water Resource Management

The emergence of Integrated Water Resource Management (IWRM) coincides with the growth of watershed associations in Québec. As a collective entity of stakeholders, these watershed associations use collaborative efforts to achieve IWRM. First Nations are often cited as priority stakeholders. Despite this 'priority' recognition, First Nations are rarely present in this new paradigm shift in water management. This is the case in Québec's Outaouais and Chateauguay watersheds. However, identifying First Nation capacity strengths and limitations provides a greater understanding as to their absence from IWRM participation. First Nation capacity to practice IWRM requires greater research. The purpose of this study is to apply an analytical framework to assess the overall capacity of two First Nation communities to practice IWRM in the province of Québec. The capacities of Kitigan Zibi and Kahnawà:ke First Nations were evaluated with respect to actor networks, information management, human resources, and technical, financial, and institutional dimensions. This study recommends that future Québec IWRM initiatives with First Nation collaboration need to be directed towards strengthening actor networks capacity and understanding the complexity of First Nation perspectives. In addition, study results indicate First Nations with limited financial capacity will experience reduced actor networks, information management, human resources, and technical capacity.

RÉSUMÉ

Maîtrise en Science Hijab Zehra Rizvi **Génie des bioressources**

Aptitude des Premières Nations au Québec à gérer sa ressource en eau de façon intégrée

Au Québec, l'apparition du concept de Gestion Intégrée des Ressources en Eau (GIRE) coïncide avec la croissance des comités de bassins versants. En tant qu'entité collective et multi-actrice, ces comités de bassins versant s'appuient sur des efforts de collaboration pour parvenir à gérer leurs ressources en eau de façon intégrée. Les Premières Nations sont souvent citées comme des acteurs prioritaires dans l'application de la GIRE. Pourtant, elles sont rarement présentes dans ce changement de paradigme de gestion de l'eau. C'est le cas pour les bassins des rivières Outaouais et Châteauguay au Québec. Cependant, identifier les forces et faiblesses du pouvoir d'action des Premières Nations permet de mieux comprendre leur absence dans ce nouveau mode de gestion des eaux. C'est pourquoi les recherches sur le pouvoir d'action des Premières Nations ont besoin d'être approfondies. L'objectif de cette étude est d'établir le cadre analytique permettant d'évaluer la capacité globale de deux communautés de Premières Nations à mettre en pratique le GIRE dans la province de Québec. Les Premières Nations Kitigan Zibi et Kahnawake furent étudiées en tenant compte des aspects tel que les réseaux d'acteurs, la gestion de l'information, les ressources humaines, et les capacités financières, techniques et de gouvernance. Un cadre analytique fut développé pour évaluer chacun de ces aspects. Cette étude recommande que les initiatives futures de collaboration avec les Premières Nations soient orientées vers le renforcement du réseau d'acteurs et, vers la compréhension de la complexité des perspectives des Premières Nations. De plus, cette étude démontre que les communautés des Premières Nations aux ressources financières

limitées verront leurs ressources humaines et leur capacité technique réduites, et auront ainsi difficilement accès aux divers acteurs du réseau et, éprouveront plus de difficultés dans la gestion de l'information.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF MAPS

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AFN – Assembly of First Nations

AFNQL - Assembly of First Nations of Quebec and Labrador

CEPI - Collaborative Environmental Planning Initiative

FNWMS – First Nations Water Management Strategy

FNWWAP – First Nations Water and Wastewater Action Plan

GWP – Global Water Partnership

GWPTAC – Global Water Partnership Technical Advisory Committee

IJC – International Joint Commission

INAC – Indian and Northern Affairs Canada

INFC – Infrastructure Canada

IWRM – Integrated Water Resource Management

MAC - Maximum Acceptable Concentration

MDDEP – Ministère du Développement durable**,** de l'Environnement et des Parcs

O & M – Operation and Maintenance

OAG – Office of the Auditor General of Canada

OBV – Organisations de Bassin Versant

OCAP – Ownership, Control, Access and Possession

OECD – Organization for Economic and Co-operative Development

PWGSC – Public Works and Government Services Canada

QWP – Québec Water Policy

RCAP – Royal Commission on Aboriginal Peoples

ROBVQ - Le Regroupement des Organismes de Bassins Versants du Québec

SaRRT – Salmon River Watershed Round Table

TEK – Traditional Ecological Knowledge

UNDP – United Nations Development Program

UNW-DPC – United Nations Water Decade Program on Capacity Development

WBM – Watershed-Based Management

CHAPTER 1 INTRODUCTION

1.1 Statement of Problem

> *"It is vital that First Nations be at the table when the resources they share with the [non-Aboriginal] community are at issue. Waters flow onto reserve and off, carrying their particular loads of contaminants. No one in a watershed should be required to import a problem from or be able to export a problem to a neighbour."*
>
> (O'Connor, 2002, p. 494)

A majority of the world's indigenous peoples within nation-states are rarely involved as collaborators in meaningful discussions of water policies (United Nations, 2009).[1] It is suggested that a correlation exists between the designation of ethnic indigenous identity and limited access to water (Bailie, Bronwyn and McDonald, 2004; Gracey, Williams and Houston, 1997; Macisaac, 1996; United Nations, 2009). To address such water inequities, a paradigm shift, known as Integrated Water Resource Management (IWRM), could potentially reduce water inequities amongst users and increase indigenous participation. IWRM embraces principles based on stakeholder participation in decision-making, equity of water allocation, efficient and balanced water use, and recognition of linkages and interactions among human and physical systems. For the purpose of providing a common definition: *"IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems"* (Global Water Partnership, 2000).

[1] A variety of definitions are used throughout this paper. Aboriginal refers to a person who identifies with, or is a member of a political or cultural entity that originates from persons of North America and includes First Nations, Métis, Inuit and Indian. An aboriginal member of an Indian Band or First Nation refers to a person who is a member of an Indian Band or First Nation (Statistics Canada, 2010a). Indigenous means "native to the area." In this sense, Aboriginal Peoples are indigenous to North America and has a similar meaning to Native Peoples or First Peoples.

As IWRM is more commonly accepted in the province of Québec, stakeholder participation is often seen as an essential 'vehicle' to achieve short and long-term goals in collaborative water management (Dalton, 2006; Morin and Cantin, 2009; Roy, Oborne and Venema, 2009; Watson, 2007). In Canada, First Nations are frequently cited as a priority stakeholder among environmental groups, communities, governments, scientific experts, commercial or agricultural industries, and other stakeholders [Ministère du Dévelopment durable, de l'Environment et des Parcs (MDDEP), 2002b; National Assembly, 2009].

The establishment of the Québec Water Policy (QWP) in 2002 represents the province of Québec's comprehensive strategy to formalize IWRM and stakeholder participation. The QWP focuses on Watershed-Based Management (WBM), in which context Québec has identified forty watershed zones (MDDEP, 2002a). The QWP identifies five key goals: 1) water governance reform; 2) integrated management of the St. Lawrence river; 3) protection of water quality and aquatic ecosystems; 4) continued clean-up and improved management of water services; and 5) promotion of water-related ecotourism activities (MDDEP, 2002b). Essential to achieving the province's water management goals, water governance reform includes strengthening Québec's partnerships and ensuring that these include all water-management players, particularly Aboriginals (MDDEP, 2002b). Strengthening partnerships serves to:

> *"ensure the participation of Aboriginal nations and communities in water management, within the framework of the agreements signed and those to be signed with the government of Québec", with hopes to, "enable Aboriginal communities to take charge of their own development and thereby achieve greater autonomy."*
>
> (MDDEP, 2002b)

Aboriginal socio-political organization has historically followed watershed boundaries, as noted by Wilson (2004):

> *"Treaty boundaries generally follow the 'geophysical / hydrological' demarcation lines between watersheds and sub-basins. The remarkable correlation between the Treaty boundaries negotiated in past centuries and the drainage basin boundaries recognized today by governments and watershed-based planners are based on the original First Nations' river routes, the water highways that Aboriginal – and later non-aboriginal cultures – used to travel for exploration and trade" (p. 78).*

Wilson (2004) also advocated First Nations have a holistic approach to water management, which seeks to balance the human burden on ecosystems with their carrying capacity. Despite IWRM mirroring the traditional approach known to First Nations, and adopted by non-aboriginal communities, it is suggested that First Nations are not present in IWRM decision-making processes (O'Connor, 2002; Wilson, 2004).

According to Section 91(24) of the *Constitution Act of 1867*, the federal government has fiduciary obligations to Canada's First Nations, the lands reserved for them, and consequently exclusive jurisdiction over laws pertaining to First Nations, including those laws relating to water (Swain, Louttit and Hrudey, 2006). In the context of policies relating to drinking water in First Nation communities, this fiduciary responsibility extends to assisting First Nations to attain and maintain a safe and reliable community water supply (Assembly of First Nations, 2007; Chiefs of Ontario, 2001; Harden and Levalliant, 2008).

Drinking water is an important indicator of watershed health (Mitchell, 2005; O'Connor, 2002). Achieving safe drinking water is most challenging in communities with small drinking water systems and First Nation communities (Morris et al., 2007). As of October 31st, 2010**,** there were 116 First Nations communities across Canada under a Drinking Water Advisory (Health Canada, 2010). Despite concern over drinking water in First Nation communities (Harden and Levalliant, 2008; NAHO, 2002; OAG, 2005; O'Connor, 2002; Parsons, 2003; Smith, Guest, Syrcek, and Farahbakhsh, 2006; Swain et

al., 2006; Wilson, 2004) and substantial funds and program efforts targeting water quality in First Nation communities, Federal government efforts have yielded little improvement (OAG, 2005). The Assembly of First Nations (AFN) (2009) report stated that nearly one in thirty First Nation homes were without hot running water (3.7 percent), cold running water (3.5 percent) or flushing toilets (3.5 percent). Of the 88,485 First Nation homes surveyed, 5,486 (6 percent) were without sewage services (AFN, 2009). Some 33 percent of First Nations people consider their main drinking water supply unsafe to drink. Overall, 12 percent of First Nations communities have to boil their drinking water (AFN, 2009). IWRM is often suggested as a potential solution to alleviate poverty and as a tool to 'equalize' the distribution of water resources for marginalized people (GWP, 2003b: Hanjra and Gichuki, 2008; Mulwafu and Msosa, 2005).

IWRM could be a potential means for First Nation communities to address drinking water and water resource management concerns. However, non-aboriginal stakeholders, associations and governments involved in IWRM, who have an interest in First Nation contributions may not understand what capacities are required for First Nation collaboration. Such capacities may include: the presence of social linkages, adequate human personnel, expertise in water management, and access to funds, amongst others. These are worthwhile aspects to explore in efforts to widen understanding of First Nation's capacities to practice IWRM.

Existing literature evaluates the capacity for the implementation of specific aspects of IWRM, including: (i) source water protection or management (Carter, Kreutzwiser and de Loë, 2005; De Loë, Di Giantomasso and Kreutzwiser, 2002; De Loë and Lukovich, 2004; Ivey, de Loë, Kreutzwiser and Ferreyra, 2006; Timmer, de Loë and Kreutzwiser,

2007), (ii) desalination (Al-Jayyousi, 2000), (iii) implementation of IWRM at the national level (Mkandawire and Mulwafu, 2006), (iv) urban water management (Brown, 2008); drought (Hundertmark, 2008), (v) rain-water harvesting (Farahbakhsh, Despins and Leidl, 2009), and (vi) institutional capacity (Lamoree and Harlin, 2002). Although specific studies with an indigenous focus include the evaluation of (i) drinking water capacity in a First Nation community in Saskatchewan with regards to financial, human resources, institutional, socio-political, and technical aspects (Lebel and Reed, 2010) and (ii) fifty-six First Nation drinking water systems in Alberta specific to technical and human resources (Smith, Guest, Syrcek, and Farahbakhsh, 2006) there remains an insufficient discussion on the capacity of indigenous communities to holistically practice IWRM. At present there are no studies that provide a 'holistic' evaluation of an indigenous community's ability to practice IWRM internationally, or within Canada or Québec.

As IWRM becomes a dominant concept in the development of Québec's provincial water framework, it is even more important that Québec's agenda give consideration to First Nations' capacity. The inclusion of First Nation capacity within Québec's IWRM framework, particularly at the community level, requires greater study; therefore, it is imperative that an exploration be made of the capacity for First Nations to practice IWRM, both in terms of experiences and challenges. This paper will evaluate the capacity of the Kitigan Zibi and Kahnawà:ke First Nations, located in the province of Québec, to practice IWRM with respect to actor networks, information management, human resources, and technical, financial, and institutional dimensions.

1.2 Purpose and Objectives

The principal objective of this study is to evaluate the capacity of First Nation communities to practice IWRM in Québec. The second objective of this study is to identify key First Nation challenges or strengths in IWRM practice in Québec. Specific study objectives include:

(1) To develop a framework to evaluate First Nations' capacity to practice IWRM in Québec.

(2) To capture the capacity challenges faced by First Nations in both rural and urban settings, situated in two watersheds in Québec.

(3) To raise awareness of First Nations' challenges and perspectives in Québec's emerging IWRM policies and practices.

The originality of this work is based on the following:

(1) It develops a framework that takes into consideration the capacity of First Nation communities to participate in IWRM.

(2) It evaluates the IWRM capacity of two First Nation communities of different cultural identities (Algonquin and Mohawk).

(3) It evaluates IWRM capacity of First Nation communities in two different geographical settings (urban and rural in the province of Québec).

(4) It advances the academic literature on IWRM and widens its scope with an inclusion of indigenous perspectives in Québec.

1.3 Community Selection Criteria

The selection criteria were predicated upon: (i) representation to include participants from geographically rural and urban regions, (ii) participant communities

being located in the province of Québec, (iii) Band Chief or representatives being in agreement with study objectives and research process, and (iv) participant communities having a 'First Nation' designation as defined by the Government of Canada.

1.4 Thesis Overview

This thesis is presented in a traditional format and is organized into six chapters, which explore the research objectives described earlier. Chapter 2 is a summary of existing literature covering the subjects of IWRM in Québec, water inequities encountered by indigenous peoples around the world and particularly First Nations in Canada, and the capacity dimensions necessary to evaluate IWRM at a local level. Chapter 3 details the study area and participant communities. Chapter 4 details the methodology to evaluate First Nations' capacity to practice IWRM. Chapter 5 presents and discusses the results of the research undertaken in the Outaouais and Châteauguay watersheds. Chapter 6 provides a summary and conclusions based on the results of this research, and provides recommendations for further study.

CHAPTER 2 LITERATURE REVIEW

2.1 Integrated Water Resource Management (IWRM)

IWRM is an approach that embraces principles based on equity of water allocation, efficient and balanced water use, stakeholder participation in decision-making, and recognition of linkages and interactions among human and physical systems. For the purposes of providing a common framework in the following discussion, the most widely accepted definition of IWRM, formulated by the Global Water Partnership (GWP) (2000), will be used: *"IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."*

IWRM has been the recommended approach at several international conferences including the 1977 United Nations Conference on Water in Mar del Plata, the 1992 International Conference on Water and Environment in Dublin, the World Water Forums in The Hague (2000) and Kyoto (2003), the 2001 International Conference on Freshwater, the 2002 World Summit on Sustainable Development (Rahaman and Varis, 2005; Snellen and Schrevel, 2004); and more recently the World Water Forums of 2006 and 2009. While IWRM is not a recent approach the exact date of its origin is under dispute. Some scholars date the approach to 10th century water tribunals in Valencia, Spain (Rahaman and Varis, 2005), while others associate IWRM with the establishment of the 1927 'Confederaciones Hidrograficas', or Spanish Drainage Basin Authorities (Dukhovny and Sokolov, 2005).

While some scholars accept IWRM as a catalyst for positive change (Abdulbaqi, Suleyan, Thamer and Nassereldeen, 2007; Davis, 2007; Dukhovny, 2004; Mitchell, 2005;

Van der Zaag, 2005), others find the approach flawed. One of the criticisms is that the definition of IWRM is vague and a single concept cannot be universally accepted (Biswas, 2004). Furthermore, the approach needs to be defined relative to local realities (Biswas, 2004; Petit and Baron, 2009). However, Davis (2007) notes that amongst five key organizations [World Bank, World Conservation Union, Global Water Partnership, United States Environmental Protection Agency (USEPA) and United States Corps of Engineers (USCE)] there is no common definition and proposes that IWRM does not require a universal definition.

Another criticism occurs in regards to implementation. Many are uncertain as to 'how' IWRM will be implemented (Biswas, 2004; Dukhovny and Sokolov, 2005; Jonch-Clausen and Fugal, 2001; Molle, 2008; Petit and Baron, 2008; Rahaman and Varis, 2005). Jonch-Clausen and Fugal (2001) advise that IWRM should not be misunderstood as a universal blueprint. Additional apprehensions about IWRM include its lack of legal authority (Akpabio, Watson, Ite and Ukpong, 2007; Rahaman and Varis, 2005), spiritual and cultural aspects (Rahaman and Varis, 2005), and grassroots level involvement (Mkandawire and Mulwafu, 2006).

The overall function of IWRM is highly debated. The Global Water Partnership Technical Advisory Committee (GWPTAC) recognizes IWRM as a process that can achieve a goal (GWP, 2000), while Dukhovny and Sokolov (2005) suggest that IWRM is not a 'process', but rather a management system of coordinated development. Additionally it is suggested that IWRM is the integration of human and social system interactions accomplished by people that essentially determine water use and pollution (GWP, 2000). Notwithstanding these arguments, it is generally accepted that there is no alternative to

IWRM (Snellen and Schrevel, 2004). Furthermore, IWRM is often presented as a potential solution to alleviate poverty by serving as a tool to 'equalize' the distribution of water resources (GWP, 2003b; Hanjra and Gichuki, 2008; Mulwafu and Msosa, 2005). Yet, these critiques rarely include discussions on preconditions essential to the implementation of IWRM, *e.g.*, political will, adequate funding, capacity, participation and an understanding of the natural resources present in the basin (United Nations World Water Assessment, 2009).

2.1.1 Integrated Water Resource Management in Canada

Canada has evolved from traditional approaches to water management, being fragmented, sectoral, reactive and 'top-down,' to an integrated style (Mitchell, 2006; Ramin, 2004). Environment Canada (2005) defines IWRM as a "*multidisciplinary and iterative process that seeks to optimize the contribution of aquatic resources to the social, environmental, and economic welfare of Canadians, while maintaining the integrity of aquatic ecosystems, both now and into the future.*" In Canada IWRM originated in 1946 with the advent of the Ontario Conservation Authorities, and blossomed with comprehensive river basin planning of the 1960s, initiated by the Canadian federal government and several provincial governments (Mitchell, 2006).

Environment Canada, a federal department responsible for the preservation of the natural environment, first introduced IWRM in the *Federal Water Policy* of 1987, which consisted of five strategies including water pricing, public awareness, science leadership, integrated planning and legislation (Environment Canada, 2009). The Canadian government committed to IWRM at the Bonn Conference on Freshwater in 2001, and again at the World Summit on Sustainable Development in Johannesburg, South Africa in

2002 (Wilson, 2004). To direct it in addressing infrastructure challenges, the Government of Canada formed a new department, Infrastructure Canada (INFC), in 2002. Municipalities applying to the INFC for water and wastewater initiative funds are recommended to submit an IWRM plan. This process formalizes IWRM within Canada's institutional framework (Infrastructure Canada, 2010). This initiative supports water and wastewater management strategies that demonstrate long-term sustainability (Infrastructure Canada, 2010).

Currently, 115 decentralized provincial or territorial-level governance arrangements play a role in integrating Canadian water management governance structures (Robins, 2007), while voluntary organizations carry out thousands of stewardship activities specific to water or resource management (Morin and Cantin, 2009; Roy, Oborne and Venema, 2009). The benefits of watershed management have been shown to include clean drinking water quality at surface sources (Davies and Mazumder, 2003). The agricultural sector in each province has also benefitted from water management (Roy et al., 2009).

The Government of Canada's direct involvement includes the Atlantic Coastal Action Program (Hawboldt, 2004), the Mackenzie Valley Resource Management Act (Ramin, 2004), Fraser Basin Council, the St. Lawrence Action Plan, and numerous boundary arrangements with the United States. Morin and Cantin (2009) stress federal government involvement is necessary to set national standards on data, as well as facilitate and develop federal water management strategies, strengthen relationships, and coordinate jurisdictions. Mitchell (2005) and Ramin (2004) point out boundary issues will be an inherent concern in a nation composed of provinces and territories. Furthermore, it is noted that implementation will be difficult without a statutory basis (Michell, 2005).

2.1.2 Integrated Water Resource Management in Québec

As Canada's progress in IWRM is expanding, several provinces have developed comprehensive provincial water policies, including Québec. With almost 17% of the total Canadian territory, Québec is the largest province, and covers a total area of 1,700,000 km^2 (Gouvernment du Québec, 2011). Québec has a population of 7,955,000 inhabitants, and is the second largest province after Ontario (ROBVQ, 2010, Statistics Canada, 2010b). The origins of an integrated approach to water management began with the Québec Water Policy (QWP) in 2002 (ROBVQ, 2010).

QWP's first achievement identified thirty-three watershed organizations (ROBVQ, 2010). The mandate of each watershed organization was to develop a watershed management plan. Moreover, watershed organizations act as 'regional round tables' where all stakeholders of water resources in a given watershed are invited to participate (ROBVQ, 2010). In March 2009, a new division of the territory increased the watershed organizations to forty watershed zones, with a focus on southern Québec (MDDEP, 2002a, ROBVQ, 2010). The QWP recognizes water as a *"valuable asset of Québec society and an integral part of its collective heritage."* Furthermore, water (both surface and groundwater) has a "common to all" status and is formally recognized in the Civil Code of Québec. A "common to all" status indicates,

> *"all members of society have the right to access water and use it in a manner consistent with its nature, and that the government has a responsibility to regulate water use, establish priority uses and preserve its quality and quantity, while taking the public interest into account"*
>
> (MDDEP, 2002b).

2.1.3 First Nations and Integrated Water Resource Management

Until recently, Western or dominant societies have neglected indigenous paradigms in water resource management. Cultural or spiritual indigenous perspectives on the uses

and attitudes toward water management are often lacking, frequently disavowing indigenous participation in water policy and planning (United Nations, 2009). Furthermore, customary access and rights to water, along with water pollution that may impact indigenous cultural and physical health, are often not addressed (United Nations, 2009). Lack of awareness of indigenous perspectives is a result of prejudice-driven marginalization, a monopoly of Western science and the disregard for Traditional Ecological Knowledge (TEK) (Tipa, 2009).

As IWRM becomes a dominant approach and develops into the national water framework, particularly in Canada, it is even more important that IWRM incorporates Aboriginal perspectives, while recognizing barriers for Aboriginal peoples within the IWRM framework. Furthermore, Canada's colonial legacy and particularly the Government of Canada's fiduciary responsibility for Aboriginal people, suggest that for First Nations communities to be made a priority, the legal, social, economic, and technical aspects of the IWRM framework should be considered in greater depth.

First Nations advocate a holistic approach to water management to ensure the collective burden on ecosystems remains within its carrying capacity (Wilson, 2004). Integrated watershed management systems adopted by non-aboriginal communities on world and national stages mirrors this traditional approach (Tipa, 2009; Wilson, 2004). The lives of First Nations are intricately connected to healthy rivers and lakes as a cultural and spiritual necessity, and are most impacted by water depletion, pollution or other changes (Blackstock, 2001; Walkem, 2007). Protection of the environment (clean air, water, soil, food; traditional ways of life, culture, language and spirit) is an obligation guided by the Haudensaunee Great Law of Peace, which states that the impact of one's

actions must be considered seven generations into the future (AFN, 2005). The Haudensaunee Great Law of Peace originates from a collective respect for the natural world, which provided all that was needed to survive, crops as well as food that was hunted, gathered or fished[2] (Haudenosaunee Confederacy, n.d.).

Integrated water management is proposed as a solution to address poor water quality in First Nation communities (O'Connor, 2002; Wilson, 2004). Wilson (2004) suggests First Nations expect to participate on a government-to-government basis, and proposes First Nation Watershed Councils to ensure First Nations identify, communicate, coordinate and implement water quality goals and objectives at the local, provincial and federal level.

Indian and Northern Affairs Canada (INAC) has the primary responsibility for addressing water issues in First Nation communities; however, there is no inclusion of First Nations at the decision-making level (Wilson, 2004). Provinces generally fail to involve First Nations in the development and implementation of integrated watershed management plans (Wilson, 2004). Although, the Government of Québec ensures Aboriginal participation, Wilson (2004) observes that the Government of Québec includes First Nations with signed agreements (*e.g.*, the Cree Naskapi agreement), but not those without signed agreements.

In response, First Nations are taking initiatives to address water related concerns. For example, the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) arose in response to a 2003 request by the Cape Breton First Nations Chiefs to develop an overall environmental management plan for the Bras d'Or Lakes and watershed lands

[2] The Haudenosaunee Confederency consists of the Mohawk, Oneida, Onondaga, Cayuga and Seneca nations.

(Bras D' Or Lakes CEPI, 2010a). The Walpole Island First Nation in Ontario currently works with local industry to address water quality concerns (Wilson, 2004). The First Nations of Okanagan have established the Okanagan Nation Alliance Fisheries Department, whose mandate is to conserve, protect, restore and enhance indigenous fisheries and aquatic resources within the Okanagan Nation territory (Okanagan Nation Alliance, 2004). The Clayoquot Sound Central Region Board has developed a number of watershed plans (Wilson, 2004). Similarly, the Salmon River Watershed Round Table (SaRRT), a group composed of Aboriginal bands of Okanagan and Shuswap Nations, along with a local district advisory body, implement restoration projects to maintain the region's ecological integrity (Day and Cantwell, 1998).

2.2 First Nation Challenges in Water

The estimated 370 million indigenous people in some 90 countries are more likely to experience poverty than non-indigenous people, irrespective of geographical, historical, economic and social contexts (United Nations, 2009). Often, the reality of indigenous peoples is hidden in national statistics and thereby accurate assessments are difficult to obtain (Patrinos, 1996). In comparative studies examining the quality of life to national counterparts, indigenous peoples worldwide lag significantly behind (Eversole, McNeish and Cimadamore, 2005; Patrinos and Psacharopoulos, 1996). In Canada, a comparison of Aboriginals and their Canadian counterparts showed Aboriginals to have a significantly lower quality of life (Beavon and Cooke, 2003; Cooke, 2005; Cooke, Mitrou, Lawrence, Guimond and Beavon, 2007; McHardy and O'Sullivan, 2004). A correlation appears to exist between the designation of ethnic indigenous identity and limited access to water (Bailie, Bronwyn and McDonald, 2004; Gracey, Williams and Houston, 2004; Macisaac,

1996; United Nations, 2009). The following sections will cover literature specific to First Nation water challenges in Canada.

2.2.1 'Regulation' Versus 'Guideline'

A water regulatory regime is a basis to provide rules and standards to ensure water quality and safety. In most provinces, such regulatory regimes are absent for First Nation communities, but applied in their non-aboriginal counterparts. Currently, drinking water safety in First Nation communities is managed through a series of guidelines, protocols and contracts between Indian and Northern Affairs Canada (INAC) and First Nation communities (Duncan and Bowden, 2009; OAG, 2005; Swain et al., 2006). Furthermore, the federal government has defined the responsibility for drinking water in First Nation communities as *"shared among First Nation Band Councils, Health Canada, and INAC"* (Hill et al., 2009).

Although the contracts are clear about operating and managing water facility responsibilities, critical information on liability and mandate of action in the event of system failure is absent (MacIntosh, 2009). There is a general consensus among senate committees, independent commissions, and political representatives, like the Assembly of First Nations (AFN), that the current situation produces unacceptable levels of risk to public health and that a regulatory framework is needed (Duncan and Bowden, 2009; MacIntosh, 2009; OAG, 2005; Swain et al., 2006).

In May 2006, AFN, Health Canada, INAC and Environment Canada assembled the 'Expert Panel on Safe Drinking Water for First Nations' to determine options for regulatory regimes. In January 2009, the federal government issued a discussion paper detailing its preferred regulatory route for enabling a legislative framework based on the

'Expert Panel.' The federal government preferred to incorporate provincial legislation regarding operational standards through a framework statute, and then develop details of the regime through regulations to be developed in consultation with First Nations over the next few years (MacIntosh, 2009). However, the federal recommendation is not the preference of First Nations. First Nations feel this compromises their rights and is a violation of federal fiduciary responsibility (AFN, 2007). Another area of concern expressed by First Nations groups is the degree of variance in provincial standards, which may pose a risk in widening the gap between First Nation communities that are achieving good quality water, and those which are not (AFN, 2007).

A watershed protection report submitted to the Ministry of Environment of Ontario cited three non-aboriginal municipalities clearly lacked municipal authority *"to address threats to vulnerable drinking water sources in existing built-up areas and from existing activities"* (Hill at al., 2009). Commissioner O'Connor's Report on the Walkerton Inquiry recommended working toward intergovernmental coordination, particularly with representatives of Fisheries and Oceans Canada, Environment Canada, Indian and Northern Affairs Canada, and Agriculture and Agri-Food Canada, however, O'Connor cautioned that this is complex *"in an area where constitutional jurisdiction is not always clear"* (O'Connor, 2002). This indicates that if non-aboriginal municipalities are subject to a lack of authority as it relates to watershed management, then First Nation communities will be subject to even greater governance complexities. In such a situation, it is not clear how IWRM will be achieved.

2.2.2 Customary Water Rights

Aboriginal peoples have water rights, unless limited or properly extinguished (Phare, 2006). Section 35 of the *Canadian Constitution Act of 1982* affirms and protects Aboriginal rights to occupy land, fish, hunt, trap and generally use 'goods' produced by the land and water (Craig, 2003; Kempton, 2005; Phare, 2006). Prior to 1982, only the federal government (and not provincial governments) could extinguish Aboriginal and treaty rights; whereas today, neither government can extinguish water rights (Kempton, 2005).

Some argue the federal government has done little to protect Aboriginal peoples' constitutionally protected water rights, despite the Supreme Court of Canada's explicit position (Morris et al., 2007; Phare, 2006). The federal and provincial crown must honorably discharge fiduciary, constitutional, and statutory obligations to Aboriginal peoples (Phare, 2009). Crown activities infringing on water rights include allowing non-Aboriginal water-users to deplete or degrade water sources required for any use by the community, or licensing water-dependent activities for manufacturing and industrial activities, food and animal processing, hydro-electric development, intensive agriculture and water bottling. Such activities have illegally impacted Aboriginal and treaty water rights (Phare, 2009).

In Canada, Aboriginal people's customary right to water ensures a 'rights-holder' status, thereby placing them in a unique position, differing from that of any other stakeholder (Phare, 2006). Often IWRM stakeholders and watershed associations may not understand Aboriginal people's customary water rights, particularly when there is a general lack of literature discussing the matter. Instead, research in developing countries indicates that indigenous customary rights, laws and practices are necessary to achieve IWRM goals.

In Zimbabwe, for example, Chikozho and Latham (2005) examined customary Shona practices in the context of current water models and recognized water use and management to be strongly influenced by Shona customary law and informal practices. They further cautioned that water management based on Western paradigms that neglect Indigenous worldviews will constrain IWRM efforts. In Lesotho, Tshabalala (n.d.) suggests indigenous participation in water conservation and resource management will highly benefit IWRM implementation. In Bolivia there is an even greater regard for indigenous communal water practices, which indicate a higher degree of efficiency and equity, and are used in Bolivia's new irrigation laws (Alurralde, 2006). Maganga, Kiwasila, Juma and Butterworth's (2004) case study of Tanzania's Pangani and Rufiji basins indicated that if diverse customary laws of pluralistic ethnic groups are not considered in the implementation of IWRM, a process normally operating under water resource regulations imposed through statutory laws, this process would fail.

2.2.3 Geographical Boundaries and Remote Regions

Key issues related to geography within Canada are: (i) the location of the majority of Aboriginal communities, and (ii) the boundaries imposed on Aboriginal peoples. In regards to geographical location, 43 percent of Aboriginal people live in remotely situated communities or settlements, comprising 30 percent of the Northern Canadian population (MacLeod, Browne and Leipert, 1998). 'Remote isolated' regions refer to areas where there are no scheduled flights, minimal telephone and radio, no road access; whereas 'isolated' regions refer to areas where there are regular flights, good telephone service, but no road access (Clarke, Riben and Nowgesic, 2002). Smaller and more remote

communities simply cannot cope with all the technical and managerial challenges specific to water-related activities (Hudrey, 2008).

Boundaries within which indigenous people are forced to live are common to many countries. Indigenous people are disconnected from the larger natural environment and the resulting physical boundaries serve as a barrier to natural resource management within the land and water systems that impact their environment. This geographical boundary is imposed on First Nations in Canada. The 'reserve' boundaries are physical boundaries, which limit the traditional scale of watersheds known intimately to First Nations prior to colonization. Peters (2008) affirms, *"historical geographers have shown how mapping and colonial representations of nature erased Aboriginal people from the Canadian landscape."* The erosion of First Nations access to their ancestral lands has limited their capacity to protect and maintain environmental stewardship at a watershed level.

2.2.4 Poor Quality of Drinking Water in First Nation Communities

The greatest inconsistencies and inequities in drinking water are most severe in communities with small drinking water systems and First Nation communities (Morris et al., 2007). Despite substantial funding and program efforts directed towards addressing water quality in First Nation communities, the Federal government efforts have yielded little improvements (OAG, 2005).

The 1990 Drinking Water Safety Program for Native People assessed First Nation water and wastewater systems based on available water data. Bacteriological and/or chemical analyses showed 25 percent of First Nation systems posed a risk (OAG, 2005). The 2001 National Assessment of Water and Wastewater Systems in First Nation Communities conducted by INAC was based on an on-site inspection of all First Nation

water systems, and included an evaluation of system performance, associated risk levels and operating practices (INAC, 2003). Of 740 community water systems, 46 percent were classified as posing a medium water quality risk, and 29 percent were classified as posing potentially high risks (INAC, 2003). High and medium water quality risk assessments occurred as a result of a failure to meet one or more Maximum Acceptable Concentration (MAC) parameters. This, in turn, occurred due to a lack of regular testing procedures, records maintenance, operator knowledge in how to run the water system, emergency procedures, safety equipment and operating manuals in the facilities, as well as poor raw water sources, inadequate treatment, equipment failure, and absence of backup equipment or power sources (INAC, 2003). In 2003, the federal government responded to these poor results with the First Nations Water Management Strategy (FNWMS), which was afforded a $600 million budget to improve water and wastewater systems in First Nation communities (INAC, 2004b; OAG, 2005). In 2005, the Office of the Auditor General audited the FNWMS and concluded that residents of First Nation communities did not benefit from the same level of drinking water protection as other Canadian communities (OAG, 2005). The OAG faulted the lack of laws and regulations governing the provision of drinking water, despite hundreds of millions in funds invested (OAG, 2005).

In 2006 the Plan of Action for Drinking Water in First Nation communities yielded the *Protocol for Safe Drinking Water for First Nation Communities*. The result of 875 operators receiving on-going training through the Circuit Rider Training Program and having 24-hour access to a support hotline, was a decrease in high-risk drinking water systems from 193 to 97 (INAC, 2007). Building on progress under the Plan of Action for Drinking Water in First Nation Communities, the 2008 First Nations Water and

Wastewater Action Plan (FNWWAP) received $330 million in funding. There were 49 high-risk drinking water systems identified, significantly below the 193 identified in 2006 (INAC, 2010d). Unfortunately, the number of water treatment operators with their first level of certification or greater decreased from 64 percent to 60 percent, despite gains in other areas (INAC, 2010d). In 2009, the Economic Action Plan targeted $165 million for water and wastewater infrastructure projects in 18 First Nations communities across the country (INAC, 2010c).

2.2.5 Human Resources Capacity

First Nation water treatment operators are critical in the delivery of safe drinking water (O'Connor, 2002; Swain et al., 2006), however First Nation communities often lack certified or qualified personnel to operate water treatment facilities, which results in considerable risk (INAC, 2003; Smith et al., 2006). Despite the fact that water treatment operators are critical for the delivery of safe drinking water, operator training certification and retention of qualified individuals are major issues in First Nation communities (OAG, 2005; Smith et al., 2006).

Smith et al. (2006) note that operators can be chosen because they are related to individuals on the Band Council or because they are already involved in some other aspect of public works, and not because they are qualified or interested in the work. This often means operators do not understand the high level of responsibility for providing safe drinking water or the consequences to the community should they fail in their position. As well, operators can change at a whim with political flux within the Band Council, leading to the replacement of trained and or experienced operators, posing an additional challenge in retaining qualified individuals (Smith et al., 2006). In a study of 50 Albertan First

Nation communities, 39 were flagged as high risk because many operators operating water treatment plants and distribution infrastructure were not certified (Smith et al., 2006).

2.2.6 Technical Capacity

As previously noted a number of government initiatives directed towards technical improvements have not necessarily helped improve the quality of drinking water. Other studies indicate the absence of water infrastructure is correlated with disease. A *Shigella* epidemic in Manitoba in the early 1990s affected more than half of the First Nations communities in that province (Health Canada, 2005). Among 61 First Nation communities in Manitoba, those without wells or running water accounted for 89 percent of *Shigella* cases (Clarke et al. 2002). The reported incidence of *Shigella* among First Nations communities (74.1 per 100,000 individuals) was 26 times greater than that of their Canadian counterparts (2.8 per 100,000 individuals) (Clarke et al. 2002).

Another technical aspect cited for poor water quality is manual chlorination. Most First Nation water treatment plants use liquid sodium hypochlorite solutions dosed with a diaphragm metering pump (Smith et al., 2006). Due to the high hypochlorite concentrations, crystallization and corrosion of the pump heads are frequently observed (Smith et al., 2006). These metering pumps require frequent maintenance and require service kits and a working backup pump to be present in the water treatment plant at all times. However, in many First Nation treatment facilities observed in Alberta this is not the case and metering pumps are frequently not repaired and manual chlorination practices are used (Smith et al., 2006).

2.2.7 Financial Capacity

First Nation communities rely heavily on INAC for capital and operational funding, and Health Canada's First Nations and Inuit Health Branch for monitoring the quality of drinking water (Smith et al., 2006). Despite substantial funding aimed at addressing water quality in First Nation communities, the efforts of the Federal government have yielded limited improvement in drinking water (OAG, 2005).

A common misconception is that First Nations receive substantial financial support from the federal government. However, First Nations are responsible for 20 percent of operation and maintenance (O & M) costs for water systems, which is a heavy financial burden in communities with high unemployment and little likelihood of recovering costs from the community (OAG, 2005; Swain et al., 2006). The poverty level in a community directly impacts the ability to finance O and M of water treatment facilities. A case study of Attawapiskat First Nation determined the community was heavily dependent on federal funds for capital projects, and with an 80-85 percent unemployment rate and high cost of living, it was impossible to rely on the community to generate funds (Chiefs of Ontario, 2001). Although the federal O & M directive assumes that user fees will supplement the modest operating grant provided by INAC in Attawapiskat, only the school, hospital, nurse's residence and a few businesses can regularly pay user fees for water (Chiefs of Ontario, 2001). In this remote northern community, the Chief and Council feel that they cannot request community members to pay for poor quality water when that money is needed for heating and food (Chiefs of Ontario, 2001). In addition, operator-training expenses are often unaffordable to communities that experience financial constraints (Swain et al., 2006).

Despite First Nations financial challenges, communities are required to meet the same health-based water quality standards as larger drinking water systems, but often lack resources and economy of scale that larger systems enjoy (Smith et al., 2006). Consequently, facilities go without repairs or with the most minimal number of hours required to operate a water treatment facility to meet the budget set forth by INAC. Limited financial resources place a major risk on O & M objectives, thereby jeopardizing safe drinking water.

2.2.8 Institutional Capacity

Governance as it relates to drinking water regulation in First Nations communities in Canada is frequently cited as an area of concern in water management literature. As noted previously, unlike Canadian communities in most provinces a water regulatory regime is absent for First Nation communities, generating unacceptable levels of risk to First Nation health (Duncan and Bowden, 2009; MacIntosh, 2009; OAG, 2005; Swain et al., 2006). In addition, researchers regard multiple actors within the federal government as contributors to the complexity of water management for First Nation communities (OAG, 2005; NAHO, 2002; Swain et al., 2006).

Federal government efforts to manage First Nation safe drinking water are interconnected between four departments and the First Nation band office. These departments include:

(i) *INAC* provides funding for capital construction, operation and maintenance, as well as for water and wastewater plant operator training and certification. INAC provides up to 80 percent of operation and maintenance costs while First Nations are expected to fund the remaining 20 percent through user fees or other sources (OAG, 2005).

(ii) *Health Canada* provides environmental health services to First Nation communities south of the 60th parallel through the Environmental Health Program and the Drinking Water Safety Program (Health Canada, 2010; INAC, 2004a). Health Canada objectives are to fund and deliver drinking water monitoring programs. In some communities, Health Canada may have employees that test drinking water, while in other communities the responsibility is transferred over to First Nations (OAG, 2005).

(iii) *Public Works and Government Services Canada* (PWGSC) provides engineering advice and approves water and wastewater systems for INAC (INAC, 2004a).

(iv) *Environment Canada* protects source water by regulating wastewater discharge into federal waters through the development of wastewater standards, guidelines and protocols for First Nation lands (OAG, 2005; Swain et al., 2006).

(v) *The Chief and Council* are responsible for the governance and maintenance of water systems, including day-to-day operations, and the sampling and testing of drinking water. Furthermore, they must ensure that the water system is planned, designed and constructed according to funding agreements (INAC, 2004a). For some First Nations, Tribal Councils and technical advisory groups are another resource to provide expertise and consultation.

Federal departments have shifted their responsibility to First Nation governments without providing guidance or resources to build capacity. In 2005, over 800 members of the Kashechewan First Nation were evacuated after *E. coli* was discovered in their water supply system. When water pathogens are detected, there is no clear protocol on how to proceed or assignment of who is responsible for what. 'Responsibility' gets tossed from the First Nations, to Provincial and to Federal Government parties, making development and implementation of a clear protocol and chain of command structure ambiguous. The

Office of the Auditor General (2005) report concluded that the federal government's fiduciary responsibility and downgrading responsibility of water provisions to First Nations, creates confusion in regards to where the ultimate responsibility falls.

Based on Day and Cantwell's (1998) case study, governance was identified as the greatest significance for First Nations involved in the implementation of integrated land and resource planning. However, institutional capacity based on research indicates governance vulnerabilities with respect to an absence of a water regulatory regime and the involvement of multiple actors.

2.3 Capacity and Integrated Water Resource Management

First Nations in Canada experience a wide spectrum of challenges in water resource management. As previously identified, First Nations experience capacity limitations as it relates to human resources, as well as technical, financial and institutional issues. Strengthening capacity is an integral component of integrated water resources management. This section will define capacity versus capacity building, discuss the relevance of capacity in the water sector, and identify previous capacity evaluations assessing aspects of IWRM.

The United Nations Development Program (UNDP) (1997) defines capacity as the "*ability of individuals, institutions and societies to perform functions, solve problems and set and achieve objectives."* In Delft, the Netherlands in 1991, the UNDP symposium *A Strategy for Water Resources Capacity Building* defined 'capacity building' as:

- the creation of an enabling environment with appropriate policy and legal frameworks;
- institutional development, including community participation (of women in particular);
- human resources development and strengthening of managerial systems.

(Franks, 1999; Hamdy, Abu-Zeid and Lacirignola, 1998)

UNDP recognizes that capacity building is a long-term, continuing process, and is a strategic element for the sustainable management of the water sector (Biswas, 1996; Franks, 1999).

Since the early 1990s, capacity in the context of water management has been viewed as critical (Franks, 1999; Hartvelt and Okun, 1991). Lamoree and Harlin (2002) note an increase in attention to capacity building due to donor agencies focusing water sector programs towards IWRM. The GWP recognizes capacity building as a priority initiative to assist countries in developing IWRM plans and strategies (GWP, 2008). The UN-Water Decade Program on Capacity Development (UNW-DPC) prioritizes capacity development activities, requires capacity needs assessment and gaps analysis, as well as the implementation of innovative capacity development methodologies (UN Water, 2009). *A Handbook for Integrated Water Resources Management in Basins* suggests a successful basin management strategy anticipates the need to strengthen capacity and fund capacity building, while basin organizations are encouraged to develop programs to build capacity (GWP, 2009). Furthermore, it is suggested that capacity development is necessary for 'disenfranchised groups,' to ensure their involvement in planning and implementation (GWP, 2009). Essentially, capacity is an enabler and driver in IWRM (Van der Zaag, 2005) and the water sector is highly dependent on individual and institutional capacities (Blokland, Alaerts and Kaspersma, 2009).

The following capacity assessments evaluated a particular aspect of IWRM:

(i) *Source water protection*:

- capacity for groundwater protection based on financial, institutional, technical, political and social capacity dimensions in Ontario, Canada (De

Loë, Di Giantomasso and Kreutzwiser, 2002) and Long Island, New York (De Loë and Lukovich, 2004),

- capacity of six small communities in Nova Scotia's Annapolis Valley to protect their drinking water supplies based on financial, human resources, institutional, social and technical capacity (Timmer, de Loë and Kreutzwiser, 2007),
- local capacity for source water protection based on technical knowledge, legal authority, public involvement and land and water integration specific to institutional arrangements in the Oldman River basin, Alberta (Ivey, de Loë, Kreutzwiser and Ferreyra, 2006), and
- groundwater management based on a normative model which characterizes integrated and sustainable water management activities in three municipalities in Ontario, Canada (Carter, Kreutzwiser and de Loë, 2005).

(ii) *Desalination*:

- capacity building for desalination based on legal, institutional, research and technical status in Jordan (Al-Jayyousi, 2000).

(iii) *Implementation of IWRM*:

- the capacity of Malawi at a national level to implement IWRM plans based on awareness, planning and implementation, training and equipment and facilities (Mkandawire and Mulwafu, 2006).

(iv) *Urban water management*:

- institutional and organizational capacity in urban water management Australia (Brown, 2008).

(v) *Drought*:

- drought management capacity based on regional cooperation and management in the Mekong River Basin (Hundertmark, 2008).

(vi) *Rainwater harvesting:*

- developing capacity for large-scale rainwater harvesting in Ontario, Canada (Farahbakhsh, Despins and Leidl, 2009).

(vii) *Institutional capacity:*

- institutional capacity building based on human, organization, resources and institutional development in Mozambique (Lamoree and Harlin, 2002).

Although specific capacity studies with an indigenous focus include the evaluation of (i) drinking water in a First Nation community in Saskatchewan with regards to financial, human resources, institutional, socio-political, and technical aspects (Lebel and Reed, 2010) and (ii) fifty-six First Nation drinking water systems in Alberta specific to technical and human resources (Smith, Guest, Syrcek, and Farahbakhsh, 2006) there remains an insufficient discussion on the capacity of indigenous communities to holistically practice IWRM.

The nature of an integrated approach to water resources management requires capacity across various areas and recognizes interdependencies (Cap-Net, 2006; Franks, 1999). Current literature does not include 'holistic' capacity evaluations for IWRM at the community-level. Furthermore, capacity evaluations do not assess indigenous communities ability to practice IWRM. Therefore, the overall capacity of an integrated approach to water resource management is necessary to understand the abilities and limitations of

IWRM at the community level. The following section will discuss capacity dimensions and indicators necessary to evaluate IWRM capacity on a holistic level.

2.3.1 Integrated Water Resource Management Capacity Dimensions and Indicators

The following analytical framework is based on a current water resources management situation evolving to the 'ideal' situation in the future (Van Hofwegen, 2001). An analytical framework assesses the present situation and trends (Van Hofwegen, 2001). An assessment can then formulate the needs of IWRM based on the 'ideal' scenario and determine interventions necessary to achieve a desired IWRM situation (Van Hofwegen, 2001).

The IWRM audit approach suggests indicators are designed to indicate the capacity of the water sector to achieve various objectives (Rey, Silva, Ardorino and Levite, n.d.). Indicators are used to (i) measure IWRM progress, (ii) identify weak areas of capacity and thereby respond with corrective action, and (iii) report on an annual basis to management and stakeholders (Cap-Net, 2008). The development of capacity indicators is based on the implementation of an integrated approach to water resources (Cap-Net, 2008).

2.3.1.1 Actor Networks Capacity

IWRM requires diverse actors to cooperate, communicate and exchange information, and thereby strengthen actor networks. Partnerships among stakeholders are essential in collaborative water management efforts (Yillia, Bashir and Donkor, 2003) and capacity is improved when stakeholders coordinate, facilitate, and maintain active linkages to provide vision and direction (de Loë, Di Giantomasso and Kreutzwiser, 2002) and ultimately partnerships overcome the 'silo' effect (Mitchell, 2006).

Actor networks capacity indicators include vertical and horizontal linkages that encompass cross-sectoral cooperation, cooperation between administrative levels, across administrative boundaries and broad stakeholder participation as adopted in Raadgever Raadgever, Mostert, Kranz, Interwies and Timmerman's (2008) study on management regimes. Another important indicator is cross-sectoral analysis to identify emerging problems and integrate policy implementation as developed by Pahl-Wostl et al. (2007). Social linkages, a vital element of actor networks, include indicators identified by Timmer et al. (2007) specific to clear leadership for water protection at the watershed level, in addition to community awareness and support for watershed protection. Another important aspect of social linkages is developed by Lebel (2008), which evaluates community members' involvement in decisions pertaining to drinking water management and environmental protection.

2.3.1.2 Information Management Capacity

Information management is the collection, management, and distribution of information to one or more stakeholders. Cooperation in information management helps develop trust and collaboration amongst stakeholders. Information has to be accessible, shared, and integrated to enable decision-making (Kennedy, Simonovic, Tajada-Guibert, Doria and Martin, 2009). This fosters greater technical capacity, mutual understanding, and shared insights (Mostert et al. 1999; Van der Zaag and Savenije, 2000).

Different researchers have identified various elements important to information management capacity. Raadgever et al. (2008) acknowledged joint collaborations, the use of information, and the span of communication (as it relates to exchange of information with other actors) and the interdisciplinary nature of information. Meanwhile Timmer et al.

(2007) identified the availability of water data as essential for management and decision-making. De Carvalho, Carden, and Armitage (2008) highlighted the importance of monitoring capabilities (e.g. producing quality data). Cap-Net (2008) places the emphasis on information being available to managers and other stakeholders. Finally, Pahl-Wostl et al. (2007) determined that a comprehensive understanding is required, with open and shared information sources that fill gaps and facilitate integration.

2.3.1.3 Human Resources Capacity

Human resources capacity refers to education and training for continued professional growth for individuals involved in water management, protection or rights-holder participation activities, or the expertise these individuals currently possess. Regional capacity and human resources development are important elements in IWRM (Forster, 1997; Gumbo, Forster and Arntzen, 2005, Van Der Zaag, 2003). Timmer et al. (2007) identified important elements of human capacity such as access to individuals with appropriate education and training, and sufficient numbers of individuals dedicated to water management, environmental protection or rights-holder participation. In addition, Lebel (2008) identifies education and training opportunities regularly accessed by staff members as a necessary aspect of human capacity. Human resource capacity is necessary for competent water management (Forster, 1997) and essentially links education, training, and the abilities of individuals required to achieve sustainable water stewardship.

2.3.1.4 Technical Capacity

Mugabe (2000) defines technical capacity as *'the ability to generate, procure and apply science and technology to identify and solve a problem or problems'.* In integrated water resources technical capacity encompasses watershed health, along with piped and

well distribution systems. Timmer et al. (2007) identified technical capacity indicators to include community drinking water that meets drinking water standards, frequency of water quality monitoring, identification of municipal groundwater recharge areas and water supply contaminant sources (point and non-point), with municipal water source areas being delineated in official plans. In addition, other indicators noted by Lebel (2008) include adequate physical infrastructure to produce and distribute safe drinking water and an adequate source of water in terms of quantity and quality.

2.3.1.5 Financial Capacity

Financial capacity is the ability to access, generate and save funds for drinking water and environmental stewardship. Financial capacity indicators are necessary to evaluate a community's ability to access, generate and save funds for drinking water management, environmental protection, and watershed participation activities. A lack of financial resources can hinder the capacity of stakeholders to plan and achieve watershed goals (Litke and Day, 1998). In a study of 37 watersheds adequate funding was a commonly cited factor for successful watershed management (Leach and Pelkey, 2001).

To assess financial capacity, Raadgever et al. (2008) identify the following indicators: (i) availability of sufficient (public and private) funds for water management initiatives, (ii) cost recovery from the users by public and private financial instruments, and (iii) decision-making and financial control under the same leadership. As well, Timmer et al. (2007) note that water rates, which reflect the cost of protecting and providing drinking water, are an important measure of financial capacity. In addition, Lebel (2008) acknowledges the importance of funding obtained from within the community and externally, stability of funding, and ability to save funding surpluses. Another aspect of

financial capacity relates to a community's ability to pay or access services. Indicators discussed by Cap-Net (2008) include percentage of community members with a secondary education, unemployment rate, income levels and work days lost per annum due to water-related diseases.

2.3.1.6 Institutional Capacity

Institutional capacity encompasses the regulation, legislation, protocols, and plans surrounding watershed management. Appropriate governance frameworks and policies are necessary for institutional capacity in IWRM. Van der Zaag (2003) suggests that since IWRM is based on relationships among water users and between water users and the government, it necessitates good governance. Institutional capacity indicators necessary to examine legal and policy aspects are discussed by Raadgever et al. (2008) and include appropriate legal frameworks, adaptable legislation, long-term planning, experimentation and implementation. Policies that include planning are identified by Timmer, de Loë and Kreutzwiser (2007), and include community planning strategies and land use activities in community well fields, recharge and watershed water supply areas.

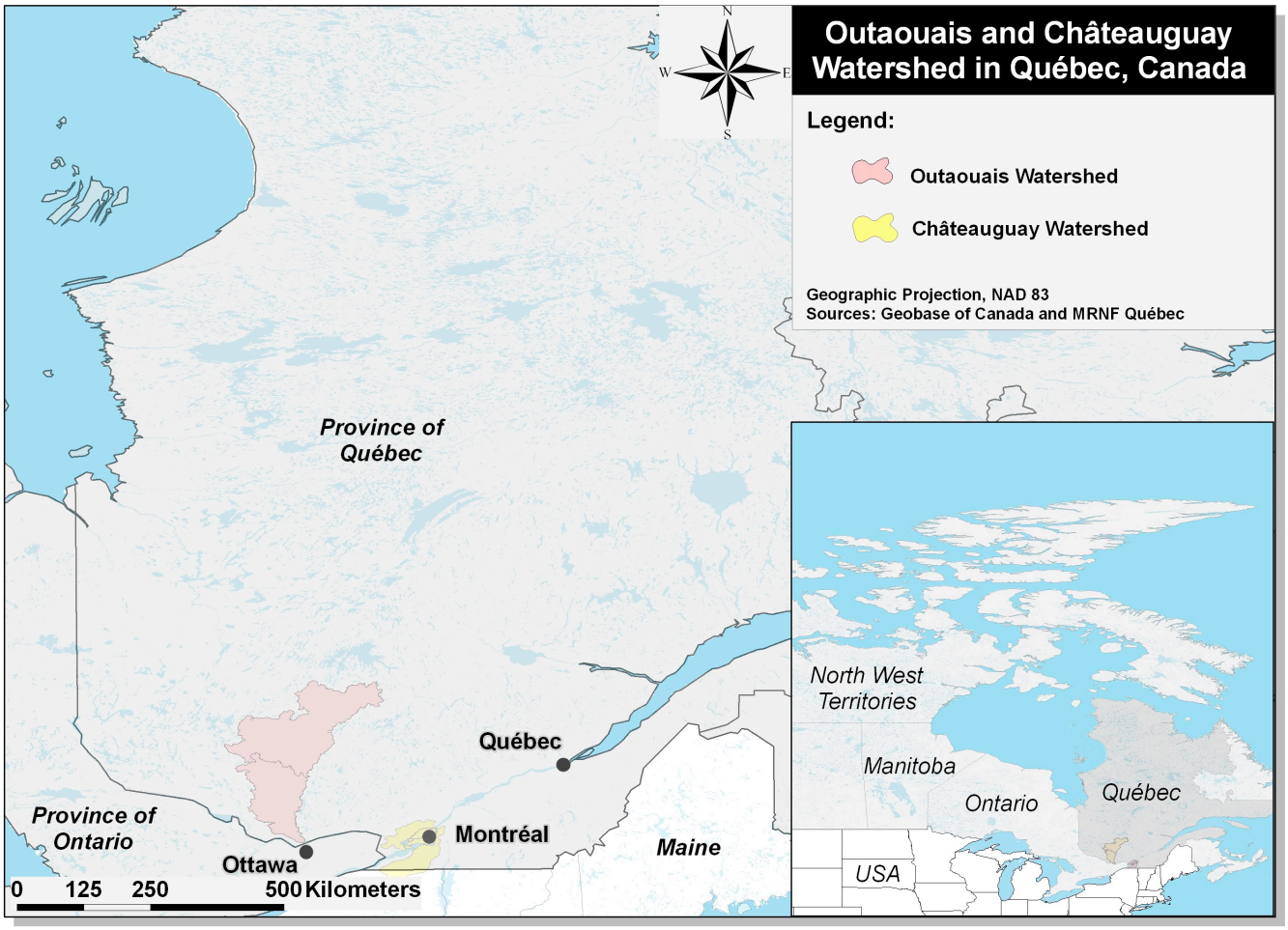
2.4 Concluding Remarks

An integral component of IWRM that has yet to be discussed with sufficient frequency is the inclusion of indigenous capacity in Canada. While the importance of capacity is widely acknowledged in IWRM, more attention needs to be drawn to 'holistic' evaluations at the community-level for indigenous communities to practice IWRM. The ultimate goal of a capacity assessment of a community to practice IWRM is to identify weak areas of capacity and thereby respond with corrective action, particularly in the areas of actor networks, information management, human resources, and technical, financial, and

institutional. The current study is necessary to address gaps in current literature specific to First Nation capacity in IWRM in the province of Québec. As IWRM develops and becomes part of the wider Québec water management agenda, it is necessary to ensure that discussion on First Nation capacity in IWRM is given greater attention. Regional IWRM models in Canada could be the mechanism to revive Indigenous control, access and input into current water resource management. This revival of Indigenous perspectives has the potential to bridge a colonial past and move forward with progressive and equitable water management systems.

CHAPTER 3 STUDY AREA

Map 3.1: Outaouais and Châteauguay Watersheds in Québec



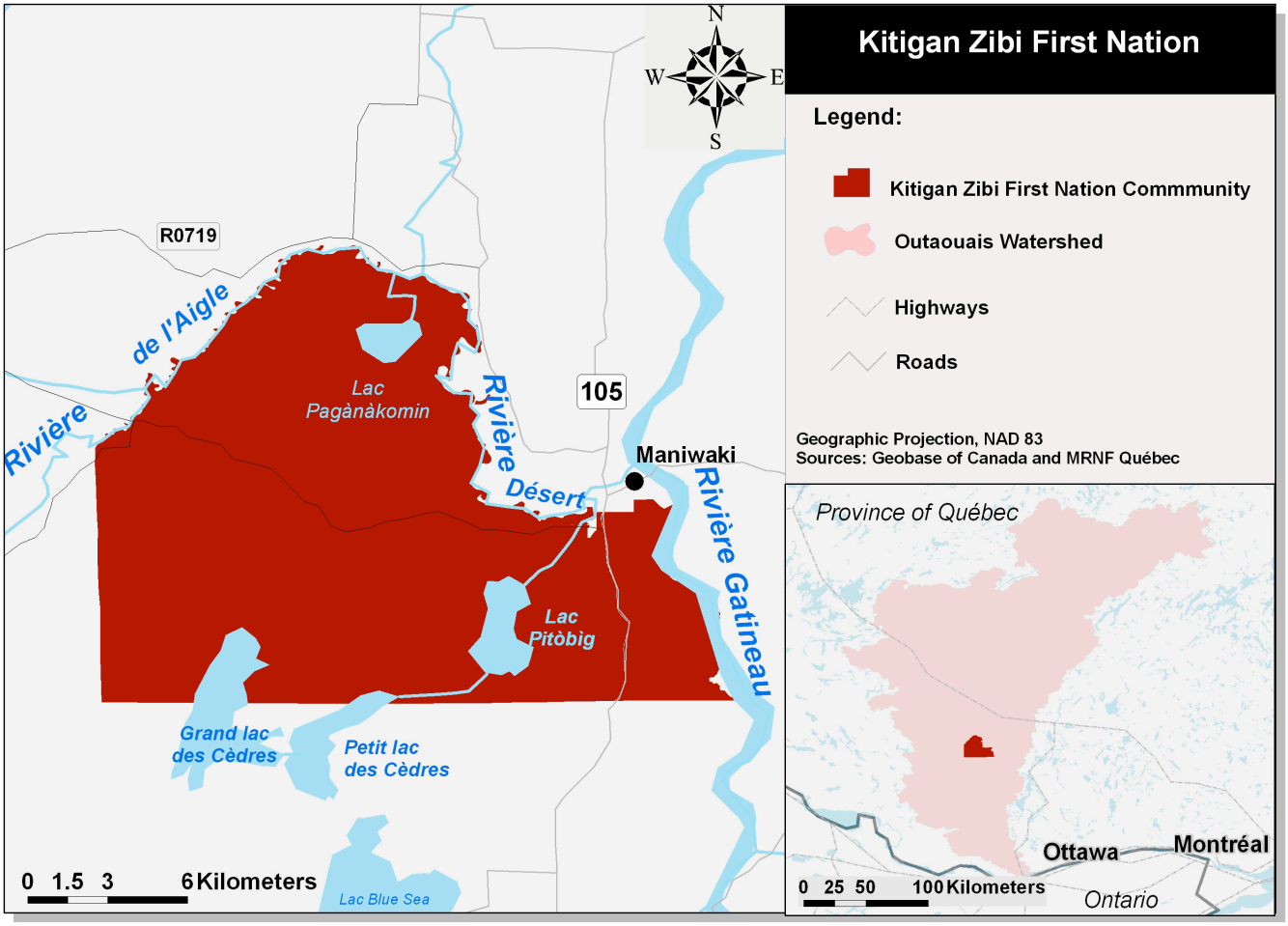
3.1.1 Kitigan Zibi First Nation

The Kitigan Zibi Anishinabe community was formally established in 1851. The majority of Kitigan Zibi ancestors migrated from the Lake of Two Mountains, also known as the Oka area in Québec (Kitigan Zibi Band Council, 2010). Kitigan Zibi is a rural community of 1,557 Algonquin residents, located 130 kilometres north of Gatineau, Québec as shown in Map 3.2. It is bound on the north by Rivière de l'Aigle and Rivière Désert as shown in Map 3.2. The community is 18, 437.6 hectares (45,559.3 acres) in total surface area and is part of the Outaouais Watershed as shown in Map 3.1 and 3.2 (refer to

Table 3.1 First Nation Community Profiles) (INAC, 2010b). There are about twenty-five businesses in Kitigan Zibi, including food stores, arts and crafts, laundry, hairdressing, cabinet making, excavation, a car wash, daycare, heavy machinery, hardware, a restaurant, welding, consulting, ambulance service and a cultural centre (INAC, 2010b).

In 1999, a Health Canada study found high levels of uranium, a toxic heavy metal, present in groundwater and issued a 'do not consume' drinking water advisory for well water users (Harden and Levalliant, 2008). Presently, 88 of 525 homes are connected to the piped water distribution and wastewater system of the neighboring municipality of Maniwaki (Kitigan Zibi First Nation, personal communication, April 30th, 2010). The remaining 437 households rely on well water for non-drinking purposes, receive bottled water for drinking from INAC and have their own on-site sewage systems (Kitigan Zibi First Nation, personal communication, April 30th, 2010). As of December 2010, Kitigan Zibi's first water and wastewater system will be constructed to provide water and wastewater services to forty-five percent of the community (INAC, 2009b).

Map 3.2: Location of Kitigan Zibi First Nation in the Outaouais Watershed



3.1.2 Kahnawà:ke First Nation

In 1680 the French Crown granted the Iroquois of the Sault (now the Mohawks of Kahnawà:ke)[3] exclusive use and occupation of land based on the *Seigneurie de Sault-Saint-Louis* (Mohawk Council of Kahnawà:ke, 2009). In 1703, Jesuits began to concede over two-thirds of land, and today, Kahnawà:ke encompasses less than 13,000 acres (MCK, 2009). The federal government and the Mohawk Council of Kahnawà:ke have a joint process to clarify and resolve this historic land claim (MCK, 2009).

[3] The Iroquois are in association with several indigenous groups and include the Mohawk, Oneida, Onondaga, Cayuga, Seneca, and Tuscarora nations.

Kahnawà:ke, is an urban community of 7,556 Mohawk residents, located ten kilometres southwest of Montréal on the south shore of Lake Saint-Louis as shown in Map 3.3. The community is 4, 811 hectares (11, 888 acres) in total surface area and is part of the Châteauguay Watershed as shown in Map 3.1 and 3.3 (refer to Table 3.1 First Nation Community Profiles) (INAC, 2010a). In 1999, the Kahnawà:ke Economic Development Commission was initiated to stimulate and enhance Kahnawà:ke's economic growth by investing in people and businesses. The Commission makes funds available to entrepreneurs, conducts training, markets beyond the community, and promotes entrepreneurship (INAC, 2010a).

In the 1950s, water and wastewater facilities were constructed to serve only the core centre of the community. Presently there are 2,200 households and 114 businesses connected to piped water distribution, while 300 households and 49 businesses rely on well water for non-drinking purposes (Kahnawà:ke First Nation, personal communication, May 25th, 2010). As of December 2010, improvements to the water treatment and reservoir capacity will be increased significantly to meet health and safety requirements (INAC, 2009a). Kahnawà:ke's need for a reservoir and a new water line has been identified in a 2002 SNC-Lavalin report (Kahnawà:ke First Nation, personal communication, September 3rd, 2010).

Map 3.3: Location of Kahnawà:ke First Nation in the Châteauguay Watershed

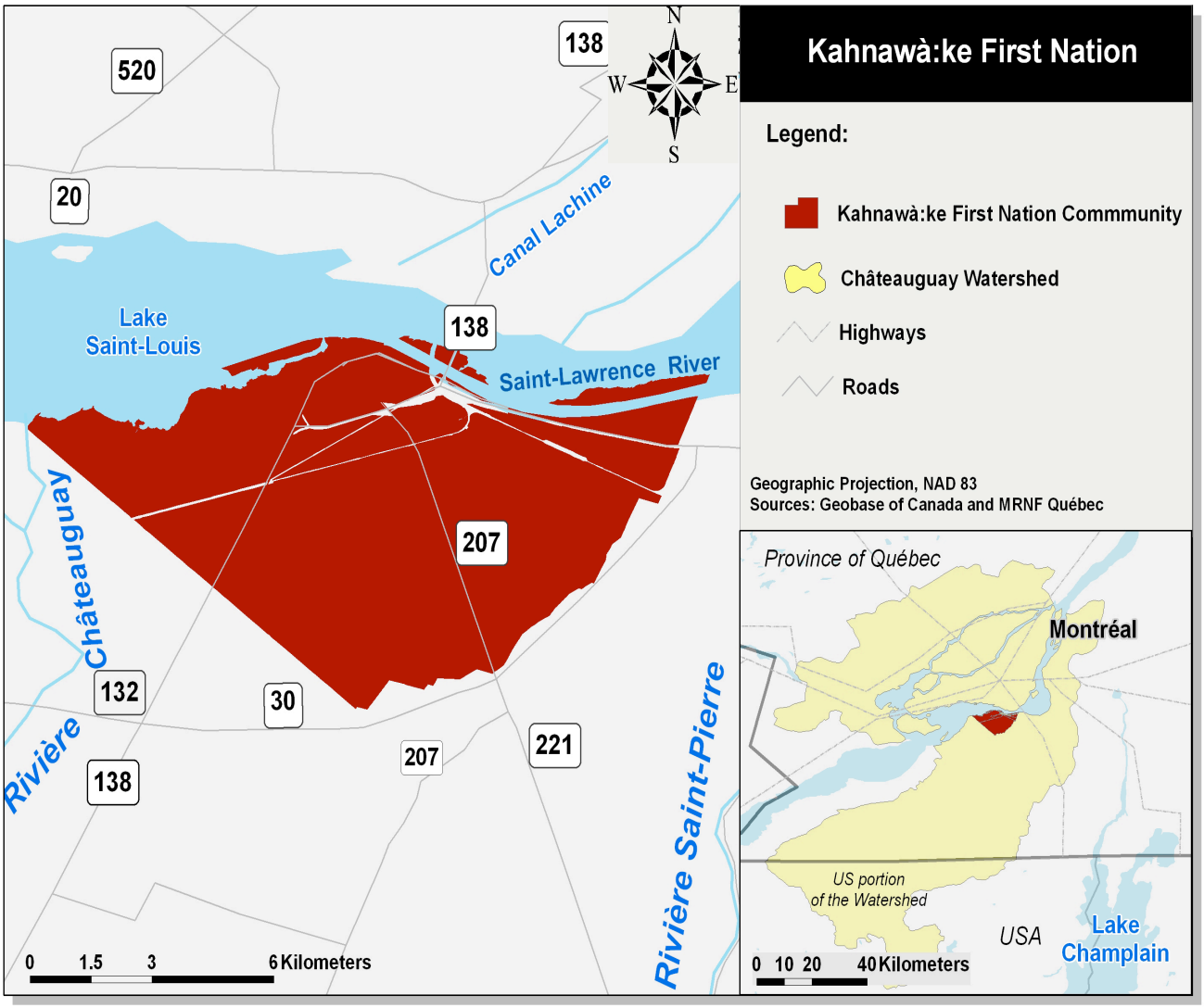


Table 3.1: FIRST NATION COMMUNITY PROFILES

Community Profile	Kitigan Zibi	Kahnawà:ke
Surface	18 437.6 hectares (45 559.3 acres)	4 811 hectares (11 888 acres)
Location	Located 130 kilometres north of Gatineau. It is bound on the north by Rivière de l'Aigle and Rivière Désert.	Located 10 kilometres southwest of Montréal on the south shore of Lake Saint-Louis.
Remoteness Factor	Year-round road access and located less than 50 kilometres from the nearest service center.	Year-round road access and located less than 50 kilometres from the nearest service centre.
Languages	Algonquin, English	Mohawk, English
Population (Community Residents)	1,557	7,556
Water Supply	Municipal agreement with the municipality of Maniwaki for water services to 88 homes	Treated surface water, household supply piped from water supply mains
Sewers	Municipal agreement with the municipality of Maniwaki for wastewater services to 88 homes	Wastewater sewer and storm sewer systems, extended aeration
Cultural Identity	Algonquin	Mohawk
Watershed	Outaouais Watershed	Châteauguay Watershed

(INAC, 2010a; INAC, 2010b)

CHAPTER 4 METHODOLOGY

4.1 Objective

The objective of this study was to evaluate the capacity of First Nation communities to practice integrated water management in Québec. Essentially 'IWRM practice' is about professionals and users communicating with each other, understanding the needs of both an ecosystem and the people who live within it, planning collaborative activities across sectoral boundaries, sharing information, and integrating plans at the basin and community level (Moriarty, Butterworth and Batchelor, 2004). However, a community's abilities and constraints determine its capacity to practice IWRM.

To meet this objective, the author developed an IWRM framework as shown in Figure 4.1 *Conceptual Framework to Evaluate First Nation Capacity to Practice IWRM*. This is a significant contribution, as it is the first framework of its kind in the integrated water resources field. The framework serves to (i) identify key holistic aspects of this paradigm, and (ii) act as an evaluation tool to determine the capacity of a First Nation community to practice IWRM.

4.2 Participant Community Selection Criteria

The selection criteria for the participant First Nation communities was based on: (i) geographical representation to include participants from rural and urban settings, (ii) location in the province of Québec, (iii) agreement from the environment department or Chief and Band Council for the study, and (iv) designation by the Government of Canada as 'First Nation'.

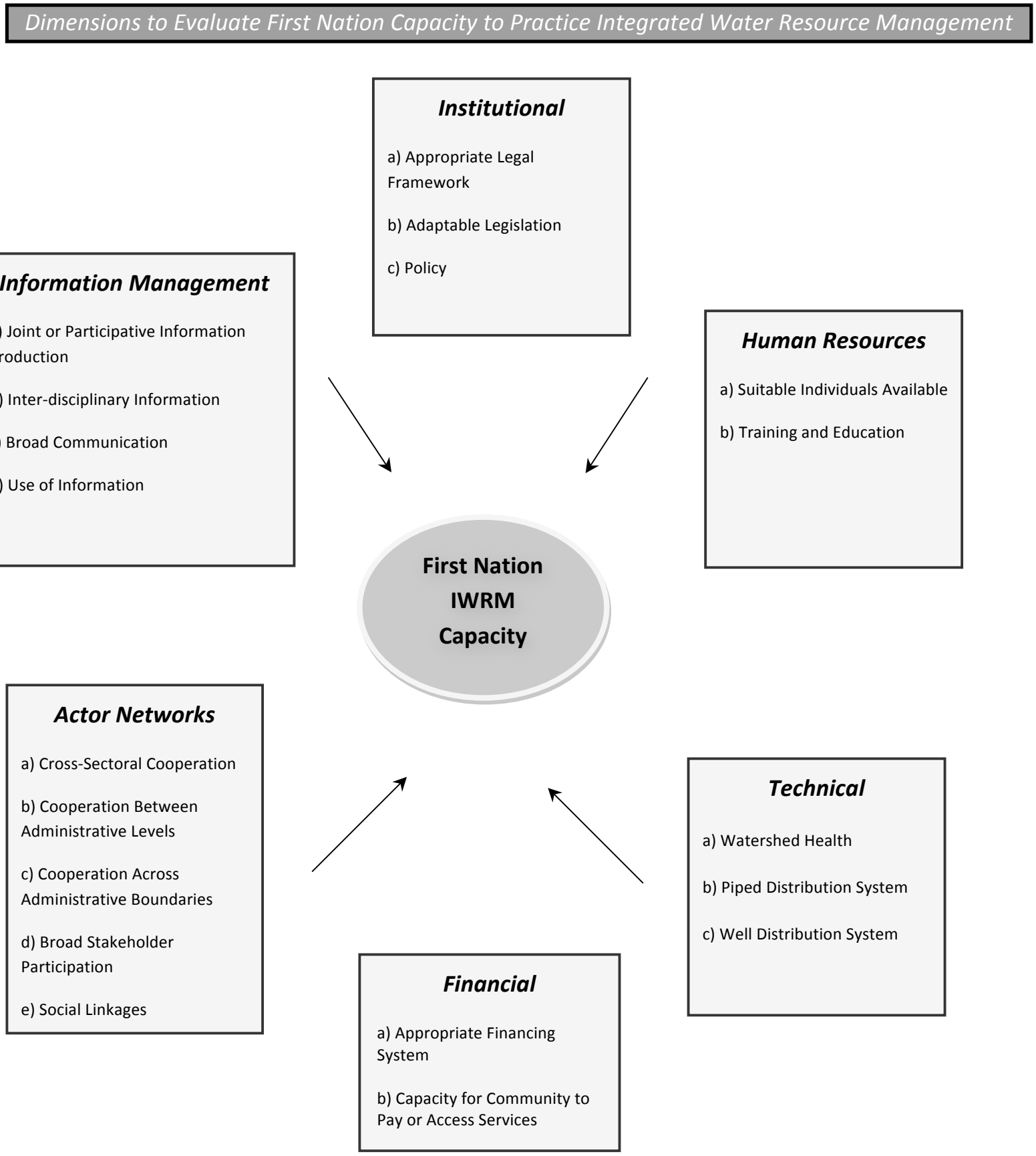


Figure 4.1: Conceptual Framework to Evaluate First Nation Capacity to Practice IWRM

4.3 Procedures to Gather and Process Data

Primary data from this study was derived from interviews with employees and leaders in the two selected First Nation communities having expertise and experience in natural resources management, water system operations, water testing, engineering, finance, and governance. Individuals included Chiefs, forest and civil engineers, water treatment operators, public work directors, environmental health and safety technicians, as well as environmental and financial administrators. The names, training, and jobs of interviewees were not disclosed in any part of this research. Total anonymity was necessary to build an enabling environment where all interviewees felt there were no consequences for their opinions, observations, and experiences. This is particularly important in smaller communities whereby identifying participants by profession easily identifies the interviewee. For example, there is likely only one person that is the community's accountant. All research interviewees consented to the research study prior to the commencement of the interviews. All interviewees participated in a voluntary manner, were informed about the research and understood that they could withdraw from the study at any time. Selected interviewees would provide information on the state of water management, as well as their perceptions of the existing situation (Van Hofwegen, 2001).

In-person one-on-one interviews were conducted in Kitigan Zibi and Kahnawà:ke First Nations. Qualitative data was gathered by utilizing both 'structured interviews', consisting of predetermined questions, with the same question order and wording (Kumar, 2005), as well as questions modified to incorporate 'flexibility' and allow exploration of emerging information (Kumar, 2005). Interview questions were based on literature

covering six capacity dimensions and the indicators described below (refer to Appendix III Interview Questions).

All the interviews lasted between thirty minutes and two hours. Gaps in information were clarified with follow-up phone or electronic correspondence. Interviews were conducted on the basis of voluntary participation and informed consent was obtained prior to conducting interviews.

4.4 Content Analysis

Based on qualitative data derived from interviews, response content was evaluated as either positive or negative by the author. The 'presence' of capacity for a given capacity indicator corresponded with a positive response, which met the capacity criteria by either exceeding or meeting the capacity requirement. The 'absence' of capacity for a given capacity indicator corresponded with a negative response, which did not meet the capacity criteria by either partially or not meeting the capacity requirement. In the assessment of each capacity dimension all indicators were weighted equally as mentioned in McGuire, Rubin, Agranoff and Richards (1994).

The presence and absence of capacity indicators for each dimension were recorded, based on interviews, in the *First Nation Capacity to Practice IWRM Indicator Ratings Table* (refer to Appendix I). At a later time, the results in the *First Nation Capacity to Practice IWRM Indicator Ratings Table* were shared with each interviewee for verification that their input was correctly evaluated to reduce research error.

The results represent findings for case studies of two First Nation communities in the province of Québec, and should not be generalized to all First Nation communities in Canada. Rather, the findings of this research are initial discussions of First Nation capacity

in the province of Québec and identify capacity preconditions required for their participation in IWRM. The identification of First Nation realities is a means to widen the scope of literature and IWRM frameworks.

4.5 Capacity Framework

For the purpose of this study six dimensions and a number of the sub-dimensions were employed in evaluating capacity as shown in Figure 4.1 *Conceptual Framework to Evaluate First Nation Capacity to Practice IWRM*. Each sub-dimension is composed of various capacity indicators that characterize the dimension. The selection of capacity dimensions was based on previous research that demonstrated the necessity of a given capacity as it related to an aspect of IWRM. The capacity dimensions employed include: actor networks, information management, human resources, and technical, financial and institutional. Capacity indicators provided a metric for identifying trends toward or away from an intended objective. To achieve the study's objectives, seventy-nine indicators were drawn from literature specifically related to watershed management, source water protection, drinking water management, and community capacity (Cap-Net, 2008; De Carvalho, Carden and Armitage, 2008; Pahl-Wostl, Sendzimir, Jeffrey, Aerts, Berkamp and Cross, 2007; Raadgever et al., 2008; Timmer, de Loë, and Kreutzwiser, 2007).

First Nation capacity to practice IWRM indicator ratings (see Tables 5.2.1 to 5.2.6) used a four-level rating scheme. This rating scheme is adapted from a *'Summary Indicator Table'* developed by the Environmental Finance Center's (2005) assessment of drinking water safety as it relates to financial capacity. Each capacity indicator is evaluated as having an absence of capacity if it does not meet or partially meet the requirements, or a presence of capacity if it meets or will meet the requirements in the future. Indicators in

various capacity dimensions ranged from a minimum of four indicators, in the case of human resource capacities, to a maximum of twenty-six indicators, in the case of technical capacities. The following section will explain each capacity dimension and sub-dimensions, and will discuss previous research that developed capacity indicators used in this study.

Actor Networks

The very nature of integrated water management requires cooperation, communication, and exchange of information, and in doing so established actor networks represent positive IWRM enablers. Hence, the need for partnerships is essential in collaborative water management efforts (Yillia, Bashir and Donkor, 2003) and capacity is improved when stakeholders coordinate, facilitate, and maintain active linkages to provide vision and direction (de Loë, Di Giantomasso and Kreutzwiser, 2002).

As Raadgever et al. (2008) adopted in their assessment of management regimes, the indicators to support actor networks used in this study were vertical and horizontal linkages, encompassing cross-sectoral cooperation, cooperation between administrative levels, across administrative boundaries and broad stakeholder participation. Another indicator, developed by Pahl-Wostl et al. (2007), was used in cross-sectoral analysis to identify emerging problems and integrate policy implementation. Furthermore, this study assessed the social aspects of actor networks and derived indicators, including clear leadership for water protection at the watershed level, as well as community awareness and support for watershed protection (Timmer et al. 2007). A last indicator, developed by Lebel (2008), evaluated community members' involvement in decisions pertaining to drinking water management & environmental protection. Actor networks capacity

indicators were selected for this study to reflect the diverse vertical and horizontal linkages that exist in drinking water management, environmental protection, and watershed participation.

Information Management

Information management is the collection, management, and distribution of information to one or more stakeholders. Cooperation in information management helps develop trust and collaboration amongst stakeholders. Information has to be accessible, shared, and integrated to enable decision-making (Kennedy et al. 2009). Information management fosters greater technical capacity, mutual understanding, and shared insights (Mostert et al. 1999; Van der Zaag and Savenije, 2000).

Information management indicators used in this study were derived from Raadgever et al. (2008) and were representative of joint collaborations, the use of information, the span of communication (as it relates to exchange of information with other actors) and the interdisciplinary nature of information. Other indicators used in this study include the availability of water data for management and decision-making (Timmer et al., 2007), monitoring capability (e.g. producing quality data) (De Carvalho et al., 2008), information availability to managers and other stakeholders (Cap-Net, 2008), and a comprehensive understanding achieved with open and shared information sources that fill gaps and facilitate integration (Paul-Wostl et al., 2007). Information management capacity indicators were selected for this study to capture two aspects: (i) how a community identifies and collects information, and (ii) the ease with which information is shared with neighbors, stakeholders, community members and governments.

Human Resources

Human resources capacity is necessary for competent water management (Forster, 1997) and essentially links education, training, and the abilities of individuals to achieve sustainable water stewardship. Forty-three percent of Aboriginal people live in remote locations, and thirty percent make up Northern Canada's population (MacLeod, Browne and Leipert, 1998),[4] and consequently, geographical location presents technical and managerial challenges (Hrudey, 2008).

First Nation water treatment operators have a critical role in the delivery of safe drinking water (O'Connor, 2002; Swain et al., 2006), but First Nation communities often lack certified or qualified personnel to operate water treatment facilities, which results in considerable risk (INAC, 2003; Smith et al., 2006). Manual chlorination in First Nation water operations is cited as a problem due to frequent maintenance and repairs. Operators spending little time at the water treatment facility is also a significant problem (Smith et al., 2006). Despite the fact that water treatment operators are critical for the delivery of safe drinking water, operator training certification and retention of qualified individuals are major issues in First Nation communities (OAG, 2005; Smith et al., 2006).

Studies have identified regional capacity and human resources development as important elements in IWRM (Forster, 1997; Gumbo et al., 2005; Van Der Zaag, 2003). This research draws on the indicators developed by Timmer et al. (2007), which are specific to human resources capacity in that they evaluate the access to individuals with appropriate education and training, and having a sufficient number of individuals dedicated to water management, environmental protection or rights-holder participation. Another indicator used in the study was developed by Lebel (2008) and evaluates education and

[4] 'Remotely isolated' regions refer to no scheduled flights, minimal telephone and radio, no road access; whereas 'isolated' regions refer to flights, good telephone service, no road access (Clarke, Riben and Nowgesic, 2002).

training opportunities regularly accessed by staff members. Human resources capacity indicators were selected for this study to capture two aspects: (i) the availability of suitable individuals, and (ii) ongoing training and education opportunities for professional development.

Technical capacity

Technical capacity refers to the physical infrastructure of water systems, including the adequacy of source water and infrastructure, as well as the ability of system personnel to adequately operate and maintain the system and implement technical knowledge (Shanaghan, Kline, Beecher and Jones, 1998). The 1990 Drinking Water Safety Program for Native People assessed First Nation water and wastewater systems based on available water data and found that 25 percent posed a risk based on bacteriological and/or chemical analyses of water samples (OAG, 2005). The 2001 National Assessment of Water and Wastewater Systems in First Nation Communities conducted by INAC used on-site inspections of all water systems with an evaluation of system performance, associated risk levels and operating practices (INAC, 2003). In the 740 community water systems that were assessed, 46 percent of were assessed as medium water quality risks, while 29 percent were classified as posing potentially high risks. High or medium water quality risks occur due to failure to meet one or more Maximum Acceptable Concentration (MAC) parameters, lack of operator knowledge to run the water system, a poor raw water source, inadequate treatment in place, lack of regular testing procedures and maintenance records, equipment failure, absence of backup equipment or power sources, and lack of emergency procedures, safety equipment and operating manuals in the facilities (INAC, 2003).

A properly funded and managed treatment system is required to produce safe drinking water, and the absence of water infrastructure is correlated with disease. In a study of 61 First Nation communities in Manitoba, those without wells or running water accounted for 89 percent of S*higella* cases (Clarke, Riben and Nowgesic, 2002). Irrespective of these issues, small First Nations communities must still provide safe drinking water that satisfies the *Guidelines for Canadian Drinking Water Quality.*

Timmer et al. (2007) indicate small communities faced with financial limitations were unlikely to identify aquifer recharge areas, source water contaminants or conduct hydro-geological activities beyond monitoring water distribution systems. Indicators specific to watershed health, piped and well distribution systems from Timmer et al. (2007) were used in this study. These include community drinking water meeting established drinking water standards, whether water quality is monitored daily, weekly and/or annually, identification of municipal groundwater recharge areas and water supply contaminant sources (point and non-point), and whether municipal source water areas are delineated in official plans. Indicators to evaluate infrastructure and source water used in this study were drawn from Lebel (2008) and include adequate physical infrastructure to produce and distribute safe drinking water and adequate source water quantity and quality. Technical capacity indicators selected for this study were intended to reflect: (i) the output of drinking water, (ii) the ability to monitor water quality (iii) knowledge of water (source water and groundwater recharge areas), and pollution sources, (iv) whether water is incorporated into official plans, and (v) the quality of infrastructure and distribution systems.

Financial capacity

Financial capacity is defined by the ability to generate and access funding (de Loë et al., 2002; Timmer et al., 2007). With respect to financial issues, there is a greater frequency of literature that is specific to drinking water management for First Nations. A common misconception is that First Nations receive abundant financial support from the federal government. However, the twenty percent operation and maintenance costs which First Nations financially carry to operate water systems is a heavy financial burden in communities with high unemployment, where the band administration is unlikely to recover costs from the community (OAG, 2005; Swain et al., 2006). In addition, operator-training expenses are often not affordable to the community (Swain et al., 2006).

First Nation communities rely heavily on Indian and Northern Affairs Canada (INAC) for capital and operational funding, and Health Canada's First Nations and Inuit Health Branch for monitoring the quality of finished drinking water (Smith et al., 2006). Despite substantial funding aimed at addressing water quality in First Nation communities, the efforts of the Federal government have yielded limited improvement in drinking water (OAG, 2005). Consequently, water facilities go without repairs or operate with the minimal number of hours required to meet the budget set forth by INAC. Limited financial resources place a major risk on operating and maintenance objectives, thereby jeopardizing safe drinking water in First Nations communities in Canada.

A lack of financial resources can hinder the capacity of stakeholders to plan and achieve watershed goals (Litke and Day, 1998). Leach and Pelkey (2001), in a study of thirty-seven watersheds, found adequate funding was a commonly cited factor for successful watershed management. In this study, indicators serving to assess financial capacity and specific to appropriate financial systems were drawn from Raadgever et al.

(2008). These included the availability of sufficient (public and private) funds for water management initiative, whether costs are recovered from the users by public and private financial instruments, and whether decision-making and financial control are under the same leadership. Another indicator used was drawn from Timmer et al. (2007) and identified whether water rates reflected the cost of protecting and providing drinking water. Finally indicators were drawn from Lebel (2008), including the ability to obtain funding from outside and inside the community, stability of funding, and ability to save funding surpluses. Another aspect of financial capacity used in this study relates to a community's ability to pay or access services. Relevant indicators drawn from Cap-Net (2008) include percentage of community members with secondary education, unemployment rate, income levels and work days lost per annum due to water-related diseases. Financial capacity indicators were selected to evaluate a community's ability to access, generate and save funds for drinking water management, environmental protection, and watershed participation activities.

Institutional Capacity

Institutional capacity encompasses the regulation, legislation, protocols, and plans surrounding watershed management. Institutional capacity incorporates appropriate institutional frameworks and policies to support integrated water initiatives (GWP, 2003a). Van der Zaag (2003) suggests that since IWRM is based on relationships among water users and between water users and government, it necessitates good governance. This study employs institutional indicators drawn from Raadgever et al. (2008) and are related to legal and policy aspects. These include appropriate legal frameworks, adaptable legislation, long-term planning, experimentation and implementation. Additional planning

indicators used in this study were drawn from Timmer et al. (2007), and included community planning strategies and how land use activities were controlled in community well fields, recharge and watershed water supply areas. Institutional capacity indicators were selected for this study to evaluate the presence of (i) legal frameworks, (ii) flexibility of laws and policies, and (iii) policy implementation and planning that incorporated long-term impacts.

Governance as it relates to drinking water regulation in First Nations communities in Canada is frequently cited in the water management literature. A water regulatory regime is a basis to provide rules, standards and monitoring activities to uphold water quality and safety. In most provinces and unlike in other Canadian communities, such a regulatory regime is generally absent in First Nation communities. Currently, water safety in First Nation communities is managed through a series of guidelines, protocols and contracts between Indian and Northern Affairs Canada (INAC) and First Nation communities (Duncan and Bowden, 2009; OAG, 2005; Swain et al., 2006). There is general consensus among senate committees, independent commissions, and political representatives, like the Assembly of First Nations (AFN), that governance ambiguity produces unacceptable levels of risk to public health, and that a regulatory framework is necessary in First Nations communities (Duncan and Bowden, 2009; MacIntosh, 2009; OAG, 2005; Swain et al., 2006).

In January 2009, the federal government released a discussion paper that detailed its preferred regulatory route for enabling a legislative framework, which is to incorporate provincial legislation regarding operational standards through a framework statute, and to then develop the details of the regime through regulations to be developed in consultation

with First Nations over the next few years (MacIntosh, 2009). First Nations feel this compromises their rights and is an entrenchment of federal fiduciary responsibility (AFN, 2007). Another area of concern is that varying provincial standards may pose a risk in widening the gap between First Nation communities that are achieving good quality water, and those that are not (AFN, 2007). The Office of the Auditor General of Canada faulted the lack of laws and regulations governing the provisions of drinking water in First Nations communities despite hundreds of millions in funds invested (OAG, 2005).

CHAPTER 5 RESULTS AND DISCUSSION

Capacity as previously discussed is the "*ability of individuals, institutions and societies to perform functions, solve problems and set and achieve objectives."* (UNDP, 1997). This section presents capacity results for Kitigan Zibi and Kahnawà:ke First Nations communities, specific to the six capacity dimensions discussed earlier; actor networks, information management, human resources, technical, financial and institutional. A general overview of the results will be presented and for each capacity dimension the presence of capacity indicators as observed for each participant community will be presented.

The subsequent section will review the sub-dimensions that characterize each capacity dimension and the reason why particular indicators were selected will be stated. A detailed discussion of the results will also be presented. This section will assess each capacity dimension to determine if there is a presence or absence of the overall capacity based on qualitative data derived from personal interviews and secondary data.

5.1 Results

5.1.1 Actor Networks Capacity Results

Only two of eighteen actor networks capacity indicators were present in the case of Kitigan Zibi (as shown in Tables 5.1 and 5.2):

(i) the tribal council or environmental department takes community input seriously, and

(ii) community awareness and support for watershed protection.

Table 5.1 Actor Networks Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Kitigan Zibi	**18**	**16**	**2**	**2:18**
Kahnawà:ke	**18**	**12**	**6**	**6:18**

Table 5.2. Actor Networks Capacity Indicator Ratings Table

Indicator	Kitigan Zibi				Kahnawà:ke			
Legend (-) Indicator does not meet capacity (+/-) Indicator partially meets capacity (+) Indicator meets capacity (*) Indicator meets capacity & is expected to in the future	**Capacity Absent**		**Capacity Present**		**Capacity Absent**		**Capacity Present**	
	-	-/+	+	*	-	-/+	+	*
I) Actor Networks Capacity								
a) Cross-Sectoral Cooperation								
• Partnerships with different communities & stakeholders	•						•	
• Conflicts with other parties (communities, stakeholders) dealt with constructively, resulting in inclusive agreements to which the parties are committed	•					•		
• Use of cross-sectoral analysis to identify emergent problems and for policy implementation	•					•		
b) Cooperation Between Administrative Levels								
• First Nation governments involved in decision-making processes with the federal departments (vertical linkages)		•				•		
• Conflicts dealt with constructively, resulting in inclusive agreements to which the parties are committed		•				•		
c) Cooperation Across Administrative Boundaries								
• Downstream communities involved in decision making by upstream communities	•				•			
• First Nation community part of a cooperation structure (e.g., watershed associations)	•				•			
• Conflicts dealt with constructively, resulting in inclusive agreements to which the parties are committed	•					•		
d) Broad Stakeholder Participation								
• Legal provisions concerning access to information, participation in decision-making (e.g., consultation requirements)	•				•			
• Community include cooperation structures from non-government groups	•				•			
• Community contribute to agenda setting, analyzing problems, developing solutions and making decisions at the watershed scale		•				•		
• Community undertakes parts of watershed management themselves, e.g., through watershed associations	•				•			
• Federal Government takes community input seriously		•					•	
• Provincial Government takes community input seriously		•					•	
• Tribal Council or Environmental department takes community input seriously				•			•	

e) Social Linkages								
• Clear leadership for water protection at the watershed level exists	•					•		
• Community members have awareness and support for watershed protection				•			•	
• Community members regularly involved in decisions as it pertains to drinking water management & environmental protection		•					•	

In the case of Kahnawà:ke six actor networks capacity indicators were present (as shown in Table 5.1 and 5.2):

(i) partnerships with different communities and stakeholders,

(ii) federal government takes community input seriously,

(iii) provincial government takes community input seriously,

(iv) tribal council or environmental department takes community input seriously,

(v) community awareness and support for watershed protection, and

(vi) community members are regularly involved in decisions pertaining to drinking water management and environmental protection.

5.1.2 Information Management Capacity Results

In the case of Kitigan Zibi six of ten information management capacity indicators were present (as shown in Table 5.3 and 5.4):

(i) different disciplines involved in defining and executing research, in addition to technical and engineering sciences, also includes ecology, social sciences, etc.

(ii) different levels of governments exchange information and data with other governments (Federal, Tribal Councils, Band Councils),

(iii) new information used in public debates,

(iv) data needed to manage water supplies, delineate watersheds and aquifers, and develop source protection plans available,

(v) community monitors and collects data (e.g. produce quality data), and

(vi) water management information available to managers and other stakeholders if requested.

Table 5.3. Information Management Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Kitigan Zibi	**10**	**4**	**6**	**6:10**
Kahnawà:ke	**10**	**3**	**7**	**7:10**

Table 5.4: Information Management Capacity Indicator Ratings Table

Indicator	**Kitigan Zibi**				**Kahnawà:ke**			
Legend (-) Indicator does not meet capacity (+/-) Indicator partially meets capacity (+) Indicator meets capacity (*) Indicator meets capacity & is expected to in the future	**Capacity Absent**		**Capacity Present**		**Capacity Absent**		**Capacity Present**	
	-	-/+	+	*	-	-/+	+	*
II) Information Management Capacity								
a) Joint or Participative Information Production								
• Community involved in setting the terms of reference and supervising the research, or are at least consulted (interviews, surveys, etc.) at the watershed scale		•				•		
b) Interdisciplinary								
• Different disciplines involved in defining and executing research, in addition to technical and engineering sciences, also includes ecology, social sciences, etc.				•			•	
c) Broad Communication								
• Different levels of governments exchange information and data with other governments (Federal, Tribal Councils, Band Councils)				•			•	
• Community actively disseminates information and data to the public (internet, literature, brochures, media, etc.)?		•				•		
d) Use of Information								
• New information used in public debates				•		•		
• New information influence federal policy		•				•		
• Data needed to manage water supplies, delineate watersheds and aquifers, and develop source protection plans available				•			•	
• Community monitors and collects data (e.g. produce quality data)				•			•	
• Water management information available to managers and other stakeholders if requested			•				•	
• Comprehensive understanding achieved with open, shared information sources that fill gaps and facilitate integration at the watershed level		•				•		

In the case of Kahnawà:ke only three capacity information management indicators were absent, while the remaining seven were present (as shown in Table 5.3 and 5.4):

(i) community involved in setting the terms of reference and supervising the research, or are at least consulted (interviews, surveys, etc.),

(ii) different disciplines involved in defining and executing research, in addition to technical and engineering sciences, also includes ecology, social sciences, etc.,

(iii) different levels of governments exchange information and data with other governments (Federal, Tribal Councils, Band Councils),

(iv) data needed to manage water supplies, delineate watersheds and aquifers, and develop source protection plans available,

(v) community monitors and collects data (e.g. produce quality data),

(vi) water management information available to managers and other stakeholders if requested, and

(vii) comprehensive understanding achieved with open, shared information sources that fill gaps and facilitate integration

5.1.3 Human Resources Capacity Results

In the case of Kitigan Zibi two of four human resources capacity indicators were present (as shown in Table 5.5 and 5.6):

(i) access to individuals with the appropriate level of education and expertise to adequately support water management, environmental protection or rights-holder participation, and

(ii) education and training opportunities available to staff members to participate and contribute to water management, environmental protection or rights-holder participation activities.

Table 5.5. Human Resources Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Kitigan Zibi	**4**	**2**	**2**	**2:4**
Kahnawà:ke	**4**	**1**	**3**	**3:4**

Table 5.6: Human Resources Capacity Indicator Ratings Table

Indicator	**Kitigan Zibi**				**Kahnawà:ke**			
Legend (-) Indicator does not meet capacity (+/-) Indicator partially meets capacity (+) Indicator meets capacity (*) Indicator meets capacity & is expected to in the future	**Capacity Absent**		**Capacity Present**		**Capacity Absent**		**Capacity Present**	
	-	-/+	+	*	-	-/+	+	*
II) Human Resources Capacity								
a) Availability of Suitable Employees								
• Sufficient number of employees dedicated to water management, environmental protection or rights-holder participation		•				•		
• Access to individuals with the appropriate level of education and expertise to adequately support water management, environmental protection or rights-holder participation				•			•	
b) Training and Education								
• Education and training opportunities available to staff members to participate and contribute to water management, environmental protection or rights-holder participation activities			•				•	
• Education and training opportunities regularly taken up by staff members from various departments to participate and contribute to water management, environmental protection or rights-holder participation activities		•					•	

In the case of Kahnawà:ke one human resources capacity indicator was absent and three were present (as shown in Table 5.5 and 5.6):

(i) access to individuals with the appropriate level of education and expertise to adequately support water management, environmental protection or rights-holder participation,

(ii) education and training opportunities available to staff members to participate and contribute to water management, environmental protection or rights-holder participation activities and,

(iii) education and training opportunities regularly taken up by staff members from various departments to participate and contribute to water management, environmental protection or rights-holder participation activities.

5.1.4 Technical Capacity Results

In the case of Kitigan Zibi twelve technical capacity indicators were absent and fourteen were present (Tables 5.7 and 5.8). The latter included indicators in

watershed health:

(i) community groundwater recharge areas are identified, and

(ii) community source water areas incorporated into official plans,

piped water:

(iii) community drinking water quality meet established drinking water standards,

(iv) community drinking water quality monitored (within the water distribution system) regularly (daily tests),

(v) community drinking water quality monitored (within the water distribution system) regularly (weekly and quarterly tests),

(vi) community drinking water quality monitored (within the water distribution system) regularly (annual tests),

(vii) community groundwater recharge areas are identified,

(viii) community source water areas incorporated in official plans,

(ix) potential water supply contaminant sources (point & non-point) identified,

(x) physical infrastructure adequate to produce safe drinking water for community residents,

(xi) physical infrastructure adequate to distribute safe drinking water for community's residents,

(xii) source water adequate in terms of quantity, and

well distribution system:

(xiii) community drinking water quality monitored (within the water supply and distribution system) regularly (annual tests), and

(xiv) source water adequate in terms of quantity.

Table 5.7. Technical Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Kitigan Zibi	**26**	**12**	**14**	**14:26**
Kahnawà:ke	**26**	**14**	**12**	**12:26**

Table 5.8. Technical Capacity Indicator Ratings Table

Indicator	**Kitigan Zibi**				**Kahnawà:ke**			
Legend (-) Indicator does not meet capacity (+/-) Indicator partially meets capacity (+) Indicator meets capacity (*) Indicator meets capacity & is expected to in the future	**Capacity Absent**		**Capacity Present**		**Capacity Absent**		**Capacity Present**	
	-	-/+	+	*	-	-/+	+	*
IV) Technical Capacity								
a) Watershed Health								
• Community drinking water quality monitored (throughout the watershed) regularly (daily tests)	•				•			
• Community drinking water quality monitored (throughout the watershed) regularly (weekly and quarterly tests)	•				•			
• Community drinking water quality monitored (throughout the watershed) regularly (annual tests)	•						•	
• Community groundwater recharge areas are identified			•				•	
• Community source water areas incorporated into official plans			•				•	
• Potential water supply contaminant sources (point & non-point) identified		•				•		
b) Piped Distribution System								
• Community drinking water quality meets established drinking water standards			•				•	
• Community drinking water quality monitored			•				•	

(within the water distribution system) regularly (daily tests)								
• Community drinking water quality monitored (within the water distribution system) regularly (weekly and quarterly tests)			•				•	
• Community drinking water quality monitored (within the water distribution system) regularly (annual tests)			•				•	
• Community groundwater recharge areas are identified			•		•			
• Community source water areas incorporated in official plans			•		•			
• Potential water supply contaminant sources (point & non-point) identified			•			•		
• Physical infrastructure adequate to produce safe drinking water for community residents			•				•	
• Physical infrastructure adequate to distribute safe drinking water for community residents			•				•	
• Source water adequate in terms of quantity			•				•	
• Source water adequate in terms of quality	•					•		
c) Well Distribution System								
• Community drinking water quality meets established drinking water standards		•				•		
• Community drinking water quality monitored (within the water supply and distribution system) regularly (daily tests)	•				•			
• Community drinking water quality monitored (within the water supply and distribution system) regularly (weekly and quarterly tests)		•				•		
• Community drinking water quality monitored (within the water supply and distribution system) regularly (annual tests)			•				•	
• Potential water supply contaminant sources (point & non-point) identified		•				•		
• Physical infrastructure adequate to produce safe drinking water for the community's residents		•				•		
• Physical infrastructure adequate to distribute safe drinking water for the community's residents		•				•		
• Source water adequate in terms of quantity			•				•	
• Source water adequate in terms of quality	•					•		

In the case of Kahnawà:ke fourteen technical capacity indicators were absent, while twelve were present (Tables 5.7 and 5.8). The latter included indicators in *watershed health*:

(i) community drinking water quality monitored (throughout the watershed) regularly (annual tests),

(ii) community groundwater recharge areas are identified, and

(iii) community source water areas incorporated into official plans.

piped water:

(iv) community drinking water quality meets established drinking water standards,

(v) community drinking water quality monitored (within the water distribution system) regularly (daily tests),

(vi) community drinking water quality monitored (within the water distribution system) regularly (weekly and quarterly tests),

(vii) community drinking water quality monitored (within the water distribution system) regularly (annual tests),

(viii) physical infrastructure adequate to produce safe drinking water for community residents,

(ix) physical infrastructure adequate to distribute safe drinking water for community residents, and

(x) source water adequate in terms of quantity, and

well distribution system:

(xi) community drinking water quality monitored (within the water supply and distribution system) regularly (annual tests), and

(xii) source water adequate in terms of quantity.

5.1.5 Financial Capacity Results

In the case of Kitigan Zibi eight financial capacity indicators were absent, while four were present (as shown in Table 5.9 and 5.10):

(i) costs recovered from the users by public and private financial instruments to maintain a balanced budget,

(ii) decision-making and financial control under the same leadership,

(iii) funding surpluses saved for future water projects, and

(iv) work days lost per annum due to water related diseases.

Table 5.9. Financial Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Kitigan Zibi	**12**	**8**	**4**	**4:12**
Kahnawà:ke	**12**	**9**	**3**	**3:12**

Table 5.10. Financial Capacity Indicator Ratings Table

Indicator	**Kitigan Zibi**				**Kahnawà:ke**			
Legend (-) Indicator does not meet capacity (+/-) Indicator partially meets capacity (+) Indicator meets capacity (*) Indicator meets capacity & is expected to in the future	**Capacity Absent**		**Capacity Present**		**Capacity Absent**		**Capacity Present**	
	-	-/+	+	*	-	-/+	+	*
V) Financial Capacity								
a) Appropriate Financing System								
• Sufficient (public and private) resources available for water management initiatives (e.g. source water protection, watershed participation, infrastructure, water system projects)	•					•		
• Costs recovered from the users by public and private financial instruments to maintain a balanced budget			•			•		
• Decision-making and financial control under the same leadership			•				•	
• Water rates reflect the cost of protecting and providing drinking water (including treatment, distribution, maintenance, and source water protection)	•				•			
• Able to obtain funding from outside the community		•				•		
• Able to obtain funding from inside the community		•				•		
• Stable funding	•				•			
• Funding surpluses saved for future water projects			•			•		
b) Capacity for a Community to Pay or Access Services								
• Level of education do most community members have		•				•		
• Unemployment rate		•					•	
• Average income level		•				•		
• Work days lost per annum due to water related diseases			•				•	

In the case of Kahnawà:ke nine financial capacity indicators were absent and three were present (as shown in Table 5.9 and 5.10):

(i) decision-making and financial control under the same leadership,

(ii) unemployment rate, and

(iii) work days lost per annum due to water related diseases.

5.1.6 Institutional Capacity Results

In the case of Kitigan Zibi three institutional capacity indicators were absent, and six were present (as shown in Tables 5.11 and 5.12):

(i) plans and policies actually implemented,

(ii) policies are flexible and not rigid when there are good reasons not to implement them (e.g., new and unforeseen circumstances and new insights),

(iii) there are community planning strategies and 'by-laws' that protect current drinking water supplies,

(iv) land use activities controlled in community well fields, recharge and watershed water supply areas,

(v) solutions for short-term problems which do not cause more problems in the (far) future (20 years or more), and

(vi) preparations being made for the (far) future (20 years or more).

Table 5.11. Institutional Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Kitigan Zibi	**9**	**3**	**6**	**6:9**
Kahnawà:ke	**9**	**1**	**8**	**8:9**

Table 5.12. Institutional Capacity Indicator Ratings Table

Indicator	Kitigan Zibi				Kahnawà:ke			
Legend (-) Indicator does not meet capacity (+/-) Indicator partially meets capacity (+) Indicator meets capacity (*) Indicator meets capacity & is expected to in the future	**Capacity Absent**		**Capacity Present**		**Capacity Absent**		**Capacity Present**	
	-	-/+	+	*	-	-/+	+	*
VI) Institutional Capacity								
a) Legal Aspect								
Appropriate Legal Framework								
• There are complete and clear legal frameworks for water management (with sufficient detail)		•					•	
b) Adaptable Legislation								
• Federal laws and regulations easily changed	•					•		
c) Policy								
Actual Implementation of Policies								
• Plans and policies actually implemented			•				•	
• Local policies reviewed and changed periodically		•					•	
• Policies are flexible and not rigid when there are good reasons not to implement them (e.g., new and unforeseen circumstances and new insights)			•				•	
Planning								
• There are community planning strategies and 'by-laws' that protect current drinking water supplies			•				•	
• Land use activities controlled in community well fields, recharge and watershed water supply areas				•			•	
Long Term Horizon								
• Solutions for short-term problems which do not cause more problems in the (far) future (20 years or more)			•				•	
• Preparations being made for the (far) future (20 years or more)			•				•	

In the case of Kahnawà:ke all eight institutional capacity indicators were present:

(i) there are complete and clear legal frameworks for water management (with sufficient detail),

(ii) plans and policies actually implemented,

(iii) local policies reviewed and changed periodically,

(iv) policies are flexible and not rigid when there are good reasons not to implement them (e.g., new and unforeseen circumstances and new insights),

(v) there are community planning strategies and 'by-laws' that protect current drinking water supplies,

(vi) land use activities controlled in community well fields, recharge and watershed water supply areas,

(vii) solutions for short-term problems which do not cause more problems in the (far) future (20 years or more), and

(viii) preparations being made for the (far) future (20 years or more).

5.2 Discussion

5.2.1 Actor Networks Capacity

Actor networks capacity consists of five sub-dimensions: (i) cross-sectoral cooperation, (ii) co-operation between administrative levels, (iii) cooperation across administrative boundaries, (iv) broad stakeholder participation, and (v) social linkages. Actor networks capacity indicators were selected for this study to reflect the diverse vertical and horizontal linkages that exist in drinking water management, environmental protection, and watershed participation.

5.2.1.1 Kitigan Zibi Actor Networks Capacity:

In the case of Kitigan Zibi, the sub-dimension 'cross-sectoral cooperation', results clearly indicate an absence of capacity. In Kitigan Zibi there are a lack of partnerships with other neighboring communities and stakeholders, and this greatly hinders the ability to work collaboratively to identify common water resource concerns. According to Kitigan Zibi interviewees, this is due to a non-aboriginal community that is situated illegally on the

Algonquin territory (Kitigan Zibi First Nation, personal communication, April 30th, 2010). It is suggested that the territorial claims of First Nations are problematic for Québec, as Québec identity comes with a *"profound sense of belonging to the territory traditionally recognized by cartographers*" (Salée, 1995). Furthermore, an interviewee suggested the neighboring municipality is *"threatened by the economic rise of Kitigan Zibi"* and socio-political tensions exist as a result (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

The need for partnerships is essential in collaborative water management efforts (Mitchell, 2006; Yillia, Bashir and Donkor, 2003). Although conflict is an unavoidable part of a collaborative process, Salame, Swatuk and Van der Zaag (2009) suggest, *"conflicts often have positive functions, and may be drivers of constructive change ... conflict also helps to define boundaries, clarify who and what belongs where, and helps to establish procedures for managing resource access, allocation, use and management."* Facilitation is a recommended process by which impartial individuals participate to help parties collaboratively diagnose and solve problems (Salame et al., 2009).

In addition, successful models of First Nation initiated watershed management plans in collaboration with communities and governments serve as an example that partnerships are possible. For example, the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) arose in response to a 2003 request by the Cape Breton First Nations Chiefs to develop an overall environmental management plan for the Bras d'Or lakes and watershed lands (Bras D'Or Lakes CEPI, 2010b). In 2006, this collaboration resulted in the Bras D'Or Lakes Charter, which was signed by the Regional Directors General of Indian and Northern Affairs Canada, Environment Canada, and Fisheries and Oceans

Canada; the Deputy Ministers of the Nova Scotia Departments of Natural Resources, Aquaculture and Fisheries, Environment and Labour, and Office of Aboriginal Affairs; the Chiefs of the Eskasoni, Membertou, Wekoqmaq, Wagmatcook and Potlotek First Nations; the Wardens of Inverness, Richmond, and Victoria counties; and the mayors of the town of Port Hawkesbury and of the Cape Breton Regional Municipality (Bras D'Or Lakes CEPI, 2010b). The Bras d'Or Lakes CEPI serves as a model demonstrating that not only can First Nations be partners in, but also initiators of watershed collaboration.

In the sub-dimension 'cooperation between administrative levels', results for the Kitigan Zibi First Nation indicate an absence of capacity due to a lack of participation in watershed associations. A lack of participation can be attributed to this Nation's strong preference to be recognized as an independent 'nation' with government status, and thereby not just another 'ordinary' stakeholder (Kitigan Zibi First Nation, personal communication, April 30th, 2010). The Royal Commission on Aboriginal Peoples (RCAP) (1996) recommends that Canadians need to understand that Aboriginal peoples are nations, and their sense of confidence and well being are deeply connected to their sense of nation. In 1985, the government of Québec officially recognized Aboriginal peoples had the right to (i) self-government within Québec, (ii) their culture, language and traditions, (iii) own and control lands, (iv) hunt, fish, harvest and participate in the management of wildlife resources, and (v) participate in the economic development of Québec, and benefit from it (Gouvernement du Québec, 2010). The RCAP report and the province of Québec's official recognition of Aboriginal people's status as 'autonomous nations' need to be incorporated into watershed education, thereby ensuring all stakeholders have a common historical understanding.

Furthermore, non-aboriginal stakeholders may not understand the complexity of First Nation customary water rights, which no other non-aboriginal stakeholder is entitled to. In doing so, false perceptions dismiss the validity of First Nation customary water rights. In Canada, Aboriginal people's customary right to water ensures a 'rights-holder' status, thereby placing them in a unique position unlike that of any other stakeholder (Phare, 2006). Maganga, Kiwasila, Juma, and Butterworth's (2004) case study of the Pangani and Rufiji basins in Tanzania indicated current regulation of water resources based on statutory laws would ensure a failure of IWRM implementation if it does not recognize the diverse customary laws of pluralistic ethnic groups. Lastly, an interviewee noted that without financial and human resources, *"watershed participation is simply not an option"* (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

In the sub-dimension 'broad stakeholder participation' results, clearly vary significantly in terms of an absence of capacity, partial capacity, presence of capacity, or presence of capacity into the future. The absence of capacity can be explained by (i) a lack of participation in watershed associations, and (ii) poor decision-making and consultation processes. Poor decision-making and consultation processes are a major concern. In regards to the decision-making process in negotiations with the federal government, interviewees have 'pushed' for the changes they sought, and concluded that it was not an 'involved' process, particularly over financial issues with INAC. For example, the recent approval for Kitigan Zibi's first water and wastewater system initially did not include a wastewater system. The community suggested the installation of both systems at the same time, citing that it was cost-effective in the long-term. The community did not sign the agreement until there were provisions to include a wastewater system and there were

considerable delays until this occurred (Kitigan Zibi First Nation, personal communication, April 30th, 2010). Furthermore, Kitigan Zibi interviewees reported dissatisfaction with forestry and mining industries and noted that 'consultations' are nothing more than letters indicating a decision that has already been made without their input or if their input was requested then the output bears little resemblance to the concerns they voiced (Kitigan Zibi First Nation, personal communication, April 30th, 2010). Thereby the potential opportunity for collaboration with other actors in a watershed association may produce the same dissatisfaction experienced with government or private industry (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

The Assembly of First Nations of Québec and Labrador (AFNQL) (2005) devised a consultation protocol (Figure 5.13) to ensure there is duty to consult and accommodate First Nations before any action takes places that has an impact on First Nation interests. The AFNQL (2005) emphasized that First Nations are not just an ordinary stakeholder, and that required consultations with them should occur at the beginning of the decision-making process. This protocol serves as a reference tool, particularly for natural resource allocation and development (AFNQL, 2005).

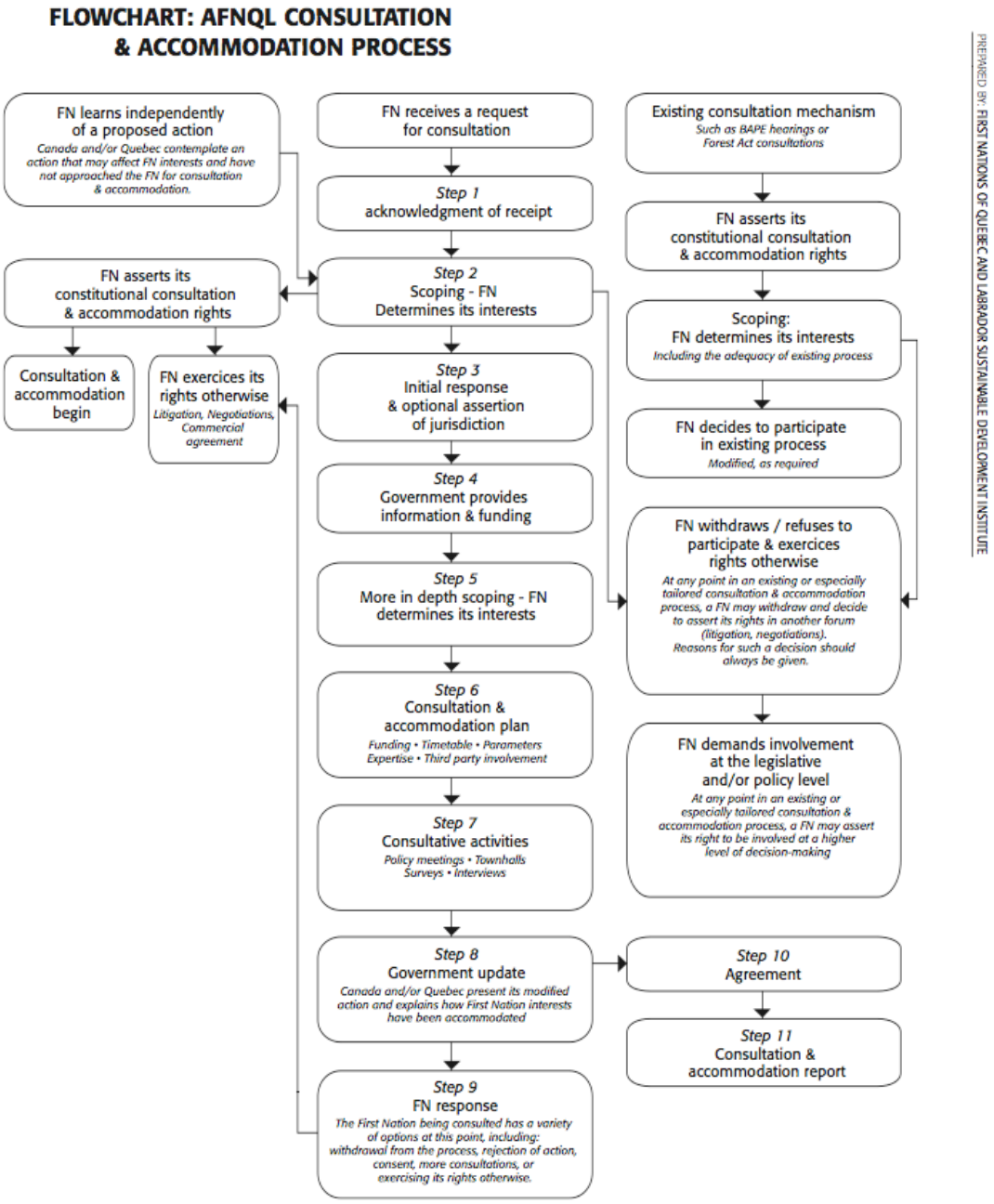


Figure 5.13. Flowchart AFNQL Consultation and Accommodation Process (AFNQL, 2005, p. 27)

In the sub-dimension of 'social linkages' there are no clear patterns. However, it should be noted that community members have a high level of awareness with respect to watershed protection, as community members cited a concern over low water-levels in the Gatineau River at the time of the study. As well, community members were involved in

public debates when uranium was found in well water (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

5.2.1.2 Kahnawà:ke Actor Networks Capacity:

In the case of Kahnawà:ke, the sub-dimension 'cross-sectoral cooperation' results indicate an absence of capacity as it relates to conflicts with other parties, especially in the context of inclusive agreements and the use of cross-sectoral analysis; however, there is a presence of capacity as it relates to partnerships. An environmental partnership exists with neighboring municipalities, particularly in their collective efforts to address industrial hog farms, which have a major impact on water quality in the Châteauguay watershed (Kahnawà:ke First Nation, personal communication, May 26th, 2010). In addition, Kahnawà:ke expressed interest in local collaboration for economic initiatives. One interviewee suggested relations *"are civil [today] — going back to 1990 things were very strained and things have improved a lot in the last 20 years, but in terms of partnerships, community works, economic projects – very little [collaboration occurs]. [However, today there is] more communicative coordination"* (Kahnawà:ke First Nation, personal communication, May 25th, 2010). In regards to conflict, it was cited that communities are independent of each other, although if they collectively voice their dissatisfaction it was thought that small communities had little decision making authority (Kahnawà:ke First Nation, personal communication, May 26th, 2010).

In the sub-dimension 'cooperation between administrative levels', results indicate an absence of capacity. It was suggested that due to previous political conflicts (e.g. Oka Crisis), the government is now more 'sensitive' to ensuring conflicts are resolved (Kahnawà:ke First Nation, personal communication, May 25th, 2010). In regards to

decision-making processes with the federal government it is limited to funding issues (Kahnawà:ke First Nation, personal communication, May 25th, 2010). It is suggested that Kahnawà:ke First Nation has primarily rejected opportunities to integrate with the state, and prefer to promote Aboriginal sovereignty (Alfred, 1995). Ellen Gabriel, of Mohawk heritage and President of the Québec Native Women Inc., voices the same sentiment in her testimony to the Standing Senate Committee on Aboriginal Peoples:

> *"I am a longhouse person. As I said, I do not vote in my band council elections because we had a government and still have a government that existed before Europeans arrived here. It was made illegal in the 1920s and it is still illegal. The government refuses to deal with traditional people's governments. They are violating section 35 of the Constitution that talks about inherent rights."*
>
> (The Standing Senate Committee on Aboriginal Peoples, 2010, p. 18)

Gabriel's testimony resonates with Alfred (1995), as he identifies Kahnawà:ke's goals as being linked to the Mohawk's alternative set of cultural symbols. These are symbols that have preserved a distinct identity, which includes a traditional political culture leading to the creation of alternative institutions (Alfred, 1995). The Standing Senate Committee on Aboriginal Peoples (2010) report concludes that First Nations have the right to maintain control over their internal affairs and be free to pursue their vision of customary government. The committee recommends this process "*truly reflect the cultures, values and aspirations of First Nations,* [and] *they must rest on First Nations designing and adopting their own leadership selection processes that respect the principles of natural justice.*" (Standing Senate Committee on Aboriginal Peoples, 2010).

In the sub-dimension 'cooperation across administrative boundaries', results indicate an absence of capacity. This is largely due to a lack of participation in local watershed associations. The Châteauguay watershed association's language of operation is French. The French language is a barrier for the participation of Kahnawà:ke, as, in

general, residents speak only English and Mohawk. An interviewee thought *"their participation* [in the watershed association*] required more time for translations"* and this limited their role in local watershed meetings and thereby hindered their participation (Kahnawà:ke First Nation, personal communication, May 26th, 2010). Furthermore, it was suggested by one interviewee that the introduction of Bill 101 in 1974, a law that defines French as the official language in the province of Québec, resulted in it being *"more difficult to locate environmental information from provincial sources* [in English]*"* (Kahnawà:ke First Nation, personal communication, May 26th, 2010). As a result, water and wastewater personnel attend workshops and conferences in the neighboring province of Ontario, and receive information in English, their preferred language (Kahnawà:ke First Nation, personal communication, May 25th, 2010).

An absence of actor networks capacity for First Nations in Québec is attributed to socio-cultural differences. Indigenous languages are spoken more within Aboriginal identity populations in Québec than in any other Canadian province or territory with the exception of Nunavut (Rosen, 2008). Québec consists of both Anglophone and Francophone Aboriginal people (Barsh, 1997). Salée (1995) examined the conflicting dynamic between the French-speaking majority in Québec and Québec's Aboriginal peoples, and asserts that both groups are competing for identity recognition. In the 1960s, as a preference to 'French-Canadian', the term 'Québecois' embraced the national, cultural and political identity of French Québec, and this is deeply tied to maintaining the French language. Salée (1995) points out that the emergence of Aboriginal nationalism and claims to rights, land, and resources *"pose a challenge to the territorial and administrative integrity of Québec both within Canada and Québec itself."* Therefore Aboriginal

nationalism, with its goals of self-determination and territorial re-appropriation is in direct conflict with Québec's sovereignty. The politics of language and identity explain Kahnawà:ke First Nation's absence in francophone watershed associations.

In the sub-dimension 'broad stakeholder participation', results indicate roughly a balance of both the absence and presence of capacity indicators. The absence of capacity is due to Kahnawà:ke not being involved in watershed management at the watershed scale. However, as previously mentioned, the provincial and federal governments take First Nations input seriously due to previous conflicts. Furthermore, community members are able to approach the Environmental Protection Office with concerns (Kahnawà:ke First Nation, personal communication, May 26th, 2010).

In the sub-dimension 'social linkages' results indicate a presence of capacity, as community members are aware of and support watershed protection, in addition to being involved in decisions pertaining to drinking water management and environmental protection (Kahnawà:ke First Nation, personal communication, May 26th, 2010).

In summary, actor networks capacity necessitates the presence of cooperation, communication and exchange of information. The nature of integrated water management is collaborative, and by definition cannot occur without partnerships among stakeholders. Both participant communities have identified numerous factors that contribute to their poor actor networks' capacity and explain why an absence of cooperation, communication and exchange of information are experienced.

5.2.2 Information Management Capacity

Information management capacity consists of four sub-dimensions and includes: (i) joint or participative information production, (ii) interdisciplinary (nature of information),

(iii) broad communication, and (iv) use of information. Information management capacity indicators were selected for this study to capture two aspects: (i) how a community identifies and collects information, and (ii) the ease to which information is shared with neighbors, stakeholders, community members and governments.

5.2.2.1 Kitigan Zibi Information Management Capacity:

In the case of Kitigan Zibi, an absence of capacity exists in the sub-dimension 'joint or participative information production'. Although the community has expertise (or ability to locate a third party) in producing information at the local level (as indicated with wood-turtle protection studies and uranium testing in groundwater), there is a clear lack of joint or participative information produced with partners at the watershed-scale. In integrated water management it is the sharing of information that is imperative in information management capacity (Kennedy et al., 2009; Mostert et al. 1999; Raadgever et al., 2008; Van der Zaag and Savenije, 2000). As previously discussed, this is primarily due to Kitigan Zibi's lack of participation in the watershed association, poor regional partnerships with other municipalities, and dissatisfaction with consultation processes.

To further explore Kitigan Zibi's reluctance to share information, it is imperative non-aboriginal water management practitioners understand First Nations' apprehension concerning the creation and management of information. First Nations strongly advocate principles of ownership, control, access and possession (OCAP) as a political response to colonial approaches (Schnarch, 2004). The impetus for OCAP is reported in the Royal Commission on Aboriginal Peoples, as cited in Schnarch (2004):

> *"The gathering of information and its subsequent use are inherently political. In the past, Aboriginal people have not been consulted about what information should be collected, who should gather that information, who should maintain it, and who should have access to it. The information gathered may or may not have been*

> *relevant to the questions, priorities and concerns of Aboriginal peoples. Because data gathering has frequently been imposed by outside authorities, it has met with resistance in many quarters"* (p. 81).

Ownership implies a First Nation community owns information collectively in the same way that an individual owns their personal information. Control refers to the rights of First Nations to maintain and control research, information and data. The principle of access ensures First Nations can obtain information and data about themselves and their communities, regardless of where this information is held. Finally, the principle of possession is a means by which ownership can be asserted and protected (Schnarch, 2004). The benefits of OCAP include: rebuilding of trust, improved research quality, decreased bias, meaningful capacity development and community empowerment to make change (Schnarch, 2004). First Nations-controlled research initiatives based on OCAP principles supports capacity development. According to Schnarch (2004),

> *"…the capacity to access resources, manage and carry out research, and promote and disseminate results makes it possible and desirable to have control. On the other hand, having control implies a sense of ownership and responsibility that motivates – even requires – accelerated capacity development"* (p. 87).

OCAP necessitates all integrated water management actors are in agreement with its principles and adhere to conduct based on First Nation preference in information sharing.

In the sub-dimension 'interdisciplinary' (referring to the nature of information) there is a presence of capacity, as indicated with previous activities involving experts in the areas of forest engineering, biology, ecology, and hydrology (Kitigan Zibi First Nation, personal communication, April 30th, 2010). In the sub-dimension 'broad communication' Kitigan Zibi was willing to share information, however, interviewees stated information had to be reciprocal and the Band office needed to understand what the information was being used for (Kitigan Zibi First Nation, personal communication, April 30th, 2010). The

presence of capacity was produced in regards to different levels of governments exchanging information and data (Kitigan Zibi First Nation, personal communication, April 30th, 2010). The distribution of information produced an absence of capacity, largely because information could not be distributed at all times (via internet, literature, brochures, and media) due to financial and human resource limitations.

In the sub-dimension 'use of information' results indicated a presence of capacity across all indicators, with the exception of two. Kitigan Zibi interviewees indicated that new information is used in public debates and referred to discussions held in 1999 when uranium was found in drinking water obtained from groundwater sources (Kitigan Zibi First Nation, personal communication, April 30th, 2010). However, interviewees thought new information could not influence federal policy. An interviewee revealed that Health Canada wanted to follow the provincial health guideline for uranium levels, however, due to economic factors, this limit was set higher despite negative impacts on human health (Kitigan Zibi First Nation, personal communication, April 30th, 2010). New information did not influence federal policy based on community realities (Kitigan Zibi First Nation, personal communication, April 30th, 2010). In addition, the community had the capacity to monitor and collect data and could thereby produce water data. Despite Kitigan Zibi's ability to produce quality water data, a comprehensive understanding could not be achieved because information was not shared to fill gaps and facilitate integration as required for watershed management in a collaborative setting.

5.2.2.2 Kahnawà:ke Information Management Capacity:

In the case of Kahnawà:ke, the sub-dimension 'joint or participative information production' indicated a presence of capacity due to local experts that set research terms and

participate in university research, and have previously participated in public forums with the International Joint Commission (IJC) [5] (Kahnawà:ke First Nation, personal communication, May 25th, 2010). In the sub-dimension 'interdisciplinary' (referring to the nature of information) there is a presence of capacity, as indicated with previous activities involving experts in environmental protection or awareness activities.

The two indicators in the sub-dimension 'broad communication' demonstrated both absence and presence of capacity. The absence of capacity was apparent with a partial capacity to distribute information produced. Information cannot be distributed at all times (via internet, literature, brochures and media) due to financial and human resource limitations. In addition, Kahnawà:ke was willing to share information with various government levels and an interviewee indicated it was often mutually beneficial (Kahnawà:ke First Nation, personal communication, May 26th, 2010).

In the sub-dimension 'use of information' there is a presence of capacity. This was best showcased in an example an interviewee identified as the 'Clean Soil Policy' as a means to discourage residents from relocating contaminated soil (often imported industrial waste) onto non-contaminated soil (Kahnawà:ke First Nation, personal communication, May 26th, 2010). As well, there is a presence in capacity as it relates to the availability of water management data, ability to monitor and collect data, willingness to share water management data with interested parties. Since Kahnawà:ke does not participate in watershed associations, a comprehensive understanding could not be achieved because information was not shared to fill gaps and facilitate integration as required for watershed management in a collaborative setting. As previously noted, information sharing is

[5] International Joint Commission (IJC) is a bilateral organization that monitors trans-boundary environmental agreements

imperative for information management capacity (Kennedy et al., 2009; Mostert et al. 1999; Raadgever et al., 2008; Van der Zaag and Savenije, 2000).

In summary, information management capacity as it relates to integrated water management requires that information is shared and collaboratively produced. Both participant communities indicate a high level of capacity as it relates to producing quality water data. However, a lack of participation in watershed associations will hinder the distribution of information to other stakeholders. An observation in this study indicates that information management capacity has a relationship with actor networks capacity. If there is a presence of actor networks capacity, there is a greater likelihood of information management capacity as it relates to sharing information. Trust and cooperation are necessary components to ensure information is accessible, shared and integrated to enable decision-making at the watershed level.

5.2.3 Human Resources Capacity

Human resource capacity consists of two sub-dimensions and includes: (i) availability of suitable employees and (ii) training and education. Human resources capacity indicators were selected for this study to capture two aspects: (i) the availability of suitable individuals, and (ii) ongoing training and education opportunities for professional development.

5.2.3.1 Kitigan Zibi Human Resources Capacity:

In the case of Kitigan Zibi, in the sub-dimension of 'availability of suitable employees' based on two indicators there is both an absence and presence of capacity. In regards to a sufficient number of employees, interviewees indicated a dedicated staff person to exclusively manage watershed health, environmental protection where rights-holder

participation was required. However limited financial resources are a concern in ensuring there is a dedicated staff person to manage watershed matters. Kitigan Zibi's acknowledgement of financial resources as a key factor to employ a staff person exclusively for watershed matters coincides with Leach and Pelkey's (2001) study of 37 watersheds indicating adequate funding was the most commonly cited factor for successful watershed management. Furthermore, a lack of financial resources can hinder the capacity of stakeholders to plan and achieve watershed goals (Litke and Day, 1998).

Despite a lack of human resources capacity in drinking water management (INAC, 2003; O'Connor, 2002; Smith et al., 2006; Swain et al., 2006), Kitigan Zibi has staff with expertise. However, a current concern is that most young adults do not return to the community due to limited employment opportunities (Kitigan Zibi First Nation, personal communication, April 30th, 2010). Schnarch (2004) notes the true beneficiaries of educated Aboriginals are academia, industry and government, rather than Aboriginal communities citing that *"individuals are often lost to their communities as they pursue careers in the mainstream"* (p.87). It is unclear if Aboriginal communities directly benefit from their members working in mainstream sectors, while opportunities to work directly for the community in a research capacity is rare (Schnarch, 2004). Currently, this is not a human resources concern and meets the capacity requirement.

In the sub-dimension of 'training and education' based on two indicators there is both an absence and presence of capacity. Although there are education and training opportunities available to staff members to participate and contribute to water management, environmental protection or rights-holder participation, the onus was on the individual to take this opportunity (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

Furthermore this is coupled with locating additional funding, which is not an easy endeavor, particularly in the case of the Kitigan Zibi who operates on a 'zero debt' policy (Kitigan Zibi First Nation, personal communication, May 25th, 2010).

5.2.3.2 Kahnawà:ke Human Resources Capacity:

In the case of Kahnawà:ke, in the sub-dimension of 'availability of suitable employees' based on two indicators there is partial capacity. In regards to a sufficient number of employees, again interviewees voiced the same concerns and preferred a dedicated staff person to exclusively manage watershed health, environmental protection and rights-holder participation. An interviewee in Kahnawà:ke thought financial resources have become more constrained in recent years and this hinders the possibility of hiring a staff person exclusively for watershed-related activities (Kahnawà:ke First Nation, personal communication, May 25th, 1010). Financial capacity has a direct impact on human resources capacity. Without adequate funds, staff to support drinking water management and environmental protection is not possible. If financial resources are limited, then priority is directed to drinking water management, and thereby takes precedence over activities associated with watershed health. This was previously mentioned in the case of Kitigan Zibi.

As well, an interviewee in Kahnawà:ke thought current educational interests of young adults in college or university (e.g. education, arts, etc.) do not reflect the type of future expertise the Band office requires (science, management, finance, etc.), although currently there is a presence in this capacity (Kahnawà:ke First Nation, personal communication, May 25th, 2010). This could have an impact in the future retention of skilled workers. Schnarch (2004) notes that First Nations students have to bridge the gap

between their own interests versus community interests and are forced to, *"make difficult choices between their values and advancing their careers as they walk a two-culture tightrope"* (p. 87).

In the sub-dimension of 'training and education' there is clearly a presence of capacity. Education and training opportunities are available for staff members to participate and contribute to water management, environmental protection or rights-holder participation. Education and training opportunities are often taken up by staff persons (Kahnawà:ke First Nation, personal communication, May 25th, 2010).

In summary, human resources capacity requires access to individuals with appropriate education and training, and sufficient numbers of individuals dedicated to water management, environmental protection or rights-holder participation. It is indicated that limited financial resources greatly hinders the ability to hire staff to exclusively manage watershed matters. Current staff cannot be expected to adequately manage watershed responsibilities, in addition to their present responsibilities. A staff person to support integrated water management matters would directly benefit information management, actor networks, and technical capacity.

5.2.4 Technical Capacity

Technical capacity consists of three sub-dimensions and includes: (i) watershed health, (ii) piped distribution system, and (iii) well distribution system. Technical capacity indicators were selected for this study to reflect: (i) the output of drinking water, (ii) ability to monitor water quality, (iii) knowledge of water (source water and groundwater recharge areas) and pollution, (iv) source water incorporated into official plans, and (v) quality of infrastructure and distribution systems.

5.2.4.1 Kitigan Zibi Technical Capacity:

In the case of Kitigan Zibi, in the sub-dimension of 'watershed health' there is an absence of capacity primarily due to a lack of monitoring water quality throughout the watershed and not knowing where potential water supply contaminant sources are. The rationale for the absence of capacity for watershed health is a result of limited human and financial resources to support watershed health activities (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

The multiple barrier approach to ensure safe and reliable drinking water requires source water protection (Davies and Mazumder, 2003; Ivey, de Loë, Kreutzwiser and Ferreyra, 2006; O'Connor, 2002). It is suggested that local governments need technical knowledge and capacity with respect to watershed-based management (Ivey, de Loë, Kreutzwiser and Ferreyra, 2006). Despite this requirement of technical capacity at the watershed level, Kitigan Zibi cannot develop this capacity, due primarily to a lack of financial resources. For instance, an interviewee noted that in efforts to protect source water, funding was required to construct a fence around the water source, however, the community was unable to acquire funding from INAC and this greatly jeopardizes drinking water quality (Kitigan Zibi First Nation, personal communication, April 30th, 2010). In Kitigan Zibi technical capacity at the watershed level is strongly related to financial capacity.

In the sub-dimension of 'piped distribution system' the results clearly indicate a presence of capacity. The presence of water quality that meets established drinking water standards, regular water monitoring, knowledge of groundwater recharge areas and potential water supply contaminants (point and non-point source), adequate physical

infrastructure to distribute and produce safe drinking water, incorporation of water sources into plans, and adequate source water quantity all support piped distribution capacity. Groundwater is the source of drinking water for piped water distribution systems in the community. Since the water source is from sandy areas (as opposed to bedrock), there is less uranium content and thereby water quality meets drinking water quality standards (Kitigan Zibi First Nation, personal communication, April 30th, 2010). 88 Kitigan Zibi households (or 17 percent of households) are presently connected to Maniwaki, a neighboring non-aboriginal community, while the 437 remaining homes rely on well-distribution systems and have their own sewage fields (Kitigan Zibi First Nation, personal communication, April 30th, 2010). Once the water and wastewater systems are built, Kitigan Zibi will be self-sufficient in providing water and wastewater services to 236 households (or 45 percent of households) (Kitigan Zibi First Nation, personal communication, April 30th, 2010). The Band Council hopes to deliver piped water to the remaining 289 households (or 55 percent of households) within the next 5-10 years (Kitigan Zibi First Nation, personal communication, April 30th, 2010). Interviewees were highly in favor of piped distribution as a means of being self-sufficient, and this is another step towards achieving this goal. Despite this major financial contribution, it should be noted that Economic Action Plan funds were distributed to only eighteen First Nation communities across Canada, including three in Québec, which include both Kitigan Zibi and Kahnawà:ke.

In the sub-dimension of 'well distribution system' the results clearly indicate an absence of capacity. This is largely attributed to ground water sources with uranium content which contribute to poor water quality, monitoring of wells is time-intensive and

the quantity of wells to test are greater than human resources to monitor the wells. In Kitigan Zibi 437 households (or 83 percent of households) rely on individual wells. Knowledge of groundwater areas and quality is known. Although individual wells can produce an adequate quantity of water (approximately 568 - 758 litres per house), water quality is nevertheless a concern (Kitigan Zibi First Nation, personal communication, April 30th, 2010). In 1999, Health Canada found high levels of uranium and imposed a 'do not consume' drinking water advisory in the community (Harden and Levalliant, 2008). Households use individual wells for bathing, cleaning, and other activities and rely on bottled water for drinking.

5.2.4.2 Kahnawà:ke Technical Capacity:

In the case of Kahnawà:ke, in the sub-dimension of 'watershed health' there is an absence of capacity primarily due to a lack of monitoring water quality throughout the watershed and not knowing where potential water supply contaminant sources are (point and non-point source). Similar to Kitigan Zibi, limited human and financial resources to support watershed health activities are a rationale for this capacity deficiency.

In the sub-dimension of 'piped distribution system' there is a presence of capacity. The following indicators support piped distribution capacity: the presence of water quality that meets established drinking water standards, regular water monitoring, adequate physical infrastructure to distribute and produce safe drinking water, and adequate source water quantity. In Kahnawà:ke, there is over sixty years of experience in drinking water management. Piped water distribution was installed in the 1950s to core homes, and now distribution of piped water extends to 2,200 households and 114 businesses (Kahnawà:ke

First Nation, personal communication, October 5th, 2010). Kahnawà:ke relies on surface water from the St. Lawrence for the majority of their drinking water needs.

In the sub-dimension of 'well distribution system' there is an absence of capacity. The following indicators do not support well distribution system capacity: drinking water does not meet established standards, monitoring of wells is not done regularly, poor physical infrastructure to distribute or produce safe drinking water and the source water is inadequate in quality. 349 households (16 percent of the community) rely on well water, and individual wells are not monitored frequently (Kahnawà:ke First Nation, personal communication, April 30th, 2010). Three to four individual wells per week are monitored which means an individual well may be tested once every 2 years (Kahnawà:ke First Nation, personal communication, April 30th, 2010).

In summary, from an integrated water resources perspective technical capacity encompasses watershed health, piped and well distribution systems. Both communities indicated partial capacity in watershed health, presence of capacity in piped distribution systems, and an absence of capacity for well distribution systems. It is noted that a lack of information produces an absence of capacity indicators, irrespective of sub-dimensions and include monitoring water quality, identifying point and non-point contaminant sources, and possessing source water quality. This lack of knowledge contributes to information gaps to problem-solve with an integrated water management approach and achieve safe drinking water or environmental sustainability.

5.2.5 Financial Capacity

Financial capacity consists of two sub-dimensions and includes: (i) appropriate financing system, and (ii) capacity for a community to pay or access services. Financial

capacity indicators were selected to evaluate a community's ability to access, generate and save funds for drinking water management, environmental protection, and watershed participation activities.

5.2.5.1 Kitigan Zibi Financial Capacity:

In the case of Kitigan Zibi, in the sub-dimension of 'appropriate financing system' there is an absence of capacity. Vulnerabilities in internal and external funding sources contribute to overall poor financial capacity. First Nations heavily rely on INAC for external funds. In January 2009, the federal government administrated funds from a project that contributes $165 million for water and wastewater projects for Aboriginal peoples under the Economic Action Plan (EAP) (INAC, 2009a; INAC, 2009b). In 2010, Kitigan Zibi had their first water and wastewater system approved for $10 million from the EAP (INAC, 2009b). As previously mentioned, the approval for Kitigan Zibi's first water and wastewater system initially did not include a wastewater system. The community encouraged the installation of both systems and did not sign the agreement until provisions were made to include a wastewater system (Kitigan Zibi First Nation, personal communication, April 30th, 2010). An interviewee noted the constant struggle to secure external funds from INAC and the funds are not always accessible (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

In the sub-dimension of 'capacity for a community to pay or access services' there is an absence of capacity. Interviewees characterized their local economy as being composed of a limited number of businesses that provide goods and services (Kitigan Zibi First Nation, Personal Communication, April 30th, 2010). This results in community members spending a majority of their disposable income in neighboring communities,

which neither stimulates nor sustains their own economy. In general, community members find seasonal employment in the forestry and mining industries but experience challenges in securing long-term employment (for those not employed by the Band office) (Kitigan Zibi First Nation, Personal Communication, April 30th, 2010). The economic implications of these community employment trends do not support a healthy base for the Band office to rely on for financing water-related activities.

Kitigan Zibi indicated that residents do not pay what is required to fund drinking water services, as current fees for water services are substantially lower than the real cost of operating and maintaining water facilities and services, particularly when taking into account rising input costs. This low capacity for communities to financially contribute exerts greater financial strain on limited Band resources. In Kitigan Zibi the Band Office offers insurance to households for maintenance and repairs for well distribution and septic systems. The sum of $85/household insures an individual well, and an additional $85/household insures septic systems (Kitigan Zibi First Nation, Personal Communication, September 17th, 2010). This is voluntary, and only 60 percent of the community pays it. However, in the event that a household without insurance requires repairs, the household is financially responsible. There is a misconception that if there is a breakdown the Band will take care of it (Kitigan Zibi First Nation, Personal Communication, April 30th, 2010). In 2008, fees increased from $50 to $85 to reflect rising costs, as well as the greater number of repairs.

An absence of financial capacity heavily impact activities associated to watershed health. There is a heavy dependency on external funding, however, there are no financial sources, generated from the community or secured with external government funding

specified for watershed health. An interviewee specified financial resources are required to attend meetings and to collect and maintain data necessary for participation, and without financial resources watershed participation is not an option (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

5.2.5.2 Kahnawà:ke Financial Capacity:

In the case of Kahnawà:ke, in the sub-dimension of 'appropriate financing system' there is an absence of capacity. Vulnerabilities in internal and external funding sources contribute to overall poor financial capacity. Internal funding opportunities are limited. As one interviewee noted the Indian Act (Section 89) was the greatest economic barrier to stimulate local economy, and explained *"assets on reserves cannot be seized from outside entities ... a bank that finances a company [located on First Nation land] can not seize assets, so companies are hesitant to do business with Kahnawà:ke because a bank can not recover assets."* (Kahnawà:ke First Nation, Personal Communication, May 25th, 2010). A healthy local economy is sustained by business investments to generate taxes, which can then be directed to financing watershed health, source water protection and drinking water management activities.

External funding for infrastructure depends on the availability of federal funds beyond the scope of funds made available for operation and maintenance. Although Kahnawà:ke's need for a reservoir was identified as early as 2003, and that for a new water line in 2002, there was a lack of funds to support water infrastructure needs, until a financial opportunity was provided by EAP (Kahnawà:ke First Nation, personal communication, September 3rd, 2010). Due to the rare opportunity provided by the EAP, Kahnawà:ke's plan to improve their water treatment and reservoir was approved and

received $13 million (INAC, 2009a). Kahnawà:ke's reservoir capacity will be increased significantly to meet health and safety requirements (INAC, 2009a). However, had this rare funding opportunity not presented itself, Kahnawà:ke could not have financed this endeavor solely.

In the sub-dimension of 'capacity for a community to pay or access services' there is an absence of capacity. Kahnawà:ke charges a mandatory $59 per household for both water and wastewater services. However this fee has not changed in 20 years, and does not reflect the rise in input costs (Kahnawà:ke First Nation, Personal Communication, September 20th, 2010). Water management costs are $1.2 million annually, of which the community of 2,000 residents generates $118,000 (Kahnawà:ke First Nation, Personal Communication, May 25th, 2010), a very small portion of the total cost.

In summary, financial capacity supports a wide spectrum of aspects related to integrated water management. A major misunderstanding is that First Nations acquire most or all of their funds from government with ease, and therefore should exhibit the presence of financial capacity. However, interviewees revealed the difficulty in acquiring funding, as witnessed in both participating communities. This coincides with the financial burden encountered in communities with high unemployment and the inability to depend on internal financial resources as a prospective source to ensure financial capacity (OAG, 2005; Smith et al, 2006; Swain et al., 2006). As noted previously, Kitigan Zibi and Kahnawà:ke acknowledge financial resources as a key factor to employ a staff person exclusively for watershed matters, to participate in watershed associations, to monitor watershed health, and to generate and collect watershed data. The absence of financial capacity impacts actor networks, information management, human resources, and technical capacity. Again this

coincides with Leach and Pelkey's (2001) study of 37 watersheds that cite adequate funding as the most important factor for successful watershed management. In addition, a lack of financial resources hinders the capacity of stakeholders to plan and achieve watershed goals (Litke and Day, 1998).

5.2.6 Institutional Capacity

Institutional capacity consists of two sub-dimensions and includes: (i) legal aspect (consisting of appropriate legal framework). (ii) adaptable legislation, and (iii) policy (consisting of actual implementation of policies, planning, and long-term horizon). Institutional capacity indicators were selected for this study to evaluate the presence of the following: (i) legal frameworks, (ii) flexibility of laws and policies, and (iii) policy implementation and planning that incorporated long-term impacts.

5.2.6.1 Kitigan Zibi Institutional Capacity:

In the case of Kitigan Zibi, in the sub-dimension of 'legal aspect' there is an absence of capacity. Interviewees thought the federal legal framework was 'somewhat' complete and clear, thereby producing an absence of capacity (Kitigan Zibi First Nation, personal communication, April 30th, 2010). In the sub-dimension of 'adaptable legislation' there is an absence of capacity. This capacity relates to federal legislation, and the ease of which laws and regulations could be changed. Interviewees suggested that federal policies were often not reviewed, nor changed periodically due to the bureaucratic nature of the federal government (Kitigan Zibi First Nation, personal communication, April 30th, 2010).

In the sub-dimension of 'policy' there is a presence of capacity as a result of local-level control. Locally initiated environmental policies were flexible, implementable, and were cognizant of long-term benefits (20 years or more) (Kitigan Zibi First Nation,

personal communication, April 30th, 2010). Furthermore, Kitigan Zibi has implemented policies to protect drinking water supplies, particularly when determining the location of on-community landfills and restrictions of development near water supplies (Kitigan Zibi First Nation, personal communication, April 30th, 2010). An observation is that locally directed efforts benefitted the protection of drinking water and control of land use activities in community well fields, recharge and watershed water supply areas.

5.2.6.2 Kahnawà:ke Institutional Capacity:

In the case of Kahnawà:ke, in the sub-dimension of 'legal aspect' there is a presence of capacity as interviewees indicated the legal framework set out by INAC was complete and clear (Kahnawà:ke First Nation, personal communication, May 25th, 2010). In the sub-dimension of 'adaptable legislation' there is an absence of capacity, again due to the nature of federal bureaucracy.

In the sub-dimension of 'policy' there is a presence of capacity as the results clearly demonstrate the presence of all indicators. The presence of this capacity is due to Kahnawà:ke's ability to implement policies that are responsive to identified environmental priorities. For example, as previously mentioned, Kahnawà:ke's 'Clean Soil Policy' prevents residents from importing contaminated soils to non-contaminated soil sites (Kahnawà:ke First Nation, personal communication, May 26th, 2010). In addition, Kahnawà:ke has implemented policies to protect drinking water supplies, particularly when determining the location of on-community land-fills and restrictions of development near water supplies (Kahnawà:ke First Nation, personal communication, May 25th, 2010). Kahnawà:ke has the ability to adjust regulations within six weeks, indicating a high

response time for local environmental concerns (Kahnawà:ke First Nation, personal communication, May 25th, 2010).

In summary, institutional capacity requires complete and clear legal frameworks, adaptable legislation, long-term planning (beyond 20 years), and actual implementation of policies. Both participant communities indicated a strong presence of institutional capacity. This is largely due to many indicators being focused on local institutional capacity (e.g. First Nation implementation of bylaws) rather than institutional capacity at a national level (e.g. review and periodic change of federal policies). It is important to note that at the local scale, First Nations experience strong institutional capacity when decision-making and control are within their jurisdiction. Based on Day and Cantwell's (1998) case study, governance was identified as being of the greatest significance for First Nations involved in the implementation of integrated land and resource planning.

5.3 Future Steps:

First Nation capacities to practice IWRM undoubtedly encounter challenges not common to their Canadian counterparts. Based on this study, both participant First Nation communities in Québec demonstrate partial capacity to practice IWRM. To achieve sustainable, equitable and collaborative integrated water resources partnerships with First Nations as key players, it is important First Nations are engaged in capacity development. Future steps to ensure First Nations are engaged in capacity building processes include the following suggestions:

(1) *Aboriginal Self-Government* - In Chapter 5, there is discussion on actor networks capacity, which identifies the need for both participant communities to be recognized as a nation. The Standing Senate Committee on Aboriginal Peoples

(2010) report concluded that First Nations have the right to maintain control over their internal affairs and be free to pursue their vision of customary government. Furthermore, the committee supports that each First Nation's citizenry, *"must be involved in the determination of their self-government regime"* whether in the form of legislative amendments to the Indian Act, or other options as decided by a First Nation. It is suggested that ultimately a First Nation chooses and Canada must respect this decision (The Standing Senate Committee on Aboriginal Peoples, 2010). This foremost recommendation works in tandem with the other recommendations in this section. Until First Nations have a right to self-governance, the following recommendations will not create substantial changes.

(2) *First Nation Watershed Councils* - A recommendation offered by Wilson (2004) is the formation of First Nation Watershed Councils, as a means to initiate First Nation-directed watershed management. Wilson (2004) suggests Tribal Councils and First Nation regional authorities could serve as the organizing structure to form the councils, with funding initially provided by government. Wilson (2004) suggests that in the future the settlement of land claims and equitable resource revenues will financially sustain long-term efforts. Watershed Councils could provide First Nation communities with technical assistance, such as facilitating the development and exchange of information, coordinating efforts between First Nations and non-aboriginal stakeholders, undertaking research, and providing training, education and awareness programs to promote the health of the Watershed.

(3) *First Nation Capacity Building Partners* - Mentoring programs can foster knowledge transfer from First Nation communities with strong capacity in IWRM

to First Nation communities who are currently building capacity as it relates to funding, technical skills, knowledge and strengthening partnerships with non-Aboriginal stakeholders. Capacity building partnerships must build on a win-win situation for all partners involved, and the collaboration strategy should be based on mutual trust and open communication. For example, mentoring partnerships with Cape Breton First Nations Chiefs would be highly valuable, as knowledge sharing of their role in initiating the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) to develop an overall environmental management plan for the Bras d'Or watershed could help put skills and concepts directly into integrated water resource practice.

(4) *Indigenous Water Education for All* - In the interim, watershed education, with all Aboriginal and non-aboriginal actors needs to be directed towards understanding customary water rights, co-management, OCAP principles and meaningful engagement, if collaboration with First Nations in Québec is a priority. This could be a joint educational initiative funded between AFNQL and the Regroupement des Organismes de Bassins Versants du Québec (ROBVQ), Québec's umbrella organization representing forty watershed associations. Developing capacity specific to education on indigenous perspectives and rights is a progressive step forward towards ensuring all actors at the watershed table have an equal understanding and competence in indigenous matters.

(5) *Address Jurisdictional Complexities in IWRM* – The federal government is in a unique position to direct IWRM efforts and overcome jurisdictional challenges. Watersheds seldom overlap political jurisdictions, and thereby challenge

watershed-based IWRM strategies that are difficult to develop and implement. As discussed in Chapter 2, the jurisdictional complexities increase substantially when First Nations are involved. One of the most significant contributions the federal government needs to address is facilitating federal and provincial jurisdictional concerns as it relates to First Nations and IWRM. It is imperative that addressing jurisdictional complexities includes a meaningful engagement with First Nations (as discussed earlier in Chapter 5), and ensures a respect for First Nation experiences and challenges. A direct impact of addressing jurisdictional complexities will lead to the clarification of financial responsibility.

(6) *Financial Capacity* - A key recommendation is to designate funds specific to watershed activities, as a means to strengthen partnerships with Aboriginal communities and ensure Aboriginal participation in IWRM. External financial sources are presently the only option, as generating funds inside the community is beyond the financial capability of both participant communities at the time of the study. As of March 2009, watershed association budgets have increased from $65,000 to approximately $120,000 (Marie-Claude Leclerc, ROBVQ, personal communication, November 17th, 2010). Despite an increase in budget, particularly in light of the province's colossal debt,[6] Québec's watershed budget is not substantial. Furthermore, ROBVQ does not currently designate any funds specifically for First Nations (Marie-Claude Leclerc, ROBVQ, personal communication, November 17th, 2010). The Ministère du Développement durable**,** de l'Environnement et des Parcs (MDDEP), the provincial environment agency that

[6] Based on the Organization for Economic Co-operative and Development (OECD), Québec is the fifth most indebted jurisdiction amongst developed countries, ahead of Japan, Italy and Greece (Chung, 2010).

administers funds to ROBVQ, suggest IWRM-related funds for First Nations are not within their realm of responsibility (Paul Meunier, MDDEP, personal communication, November 17th, 2010). It is suggested that the financial responsibility lies jointly at the federal level with INAC, Environment Canada and Health Canada (Nancy Charland, Secrétariat aux Affaires Autochtones, personal communication, November 17th, 2010).

IWRM by nature is not confined to the boundaries of a First Nation community, and is thereby a potential responsibility of the province in addition to the federal government. Hence the clarification of jurisdictional roles as previously noted precedes the discussion of 'where' financial responsibility falls. This study recommends that to adequately support First Nation communities in IWRM-related initiatives and build financial capacity, financial support should be initially made available at the federal level through INAC, Environment Canada and Health Canada, until jurisdictional complexities are clarified. It is suggested that an additional budget of approximately $40,000 to $50,000 per watershed be allocated to hire a person to research the traditional territory, and that additional funds would be required for IWRM participation (Kitigan Zibi First Nation, personal communication, November 17th, 2010). Adequate funding would strengthen financial capacity, and thereby support technical, human resource, and information management capacity to practice IWRM.

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

The goal of this study was to evaluate the capacity of First Nation communities to practice IWRM in Québec. A key recommendation discussed in Chapter 5, is to designate funds specific to watershed activities. As discussed in Chapter 2, First Nation communities face unique challenges, unlike their Canadian counterparts, in generating financial resources. Based on key findings, the study suggests that financial resources are necessary to support watershed activities as they relate to technical capacity (e.g. to monitor water quality throughout the watershed), human resource capacity (e.g. to employ personnel that has exclusive responsibility for watershed activities; participation, monitoring, and collecting data), and information management capacity (e.g. to generate quality water data). Capacity dimensions are interconnected and tend to overlap. However, as previously noted, in the case of First Nations the presence of financial capacity plays a significant role in contributing to other capacities. However, the presence of each capacity dimension is necessary for a First Nation community's overall capacity to practice IWRM.

Furthermore, a critical finding in this study relates to the necessity of an actor networks capacity for First Nation communities. The presence of actor networks capacity is the determining factor for First Nations to participate on a collaborative basis with other stakeholders. First Nation partnerships, cooperation and communication are critical for participation in IWRM in Québec. However, the absence of actor networks capacity in this study is connected to the complexity of the socio-political setting in Québec. Although the process of addressing language, cultural identity and political tension are not easily resolved and beyond the scope of this study, alternatives are necessary to ensure the

development of First Nation capacities to practice watershed management and simultaneously address socio-political concerns. As previously discussed in Chapter 5, First Nation Watershed Councils, First Nation capacity building partners, Indigenous Water Education for All, and addressing jurisdictional complexities could all serve as a means to address language, cultural identity and political tension issues, thus bridging a colonial past and moving forward with progressive and equitable water management systems inclusive of First Nation perspectives.

6.2 Suggestions for Further Research

Directions for future research were noted throughout the duration this study, and several recommendations for investigation were identified. The recommendations are divided into two sections; the first are specific to capacity dimensions and the second to the expansion of research.

Capacity Dimensions:

(i) The development of indicators and dimensions that reflect First Nation realities, which are currently absent in the capacity framework literature, may include dimensions specific to Traditional Ecological Knowledge (TEK), customary water rights and co-management. TEK offers perspectives based on local indigenous practices of resource use. Identification of indicators specific to TEK may be unique to each community, as practices and knowledge will inherently differ from one to another. The role of TEK to monitor and manage watershed processes could guide the direction of integrated water resources. In addition, another aspect not present in capacity frameworks are customary water rights, which may involve capacity indicators specific to understanding, applying and protecting a

constitutionally protected right. Customary water rights are also evolving due to the settlement of land-claims, which also includes a component of water as it relates to Aboriginal rights to hunt, fish, trap and engage in traditional activities (Duncan and Bowden, 2009). Finally, an exploration of co-management agreements whereby First Nations have shared responsibility and control over decision-making in resource management and development in their territory could be examined as it relates to institutional capacity. Participatory processes are encouraged to ensure First Nations direct the process and create the indicators specific to their own community.

(ii) To investigate actor networks capacity on a provincial scale for all First Nation communities in Québec. Since the presence of actor networks capacity is the determining factor for First Nations to participate on a collaborative basis, it is necessary to research this capacity further. This research could determine trends in the province that are in agreement or conflict with this study's findings. The presence or absence of actor networks capacity may or may not be influenced by a number of factors, which may include but are not limited to indicators specific to language of preference, geographical location, partnerships with different communities and stakeholders, history of political tension, ability to deal with conflict constructively, decision-making processes with government, community members' awareness of watershed activities, and participation with watershed association.

Widening the scope of research:

(i) In the Canadian IWRM framework it is important to include indigenous peoples that are outside the scope of the Indian Act. Therefore, it is necessary to include Métis and Inuit people's perspectives and experiences. Métis and Inuit people's relationship with water and land resources may present other realities not reflected in studies specific to First Nations. Métis and Inuit people may have specific capacity strengths and limitations that need to be reflected to ensure Canada's IWRM framework is reflective of all indigenous peoples.

(ii) In the province of Québec it is important to include French-speaking Aboriginal community participants. As previously discussed, results may vary if participant communities have stronger affiliations to the francophone culture, particularly in the area of actor networks capacity.

(iii) In certain regions in Canada, First Nations play a stronger role in water resource management. Therefore, it is important to study First Nation participants successfully participating in IWRM in other Canadian watersheds. Lessons from First Nation communities with strong capacities in IWRM could provide best practices for ROBVQ, MDDEP and other Aboriginal communities to learn and apply key practices.

(iv) To investigate the potential creation of First Nation Watershed Councils based in Québec as a possible catalyst to strengthen both Aboriginal and non-aboriginal partnerships. Research could examine the political, social, economic, financial and environmental realities, in conjunction with indigenous perspectives and interests necessary to achieve an IWRM framework that represents Aboriginal culture,

knowledge, experiences and goals. In addition, another aspect to expand on is of Fist Nation Watershed Councils building the capacity of regional watershed associations in understanding and integrating Aboriginal priority concerns in the province of Québec.

APPENDICES

Appendix 1: Interview Questions

I) Actor Networks

a) Cross-Sectoral Co-operation

1) Are there partnerships with different communities & stakeholders?
2) Are conflicts with other parties (communities, stakeholders) dealt with constructively, resulting in inclusive agreements to which parties are committed?
3) Is cross-sectoral analysis used to identify emerging problems and to implement policy?

b) Cooperation Between Administrative Levels

1) Is the First Nation government involved in decision-making processes with the federal government?
2) Are conflicts dealt with constructively, resulting in inclusive agreements to which parties are committed?

c) Cooperation Across Administrative Boundaries

1) Are downstream communities involved in decision making by upstream communities?
2) Is the community part of a cooperation structure (e.g., watershed associations)?
3) Are conflicts dealt with constructively, resulting in inclusive agreements to which parties are committed?

d) Broad Stakeholder Participation

1) Are there legal provisions concerning access to information, participation in decision-making (e.g., consultation requirements)?
2) Does your community include cooperation from non-government groups?
3) Does your community contribute to agenda setting, analyzing problems, developing solutions and making decisions at the watershed scale?
4) Does your community undertake parts of watershed management themselves (e.g., through watershed associations)?
5) Do you feel the Federal Government takes your community's input seriously?
6) Do you feel the Provincial Government takes your community's input seriously?
7) Do you feel the Tribal Council or Environmental Department takes your community's input seriously?

e) Social Linkages

1) Does a clear leadership for water protection at the watershed level exist?
2) Do community members have awareness and support for watershed protection?
3) Are community members regularly involved in decisions as it pertains to drinking water management & environmental protection?

II) Information Management

a) Joint or Participative Information Production

1) Is your community involved in setting the terms of reference, supervising research, or are at least consulted (interviews, surveys, etc.) at the watershed scale?

b) Interdisciplinary

1) Are different disciplines involved in defining and executing research, in addition to technical and engineering sciences, also includes ecology, social sciences, etc.?

c) Broad Communication

1) Do different levels of governments exchange information and data with other governments (Federal, Tribal Councils, Band Councils)?
2) Does the Band Council actively disseminate information and data to the public (internet, literature, brochures, media, etc.?)

d) Use of Information

1) Is new information used in public debates?
2) Is new information used to influence federal policy?
3) Is data available to manage water supplies, delineate watersheds and aquifers, and develop source protection plans?
4) Does the community monitor and collect data? (e.g. produce quality data)
5) Is water management information available to managers and other stakeholders if requested?
6) Is a comprehensive understanding achieved with open, shared information sources that fill gaps and facilitate integration at the watershed level?

III) Human Resources

a) Availability of Suitable Employees

1) Are there a sufficient number of employees dedicated to water management, environmental protection or rights-holder participation?
2) Do you have access to individuals with the appropriate level of education and expertise to adequately support water management, environmental protection or rights-holder participation?

b) Training and Education

1) Are education and training opportunities available to staff members to participate and contribute to water management, environmental protection or rights-holder participation activities?
2) Are education and training opportunities regularly taken up by staff members from various departments to participate and contribute to water management, environmental protection or rights-holder participation activities?

IV) Technical

a) Watershed Health

1) Is community drinking water quality monitored (throughout the watershed) regularly with daily tests)?
2) Is community drinking water quality monitored (throughout the watershed) regularly with weekly and quarterly tests?
3) Is community drinking water quality monitored (throughout the watershed) regularly with annual tests?
4) Have community groundwater recharge areas been identified?
5) Are community source water areas incorporated into official plans?

b) Piped Distribution System

1) Does community drinking water quality meet established drinking water standards?
2) Is community drinking water quality monitored (within the water distribution system) regularly with daily tests?
3) Is community drinking water quality monitored (within the water distribution system) regularly with weekly and quarterly tests?
4) Is community drinking water quality monitored (within the water distribution system) regularly with annual tests?
5) Have community groundwater recharge areas been identified?
6) Are community source water areas incorporated in official plans?

7) Are potential water supply contaminant sources (point & non-point) identified?
8) Is physical infrastructure adequate to produce safe drinking water for community residents?
9) Is physical infrastructure adequate to distribute safe drinking water for community residents?
10) Is the source water adequate in terms of quantity?
11) Is the source water adequate in terms of quality?

c) Well Distribution System

1) Does the community drinking water quality meet established drinking water standards?
2) Is community drinking water quality monitored (within the water supply and distribution system) regularly with daily tests?
3) Is community drinking water quality monitored (within the water supply and distribution system) regularly with weekly and quarterly tests?
4) Is community drinking water quality monitored (within the water supply and distribution system) regularly with annual tests?
5) Are potential water supply contaminant sources (point & non-point) identified?
6) Are physical infrastructures adequate to produce safe drinking water for community residents?
7) Is the physical infrastructure adequate to distribute safe drinking water for community residents?
8) Is the source water adequate in terms of quantity?
9) Is the source water adequate in terms of quality?

V) Financial Capacity

a) Appropriate Financing System

1) Are there sufficient (public and private) resources available for water management initiatives (e.g. source water protection, watershed participation, infrastructure, water system projects)?
2) Are costs recovered from the users by public and private financial instruments to maintain a balanced budget?
3) Is decision-making and financial control under the same leadership?
4) Do water rates reflect the cost of protecting and providing drinking water (including treatment, distribution, maintenance, and source water protection)?
5) Are you able to obtain funding from outside the community?
6) Are you able to obtain funding from inside the community?
7) Is funding stable?
8) Are funding surpluses saved for future water projects?

b) Capacity for a Community to Pay or Access Services

1) What level of education do most community members have?
2) What is your unemployment rate?
3) What is the average income level?
4) Are workdays lost per annum due to water related diseases?

VI) Institutional Capacity

a) Legal Aspect

Appropriate Legal Framework

1) Is there a complete and clear legal framework for water management (with sufficient detail)?

Adaptable Legislation

1) Are federal laws and regulations easily changed?

b) Policy

Actual Implementation of Policies

1) Are plans and policies actually implemented?
2) Are local policies reviewed and changed periodically?
3) Can policies be flexible and not rigid when there are good reasons not to implement them (e.g., new and unforeseen circumstances and new insights)?

Planning

1) Are community planning strategies and 'by-laws' in place that protect current drinking water supplies?
2) Are land use activities controlled in community well fields, recharge and watershed water supply areas?

Long Term Horizon

1) Are there solutions for short-term problems, which do not cause more problems in the (far) future (20 years or more)?
2) Are preparations being made for the (far) future (20 years or more)?

Appendix 2: First Nation Capacity Results

Kitigan Zibi First Nation Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Actor Networks	**18**	**15**	**3**	**3:18**
Information Management	**10**	**2**	**8**	**8:10**
Human Resource	**4**	**2**	**2**	**2:4**
Technical Capacity	**26**	**12**	**14**	**14:26**
Financial Capacity	**12**	**6**	**6**	**6:12**
Institutional Capacity	**9**	**3**	**6**	**6:9**
Total Indicators	**79**	**40**	**39**	**39:79**

Kahnawà:ke First Nation Capacity Results

Dimension	Total Indicators	Capacity		Ratio of Capacity Present to Total Indicators
		Absent	Present	
Actor Networks	**18**	**12**	**6**	**6:18**
Information Management	**10**	**3**	**7**	**7:10**
Human Resources	**4**	**1**	**3**	**3:4**
Technical Capacity	**26**	**14**	**12**	**12:26**
Financial Capacity	**12**	**9**	**3**	**3:12**
Institutional Capacity	**9**	**0**	**9**	**9:9**
Total Indicators	**79**	**40**	**39**	**39:79**

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