

Government and Community Responses to Drinking Water Challenges and Crises in Rural Newfoundland and Labrador

FINAL PROJECT REPORT

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GLOSSARY AND ACRONYMS

ADWS	Advanced Drinking Water System
AES	Advanced Education and Skills, NL Government
ATV	All-terrain Vehicles
BWA	Boil Water Advisory
CBC	Canadian Broadcasting Corporation
DWS	Drinking Water System
ENVC	Department of Environment and Conservation, NL Government
FES	Fire and Emergency Services, NL Government
GTA	Gas Tax Agreement
H&CS	Department of Health and Community Services, NL Government
ICSP	Integrated Community Sustainability Plan
LAA	Department of Labrador and Aboriginal Affairs, NL Government
LSD	Local Service District
MAEP	Master of Art in Environmental Policy
MAM	Maintenance Assurance Manual
MHA	Member of the House of Assembly
MIGA	Department of Municipal and Intergovernmental Affairs, NL Government (now Municipal Affairs)
MNL	Municipalities Newfoundland and Labrador
NCC	NunatuKavut Community Council
NGOs	Non-governmental Organizations
NL	Newfoundland and Labrador
PDWU	Potable Dispensing Water Unit
PI	Primary Investigator
SWP	Source water protection
WHO	World Health Organization

EXECUTIVE SUMMARY

This study investigated government and community responses to water crises in three rural communities in Newfoundland and Labrador- Flat Bay, Black Tickle, Labrador and Steady Brook with the first two being Indigenous communities. Using a qualitative approach, we interviewed community leaders, volunteer water operators, and provincial government officials. The study made use of two different interview schedules to elicit the required responses using primarily close- and open ended questions. The study reveals that the term “water crisis” is defined differently by each community and shaped by specific experiences of water insecurity; meanwhile, community definitions contrast with the provincial government’s restrictive definition. The study establishes that each of the communities has experienced water crisis relating to contamination, infrastructure, water shortages, and/or weather. Limited local capacities coupled with aging infrastructure are the major challenges that hinder the communities’ effective response to drinking water crises. Decentralization approaches to water policy has resulted in local communities being responsible for the management of drinking water systems; this is problematic and inappropriate for rural communities. Proposed long-term solutions include broader definitions of the term water crisis; development of a comprehensive provincial wide water management plan; the creation of community- or region-specific water emergency preparedness plans; the provision of adequate financial resources and consultation and participation of communities through the establishment of multi-level water management committees.

1.0 INTRODUCTION

1.1 Background of the Report

This primarily qualitative study took place over a one-year period, from 2015 to 2016, as per the funding guidelines of the Harris Centre - RBC Water Research and Outreach Fund, and encompassed three case studies with the aim of developing a detailed picture of different responses on the part of communities and the provincial government to drinking water crises in rural communities.

Two communities are located on the west coast of Newfoundland. Steady Brook is near the larger service centre of Corner Brook and might be considered a bedroom community, although it has its own water supply. Flat Bay is more remote, located some 10km from the nearest town, St. George's, also a rural community. The third community, Black Tickle, is in Labrador; it is a very isolated island community with seasonal sea links but no road connections or regular air service. Like Flat Bay, which has a Mi'kmaq population, Black Tickle is an Indigenous (Southern Inuit) community. Because Black Tickle is part of the unresolved land claim of Indigenous organization – NunatuKavut Community Council – community issues and jurisdictions fall to the province. Although most people in Flat Bay are status Indians under the Indian Act and members of the Newfoundland and Labrador umbrella band, Qalipu Mi'kmaq First Nation, their community is not a reserve so, here, the provincial government plays the same role it does in non-Indigenous communities.

Each of the study communities has a different governance system. Steady Brook is a municipality, Black Tickle is a local service district (LSD), and Flat Bay is an unincorporated community. However, Flat Bay has a water committee that is actively supported by the local non-Indian Act Flat Bay Band. These are all very small rural communities with populations ranging from approximately 140 (Black Tickle) to 400 (Steady Brook). Other specific community characteristics are discussed in subsequent sections.

Local Service Districts (LSD) are established (through *Local Service District Regulations* under the *Municipalities Act, 1999*) to provide certain services to communities or areas that have

similar needs within a geographic zone. LSDs are limited to seven main categories of services including the provision of potable water. The LSD Committee may, under section 649 of the *Municipalities Act, 1999*, charge a fee for the cost of service or supply provided. Fees may vary among residents or users and are set by elected committees. A municipality includes a town, village, resort village, rural municipality, municipal district or restructured municipality. In the absence of any such governance structure, there may be a local water committee, sometimes established on an ad hoc basis in response to crises or concerns.

1.2 Project Background

1.2.1 Rationale

We began our work with a rights-based approach. According to the United Nations, the human right to water is not something to be earned or deserved but a right related to human health. The human right to water was formally affirmed by the United Nations Human Rights Council in 2010, making it equal to all other human rights and legally binding and enforceable in existing human rights treaties (Gerlak and Wilder, 2012: 8). While many communities and advocacy organizations around the world cite this right, the disconnect between legal national and international frameworks and local initiatives and projects is too great to effectively address water insecurity. As Gerlak and Wilder assert, “a human right to water does not fit well with the messy struggles of ensuring access to water and sanitation on the ground” (2012: 14). This is something we wanted to explore through the study. Thus, we recognize this right and operate from the basis of this recognition. We understand, however, that the rights argument can identify power relationships but it cannot alter them; it has real-world limitations.

Indigenous rights are another reference points for us as researchers as two of the three communities in this study are Indigenous. Black Tickle, Labrador is a Southern Inuit community while Flat Bay is Mi'kmaq. The treaty and Indigenous rights of the First Nations, Inuit and Metis of Canada, including those of this province, are affirmed in Section 35 of the *Constitution Act, 1982*, Articles 1 and 2 (Aboriginal Affairs and Northern Development Canada, 2010). Thus, Indigenous people have the right to live on and enjoy the land of their ancestors which includes consistent access to potable water. We note that Indigenous people are aware of the benefits of

being engaged in scientific research, especially as these relate to improvements at the local level (Cruikshank, 2004).

Drinking water is obviously necessary for human life and good quality drinking water in sufficient quantities is necessary for human health. Water insecurity causes mental stress and, potentially, health problems (Hanrahan *et al.*, 2015). Besides being a health concern, drinking water has implications for community and regional development, an ongoing issue in this province. Drinking water challenges can prevent other forms of development in communities; as residents of Black Tickle have pointed out in previous studies, it is impossible to open a bed and breakfast or a restaurant without consistent access to potable water (Sarkar *et al.*, 2015). Thus, water insecurity impedes community development and regional development. Entrepreneurship and employment are hampered because of this lack of basic infrastructure. Business ideas cannot come to fruition, which represents lost opportunity. These issues regularly appear in the NL media with some communities frequently losing access to safe drinking water due to, for example infrastructure problems, and other communities enduring long-term boil or chronic boil water advisories (BWAs) (Minnes and Vodden, 2014). A BWA is defined as “a preventative measure to protect public health from confirmed or suspected microbial or chemical contamination” (Patrick, 2011) and is an appropriate emergency response to drinking water contamination, although it should not be the only measure (Timmer *et al.*, 2007). All these, and other related, situations have adverse effects.

1.2.2 Objective(s)

Study objectives were as follows:

- To identify communities that experienced drinking water crises in 2014
- To determine how “drinking water crisis” is understood and defined by government and by the communities
- To identify existing relevant policy as well as gaps
- To provide a detailed account of each of the three responses to drinking water crises
- To discern patterns and identify discrepancies
- To measure the responses against existing relevant government policy

- To obtain different perspectives on the responses from government and communities and
- To provide analysis and offer recommendations

It is our hope that our recommendations will have applicability in this province and perhaps elsewhere so that community and government responses to drinking water crises are consistent, appropriate, and comprehensive. Further, we also want to shed light on the need for preventative measures so that the number and severity of drinking water crises in rural and remote NL decline.

2.0 RESEARCH METHODOLOGY AND APPROACH

The research adopted a case study approach based on qualitative methods. The case study approach pays attention to a particular area of concern by considering the various issues and thoroughly reporting them. The case study approach is also used when the research requires relevant evidence from the chosen geographical location (Rowley, 2002). The study therefore covered communities that have experience with water-related challenges. We began with a review of relevant information on the NL Water Resources Portal and the media inventory of the NL Rural Drinking Water Project. Our search of the media inventory identified rural communities that had experienced noteworthy challenges related to drinking water in 2014 and 2015.

The review of media reports allowed us to develop a sense of the types of drinking water problems that occur in rural NL and then to proceed with a definition of ‘crisis’ in this context. We conducted a review of relevant government documents, including legislation, pertaining to the governance and management of drinking water systems in this province. Specifically, we found the following acts useful: The *Municipal Affairs Act* 1995 and the *Municipalities Act* 1999; the *Environmental Protection Act* 2002; and the *Water Resources Act* 2002.

Using google scholar and other databases, two MA Environmental Policy students conducted an extensive review of the relevant academic literature (see selected bibliography) to help explain

and contextualize our findings and observations. Keywords and terms included: water crisis/crises, water insecurity, water shortages, and others.

In terms of primary research, we designed two interview schedules, one for community leaders and one for government officials (see appendices). These consisted of mainly open- but also close-ended questions. We carried out interviews with four community leaders (two in Flat Bay and one elected leader in each of Black Tickle and Steady Brook), which lasted between one and two hours each. One of our community interviewees is a volunteer drinking water operator. The Black Tickle interview was conducted by phone by the primary investigator (PI) who has a long-term relationship with the community. We conducted in-person interviews with three government officials (two in Corner Brook and one in St. John's) from the Department of Municipal Affairs (MA, then Municipal and Intergovernmental Affairs, MIGA). These interviews lasted one and a half hours each and were recorded through note-taking or were audiotaped and then transcribed. We asked officials from the Department of Environment and Conservation (ENVC) in St. John's to take part in interviews but the Department elected to do an email interview instead with several participants and submitted this to the study. Some of the interviews were attended by a Master of Environmental Policy Student as well as the PI.

2.1 Clearances

Because our study involved human subjects, we applied for and received clearance from the Grenfell Research Ethics Board. We also received clearance from NunatuKavut Community Council. The Mi'kmaq of Newfoundland have yet to develop research ethics processes but we followed the guidelines of Chapter Nine of the Tri-Council Policy Statement II.

3.0 THE DRINKING WATER CONTEXT

Water security is best understood through the consideration of these variables: drinking water access, availability, quality, and preference (Goldhar *et al.*, 2013). This perspective, developed through a study in Nunatsiavut, Labrador builds on the 2000 World Water Council definition which stated that water security means “ensuring that freshwater, coastal and related ecosystems are protected and improved; that sustainable development and political stability are promoted;

that every person has access to adequate safe water at an affordable cost to lead a healthy and productive life; and that the vulnerable are protected from the risks of water-related hazards” (cited in Goldhar *et al.*, 2013). Goldhar *et al.* go on to explain the concept of a drinking water system (DWS) to better understand water security at the community level: “It encompasses components of: i) access to water (including affordability); ii) availability of water (supply and distribution); iii) quality of water; and iv) preference of water” (464-465). When any element of the DWS is stressed, water security is threatened in a community (Goldhar *et al.*, 2013, 464-465).

Availability and access to quality drinking water and being able to choose in terms of preference for water is key to a successful development strategy (Reid and Vogel, 2006). Availability and access to quality drinking water also has significant positive health impacts and improves the lives of the poor globally (Reid and Vogel, 2006). Water security has been given a serious recognition so much that one of the main United Nations Millennium Development Goals (MDGs) focused on reducing the proportion of people without adequate access to affordable water by half by 2015 (UN, 2000). Goal six of the current Sustainable Development Goals also aims at achieving clean water and sanitation stressing how significant it is to give prominence to water security. DWS therefore recognizes that dealing with water security requires a shift in thinking beyond just water availability and access to more complex issues of variable water quantity and quality (Mukheibir, 2010).

Globally there is a trend towards delegating water governance to the community level as a means of improving efficiency, access and sustainability; many watershed projects in the United States serve as examples of this (Norman *et al.*, 2012). This represents a shift from ‘government’ to ‘governance’ in which there are increased roles and responsibilities in environmental management for community leaders and members (Norman *et al.*, 2012, 53). This is particularly true of Canada, which is one of the most decentralized countries in the world (Bakker and Cook, 2011). The Canadian constitution delegates water and land management powers to the provinces (Robins, 2007) with water fixed to territorial scales for the purpose of water management (Norman *et al.*, 2012). Further, “Canada’s highly decentralized approach to water governance creates challenges and has had negative impacts on its ability to manage water resources effectively” (Bakker and Cook, 2011, 275-276). Increasingly, these responsibilities are devolved

to junior governments and communities, representing “administrative decentralization” or “democratic decentralization,” which fails to take the need for capacity-building into account (Robins, 2007, 3). Decentralization cannot work unless local organizations have sufficient resources to enact responsibilities (Ananda and Proctor, 2013).

There is no clear authority for water governance in Canada (Bakker and Cook, 2011) and the country’s water quality guidelines are non-enforceable (Kot *et al.*, 2011). According to NL’s ENVC, “a drinking water system should be designed to provide 340 L/p/d (litre per person per day). World Health Organization [WHO] guidelines indicate that adults need approximately 4.5 L/day of water. Up to 20 L/p/d should ensure basic hydration, hygiene, and food hygiene needs according to the WHO” (WHO guidelines are cited in van der Zaag, 2004). Provincial governments have oversight functions but it is mostly municipal authorities that assume responsibility for safe drinking water (Kot *et al.*, 2011), as holds true for NL with the caveat that even small communities that are not municipalities assume this responsibility. Because of problems associated with water governance in Canada, there are growing concerns about water security in Canada, especially in Indigenous communities where BWAs are 2.5 times more frequent and water-borne infections 26 times higher than non-Indigenous communities (Patrick, 2011, 386).

4.0 LESSONS FROM THE LITERATURE

4.1 Capacity

Capacity is a core concern for drinking water in rural Newfoundland and Labrador. Capacity can be defined as “the ability of an organization to perform appropriate tasks effectively, efficiently and sustainably” (De Loë *et al.*, 2002). It has four dimensions: financial, social, technical and institutional (Rawlyk & Patrick, 2013). Financial capacity is the ability to generate and access adequate funding as well as the ability to adapt to changing circumstances (Timmer, *et al.*, 2007, 190).

In Newfoundland and Labrador, many rural communities are not municipalities but local service districts (LSDs) or unincorporated communities run by volunteers with limited ability to raise

funds. Weak governance structures have implications for drinking water security. Rural communities in Canada have weak capacity in terms of complying with drinking water regulations; this constitutes a heavy burden (Kot *et al.*, 2011). Rural communities, such as those taking part in this study, are also hampered by aging populations with the result that “the capacity of these communities to deliver essential services is at risk” (Kot, *et al.*, 2011, 1031).

Limited local capacity sometimes means local governments might be “less proactive” in protecting drinking water sources and instead make unwise decisions, such as investing in expensive technologies (Rawlyk and Patrick, 2013, 22).

4.2 Linkages

Linkages are connections to other organizations and groups, with vertical linkages involving senior governments, such as the province or band councils, and horizontal linkages pertaining to other municipalities and communities, and non-governmental organizations (NGOs). The provincial government sees horizontal linkages as an appropriate response to water crises. Specifically, it sees a role for NGOs in water crisis responses: “Not on a daily basis. But NGOs are a big part of emergency responses. For example, the Red Cross usually provides communities in water crises with bottled water. Also, different churches would help, too.” In the case of NL, horizontal linkages extend to the media, as we shall see. Canada’s and NL’s decentralized approach to water governance means that vertical linkages can be under-developed: communities lack oversight, leadership and, at times, assistance from senior governments (De Loë, *et al.*, 2002). Strong vertical and horizontal linkages are crucial for municipalities and LSDs with limited capacity and supports. Without these linkages, water security would be even more precarious.

5.0 PROJECT DETAILS AND RESULTS

5.1 Identifying Drinking Water Crises in Newfoundland and Labrador

Our first task was to develop an understanding of drinking water problems in rural NL in 2014-2015 and to develop a definition of ‘crisis’ in this context. Our search of the media inventory

identified many rural communities that had experienced drinking water crises in the relevant time period. Each case belongs in at least one of these categories: contamination; water shortages; infrastructure; or weather. In each case, at least one component of the DWS was compromised—quality, access, availability and preference—causing water insecurity. We note that government recognizes the extent of these problems: said one interviewee, “A lot of communities have water quality problems.” The following provides specific details under each of the categories.

Contamination (impacting DWS quality in particular):

- On New World Island, Notre Dame Bay dozens of private wells were found to have had levels of arsenic exceeding Health Canada's maximum levels
- Cartwright, Labrador experienced high levels of THMs and discolouration with both attributed to engineering flaws in the water system; system upgrades were announced by the provincial government

Water shortages (impacting DWS access and availability):

- Hopedale, the capital of Nunatsiavut in Labrador, issued a state of emergency as there was not enough water in the community's reservoir, which was built to accommodate 200 people while the town has grown to almost 700; infrastructure improvements were made, although, for two dozen households, the crisis lasted over a month
- Fortune, on the Burin Peninsula, cut off the water supply to Grand Bank due to lack of rainfall

Infrastructure (impacting DWS access and availability):

- Grand Bank's (Burin Peninsula) system was inoperable for five years due to aging infrastructure, forcing the community to rely on neighbouring Fortune

Weather (impacting DWS access, availability and preference):

- Goose Cove on the Great Northern Peninsula lost its water supply during a storm in February and again in November - the town expand reservoir capacity by redeveloping its existing dam.

- Main Brook, also on the Great Northern Peninsula, lost its water supply when power to its pump house was cut off during a storm.

Many communities in rural Newfoundland and Labrador are on BWAs for extended periods of time or on and off for many years. For instance, in 2014 Milton, near Clarenville, was on a BWA for over a decade until upgrades were made. Upgrades are extremely expensive, especially on a per capita basis and especially for a small province facing an extremely difficult financial picture. The cost for Hopedale was estimated to be \$600,000; for Grand Bank, costs were \$407,000; and for Cartwright, the total was \$205,000. Even with 90-10 cost share agreements with the provincial government, upgrades can be very difficult and even impossible to afford.

5.2 Definition of Crisis

One of our findings was that communities define crisis differently than does the provincial government; in turn, communities define crisis differently than each other. In addition, the definition of crisis varies slightly from one government department to another.

In the case of communities, definitions depend on community circumstances and recent lived experience. Steady Brook's water crisis consisted of recurrent and prolonged BWAs leading to reduced water consumption and the consumption of possibly contaminated water; as an interviewee said, "there's an old saying you know that familiarity breeds contempt but we've been on boil orders so long now that people don't pay any attention to it." In such cases, BWAs become the norm (Patrick, 2011). Another result of recurrent BWAs – and associated perceptions about water quality in Steady Brook – is the threatened closure of several local businesses that lack the reliable drinking water access they depend on. Conflict between the municipality, including staff and elected councilors, and business was intense and ongoing, causing a great deal of stress to those involved. Tensions were such that they were reported in the *Western Star*, the regional daily newspaper, and other local media. While the crisis in Steady Brook was not of the order of the crises in Black Tickle and Flat Bay, it gained a great deal of media attention because business owners, a high status influential group, voiced their concerns.

In the case of Black Tickle and Flat Bay, a water crisis means complete loss of access to potable water, sometimes lasting for weeks. These crises resulted in reduced drinking water consumption

and the consumption of possibly contaminated water from unmonitored water sources like springs. Although the study communities differ in many respects, especially socio-economically with Steady Brook incomes much higher than those of the other study communities, in all cases decreased access to potable water has the same effects, with possible health implications. Furthermore, when defining crisis, none of the communities factored in *the reasons* for their particular crisis; they were much more concerned with *its* effects.

As stated, the provincial government has no standard definition of drinking water crisis. As one official told us, different departments have different definitions. According to ENVC, “In general, we would treat any incident that threatens water quality or quantity as a possible emergency situation, but there are varying levels to this.” Factors that are considered include:

- the duration of the event
- the possibility of contamination and
- the presence of acute health effect risks and whether or not it is a reoccurrence

MIGA looks at similar factors including:

- the scale, meaning the number of people and the proportion of community impacted;
- the time of the year
- a community’s location and
- “the urgency” of the water issues

Said one official, “I guess in the strict sense a crisis would be a town that has either no water or has a situation whereby a town or community has a non-consumption order in place.” This last understanding of crisis puts Steady Brook in the crisis category for one-third of the year but there are conflicting views on this; as another interviewee said, “. . . unless the situation is having a gas or oil spill or contamination, then it is not an emergency situation.”

Note that some of these decision factors disadvantage rural communities; for instance, the scale, which refers to the number of people impacted. Black Tickle has a population of only 140, which may make it susceptible to being ignored. On the other hand, the remote location of Black Tickle should make its water crises a priority since water cannot be obtained from neighbouring communities. All three of the study communities meet ENVC’s criteria: duration, possible contamination, and health impacts.

While it appears that there is some mutual understanding of drinking water crises between communities and government, there is a crucial difference that has real world repercussions. A source water quantity problem is generally considered to be a crisis, triggering a swift response from the provincial government. According to ENVC, “If the issue is with the source not having enough water (e.g., intake frozen, well has run dry, water level in reservoir dropped, etc.) this is typically considered more of a critical issue and there will be some level of government response (e.g., shipping in bottled water, development of an emergency water supply).” On the other, if the problem originates with the treatment or distribution system, such as leaks or inoperable valves, “This is considered more of an operational issue for the community.” In such cases, government provides technical assistance and possibly emergency funding for repairs. Clearly, source water quantity problems, while considered to be community-level responsibilities, are seen as much more of a priority in terms of provincial government responses than are infrastructure problems, which are considered to be community-level responsibilities. Thus, the *origin* of a water problem is a criterion in determining and shaping government response. Further, communities do not understand this distinction which leads to perceptions of favouritism and discrimination and a sense of injustice. And sometimes water crises are rooted in factors other than source water problems.

5.3 The Role of Government

In line with the downloading of responsibilities and administration, also known as the move from government to governance, the NL government restricts its roles regarding drinking water. ENVC rationalizes this as follows: “Drinking water safety is an area of multi-facet responsibility where each player has its own responsibilities and accountability. . . The community is expected to assume ownership and demand a solution.” This means that a significant burden falls to communities. Some financial assistance is available for municipalities and LSDs through the gas tax. Communities are required to demonstrate good financial management to secure funds. MIGA expects LSDs to collect fees for the water services provided by drinking water operators, instead of allowing this work to be done by volunteers (“[Using volunteers] is a problem,” said one official). The government’s preference is that communities pay hourly wages to drinking water operators to sustain operations. On the other hand, the provincial government gives annual

awards to volunteer water operators, thus encouraging the practice of volunteer water systems management.

MIGA is the lead department when drinking water crises occur while Fire and Emergency Services (FES, Government of NL) is the lead agency. According to the officials we interviewed, MIGA's mandate is "to advise and supply capital funding, to look after daily issues regarding particular situations (pump, booster system, leaks, and pressure station), to make suggestions and (offer) guidance, to provide technical assistance, make site visits, (and to) provide advice (on) how to make request of annual municipal capital works." MIGA sees its role as one of oversight and "keeping communities on task with a long-term focus." The department encourages towns to conserve water and measure water, electricity, and chlorine consumption levels, and to identify and monitor leaks. But at present there is no regulation requiring communities to monitor and report consumption levels: "government doesn't have any conservation plan in place; (we) only deal with (water shortages) on a case by case basis."

Other departments are involved in water crises responses as well. In the case of a waterborne disease outbreak the Department of Health and Community Services (H&CS) follows emergency response actions from their *Disease Control Manual* (2013). ENVC issues environmental approvals, samples chemical and physical water quality, maintains a web portal for drinking water quality data and provides training to water operators. Advanced Education and Skills (AES) is responsible for emergency water distribution, often working closely with the Red Cross and/or other NGOs or community organizations such as churches. There are no provincial set guidelines for the provision of bottled water during an emergency, although, according to ENVC, national guidelines are used. There is, according to interviewees from government, "a fairly high degree of cooperation" between departments in terms of crises response and there have been successes such as the permanent resolution to the water supply crisis in Hopedale, Labrador in 2014. As one official explained, "Communications and coordination means success. Different departments have different mandates. FES staff in different regions will report on crisis. ENVC has staff to provide short term relief. Once water has been restored, ENVC and most other agencies will step back. But MIGA will still be there to ensure long term recovery such as infrastructure construction."

Rather than having set drinking water emergency policy, the provincial government has typical procedures that it follows in the case of a critical situation. According to ENVC, “The response to a community water shortage depends on the case by case circumstances. There is no one response fits all approach. The situation needs to be assessed, and corrective actions determined from there.”

Municipalities are required to have Emergency Response Plans under the *Emergency Services Act* administered by MIGA. LSDs do not have this requirement but there are similar expectations: “generally, communities need to keep a buffer in (their) budget for emergencies; they should plan for the unexpected events and ensure adequate funding; (they) should charge enough for the unexpected, for example, to fix a pump.” There is also an expectation in government that communities develop emergency protocols so they can respond to water crisis; this places further demands on communities and requires a certain level of human capacity.

5.4 Study Communities

Table 1: Demographic Information

	Flat Bay	Steady Brook	Black Tickle	Newfoundland and Labrador (Province)
Population				
Population in 2006	255	435	201	505,469
Population in 2011	229	408	168	514,536
2006 to 2011 population change	-10.2%	-6.2%	-16.4%	1.8%
Total private houses	100	207	79	250,275
Private houses occupied by usual residents	92	160	58	208,842
Population density per square kilometer	51.7	334.8	17.8	1.4
Age Characteristics				
Population aged 15 and over	88.1%	83.6%	85.1%	85.1%
Median age of the population	46.9	46.3	39.5	44.0
Median age of death	N	81	67	78
Marital Status				
Total population 15 years and over by marital status	200	340	140	437,910
Married or living with a common-law partner	55%	70.6%	64.3%	62.4%
Not married and not living with a common-law partner	45%	27.9%	35.7%	37.6%
Family Types				
Total number of census families in private households	75	130	60	159,385
Total children in census families in private households	65	120	50	140,940
Average number of children at home per census family	0.9	0.9	0.8	0.9

Household Characteristics				
Average number of persons in private households	2.6	2.5	2.8	2.4
Total number of persons aged 65 years and over in private households	13.3%	17.3%	8.8%	15.1%

Source: Statistics Canada, 2012

Figure 1: Study Communities



Source: Myron King, Environmental Policy Institute, 2016

Located in Western Newfoundland some nine kilometres off the Trans-Canada Highway, **Flat Bay** has piped chlorinated water from an artisan well, which is 190 feet deep. The source water is a large body of water that has been determined to be more than ample for the local population, about 250 people. The source water in Flat Bay is protected as the pump house is secure. There is no paid water operator in Flat Bay; the community relies on a small number of volunteers who serve on the Flat Bay West-Birchy Bay Water Committee, engaging in a range of activities related to drinking water. One individual received the 2016 Volunteer Water Operator of the Year Award. Flat Bay also just recently received a regional water operator shared with other towns.

As stated, Flat Bay is not a LSD or municipal government but its water committee is supported by a non-*Indian Act* band. With strong leadership, the band is very active and initiates and sponsors many community and regional activities such as annual powwow and a new health initiative that extends beyond community boundaries.

A drinking water crisis occurred in Flat Bay West and adjacent Birchy Bay in 2015 when aging infrastructure broke down, leading to a complete absence of potable water the entire summer in Birchy Bay; the crisis had a shorter duration in Flat Bay. According to one interviewee, “The system was 35 years old (and) not built with good material. Everything was done as cheap as possible. During the past 10 years, there were more and more problems with constant breakdowns every year. (We) repaired leaks voluntarily. (One committee member) hurt his back. It was very expensive for (us to get) a back digger but we managed to pull it off. It then hit the crisis stage in the spring of 2014. Everything started leaking. Everybody (in Flat Bay West) lost water for three days at one point.” Nearby, Birchy Bay, dependent on the same system, had no water for a full two months. Although the Red Cross distributed water during this time, at least some people decided to collect water from unmonitored springs and other sources, reflecting the preferences dimension of Drinking Water Systems.

Figure 2: Water Service Line for Flat Bay West and Birchy Brook



Source: Myron King, Environmental Policy Institute, 2016

There was a long-term resolution of the problems in Flat Bay West-Birchy Bay. It involved infrastructure improvements provided through government funding buoyed by a loan from the band council. Two provincial government ministers visited the community, including the district Member of House of Assembly. Flat Bay was offered a 90-10 grant: “We had to come up with 10%. It was not easy. Nobody would give it to us. So the band council kicked in. \$175,000 was the initial phase, we had to come up 10% of that. We had to get two loans at \$14,000 and \$11,800 for each community (Flat Bay West and Birchy Bay). Thank god for the band council. We would have been in trouble.”

Volunteer labour was also central to the resolution as was the media. As an interviewee explained, “CBC [the Canadian Broadcasting Corporation] came (here). They heard (about it) through the grapevine. Someone called from the community. They (CBC) called me for an interview. What better way to get our message across? After the water went down, this all played a role in getting action.” This horizontal linkage – to the media – is something that each of the three study communities valued and relied on.

People in Flat Bay also appreciated vertical linkages – to senior governments, in this case the band council and the provincial government. Flat Bay enjoys skilled longstanding Indigenous leadership with this vertical linkage well-developed. In turn, the band council had, during the study, a well-developed relationship with key agents in the provincial government, including the local MHA who was also a cabinet minister; the band council was able to leverage this relationship. This minister brought colleagues to the community during the crisis and to work with them to secure the necessary resources to resolve the crisis for the long-term.

An interviewee’s assessment of Flat Bay’s story includes a compelling point: “We give two thumbs up for what government done for us because of the crisis. But if there was no crisis or if we were asking for upgrades, they wouldn’t look at us.” As he points out, although the provincial government is good at responding to drinking water crises, there is little emphasis on providing local communities with the resources and capacity building they need to prevent such crises.

Steady Brook is a municipality with the mayor and councilors receiving an honorarium of \$4000 and \$3000 annually respectively. The town has a gravity-feed system with piped chlorinated water. According to the interviewee, the infrastructure is aging and BWAs are in effect in the community approximately one-third of the year. Steady Brook had five BWAs in 2015 and four in 2014. The most recent BWA caused solely by water quality was in 2010 (CBC Feb. 18, 2016). At times weather is another cause of BWAs: “In rainy seasons we get a lot of runoff -- mainly in the spring you get all the junk washing out on high water and it plays havoc with our chlorine system because of the fact that it’s runoff and we can’t keep up with it. If we get a massive rain storm the system just the system goes overloaded. (Then) we got to go on boil order.”

It is often some while before BWAs can be lifted as this action must be taken by H&CS. According to an interviewee, “(This) can be a lengthy process given the large region served by inspectors.” He estimated that one of Steady Brook’s BWAs was in effect three weeks longer than necessary in 2015 for this reason. This exasperated local business owners who could not provide fresh water to their customers. According to a member of council, “I am taking it at the present time (during a BWA) - a very big lot of personal abuse (that)I do not deserve. Our town clerk is taking abuse from the same people that she does not deserve.”

Source water protection (SWP) is a planning process that aims to prevent contamination of untreated water at the source (Rawlyk and Patrick, 2013) and is required for drinking water safety (Timmer, *et al.*, 2007). SWP requires well-developed technical, institutional, financial and social capacity (Rawlyk and Patrick, 2013). From secondary literature documentation it would seem that Steady Brook should have a great deal of capacity for SWP (Government of NL, 2014; Hearn, 2005; Hearn, 2007; Minnes, 2014). Steady Brook is one of five towns in the province that has a watershed management committee and one of three towns with a watershed management plan (Government of NL, 2016). In fact, a document released by the Government of NL entitled “A Municipal Guide to the Development of a Watershed Management Plan” was based on the experience of Steady Brook and its creation of their watershed management plan (Hearn, 2007). Steady Brook was even profiled in the Drinking Water Safety in Newfoundland and Labrador 2014 Annual Report, where it was highlighted as a town where, “government, the public, and industry can work together to safeguard our water resources for future generations” (Government of NL, 2015, 16). However, it has been indicated by an interviewee that, in practice, the Protected Public Water Supply Area legislation under the Water Resources Act (Government of NL, 2002) is currently not being implemented locally and it is not always enforced at the provincial level.

The lack of the enforcement of SWP is a concern for the municipality, as there are cabins in the area as well as related snowmobile and all-terrain vehicle (ATV) activity. Issues related to cabins in Steady Brook’s protected water supply area were also noted as concerns in earlier research by Minnes (2014) on the municipality. A request to the provincial government by the town to purchase and remove the cabins was denied but the town plans to remove these cabins as their owners die or cease using them. The interviewee is also concerned about electricity poles

covered with wood preserver which, he fears, could leech into the source water. Further research showed that the development was permitted under Section 39 of the Water Resource Act (Government of NL, 2002) and that the power company agreed to move treated poles to either outside of the required buffer zones or to replace those poles within the buffer zone with untreated poles (Water Resources Management Division, 2016).

Two town employees are responsible for all outside maintenance, including water operations, and have received some training from the provincial government. They check the chlorine residual water twice daily as per government requirements. Steady Brook has been working with the provincial government for at least five years on its water problems and received a cost-shared grant from the provincial government to dig artesian wells. Like most such grants, this one is a 90-10 agreement, with the province paying 90% and the community expected to raise 10%. However, the total amount –\$430,000 – is only half of project estimates received from engineers – \$860,000 – so progress has stalled. Because of high costs, Steady Brook cannot invest in maintenance that would prevent BWAs. It should be noted that Steady Brook is considered to be an affluent community, given its place at the foot of Marble Mountain and the site of a ski resort. In 2012, the average income in Steady Brook was \$51,200 versus \$41,400 for the province as a whole (Newfoundland & Labrador Statistics Agency, 2012). Arguably, town taxes could be raised on this basis but the council is aware of economic disparities within the town and does not want to exacerbate these disparities. As an interviewee explained, “There are a lot of people in this town who make big money and if they want a big water system and it costs a lot of money well (they say) bring it on. . . but if you put your tax bases so high that the little people, the widows on a very low income, have to leave their homes and move out because they can’t pay taxes, then you’ve done something very, very wrong.”

On the other hand, since the study, the town has made progress on drinking water-related conflict, according to recent media reports (CBC Feb. 16, 2016). In early 2016 a new committee focused entirely on BWAs was formed. Its first meeting was open and very well-attended. The town’s supplier of water treatment equipment was there as were town staff and councilors. “We brought everybody into the one room. It was a very crowded room, but nobody could ask a question to which there wasn’t an answer,” a councilor told CBC. “Somebody in the room was qualified to give an answer. . .people were very receptive of that.” Council also decided to

change the maintenance schedule and continue to work on communication issues in the town, thus, moving to enhance its human capacity. Other capacity issues, such as financial, remain.

Table 2: Regional Economic Information

	Region A (Flat Bay)	Region B (Steady Brook)	Region C (Black Tickle)	Newfoundland and Labrador
Economic Picture				
Average employment income (Year: 2012)	\$28,800	\$51,200	\$26,900	\$41,400
Employment rate 15 years and over (Year: 2011)	29%	52.8%	29.3%	50.7%
Change in employment (Year: 2008 to 2012)	0.0%	14.6%	-7.4%	1.6%
Average weeks worked 15 years and over (Year: 2010)	30.8	N	30.3	40.7
Economic Self-Reliance Ratio (Year: 2012)	66.1%	91.3%	69.8%	81.9%
Low income incidence (all family types) (Year: 2012)	21.7%	N	9.9%	14.2%
Income support benefits incidence (Year: 2013)	20.2%	1.3%	6.9%	8.4%

Source: Newfoundland & Labrador Statistics Agency

Like many remote northern Indigenous communities, **Black Tickle**, has no piped water and relies on a potable water dispensing unit (PWDU) or Advanced Drinking Water System (ADWS). MIGA interviewees see PWDUs as the best example of the multi-barrier approach for communities of 500 people or less. The Black Tickle PWDU is located about two kilometres from the furthest house and one kilometre from the nearest. Those residents who have all-terrain vehicles (ATVs) and/or snowmobiles use these vehicles, with trailers or *komatiks* (Inuit sleds), to retrieve water; the type of vehicle used depends on the season. Mainly for financial reasons, not everyone has access to these vehicles. As an interviewee explained, “The other day I was going

for a little ride . . . and when I was coming back there was this 67-year-old man carrying two buckets from the (PWDU) into Domino by hand. . . I was pretty sad to see that.”

Figure 3: Location of Water Dispensing Unit (PWDU)



Source: Myron King, Environmental Policy Institute, 2016

The LSD charges user fees for drinking water while unlimited “general use” water is available free. The PDWU is inconsistently funded with the result that, at times, residents rely on unmonitored water sources, such as brooks and shallow community wells, raising the issue of quality. As in the Nunatsiavut Inuit (Goldhar *et al*, 2013), preference plays a role here. The LSD employs a paid operator in Black Tickle, who works ten hours a week; the operator’s only training has been delivered by the previous water operator. The LSD consists of volunteers. There is no SWP; Martin’s Pond, the source, is not protected from animal activity or waste, for instance. Thus, while the PWDU offers multi-barrier protection, it is far from the only drinking

water source for community members with the others being compromised.

Black Tickle suffers from frequent drinking water crises, as defined by community leaders. In 2014, infrastructure problems with the PWDU meant there was no potable water for a week. According to an interviewee, “We ran out of filters. What happened was that the water quality coming from Martin’s Pond was so poor that instead of filters lasting a month they were lasting a day...there was so much sludge and silt and things in the water that we were just chewing up the filters. We were going through them faster than we could get them in. So what happened was that we ended up running out of filters and we had to shut the building (PWDU) down until more came and during that time people were without water.” Filters lasted two or three days rather than the usual one month. Flushing the system was difficult because of freezing weather conditions so it was a gradual process.

Vulnerable members of the population were of particular concern to the LSD. Said an interviewee, “There was three (people) who required (potable) water to use their concentrators and things like that because they’re on oxygen.” Safe water for baby formulas was also a worry for community leadership with all such issues heightened because of the isolation of the community and the uncertainty around when the crisis would end.

Residents of Black Tickle sometimes rely on unmonitored water sources such as brooks, some as far away as 25km, during drinking water crises. They also used shallow wells that are, in keeping with Inuit culture, shared and not privately owned. An interviewee mentioned that, “Some people went into the bay; Porcupine Bay like there’s a run off in there... Other people just used the water that was in the brooks and ponds here and boiled it. Some people just drank it straight from the brooks and ponds.” Another strategy used is to minimize drinking water consumption, which has health impacts. Bottled water is not consistently available in the community and is beyond the financial means of most households as a regular drinking water source.

During the 2014 crisis residents contacted the media, which reported on the crisis, triggering a phone call and offer of assistance from the former Department of Labrador and Aboriginal Affairs (LAA) in Happy Valley-Goose Bay. Thus, a horizontal linkage resulted in a vertical linkage. The call to the LSD came from the minister’s executive assistant and led to a short-term

resolution of the crisis. LAA initiated a response from MIGA and the Red Cross until new filters could arrive, rushed by the provincial government. No one from any agency visited the community during the crisis. But an interviewee concluded, “If anything it (the crisis) was a good impact because we realized that we could definitely depend on the Department of Municipal Affairs. It was really good to know that they were really quick acting like that.”

Except for the media, linkages between Black Tickle and other agencies were not well-developed at the time of the 2014 water crisis. As an interviewee explained, “We were just new coming on to the committee so we weren’t really sure like what steps we were supposed to have taken.” There is considerable turn-over in volunteers who serve on the LSD. There appears to have been almost no vertical linkage to the provincial government at the time of the crisis. This crisis changed this temporarily in that LAA offered to help with any further crises and, as seen above, community leaders came to see MIGA as a reliable resource. This is true even though the origin of the problem was not a source water quantity problem but equipment-related. However, there has been a change of government since the crisis with LAA becoming an office under Executive Council. There has also been a change in staff, meaning that the community has lost its new provincial government contacts.

It is not obvious to community members living in a remote area how to proceed should another crisis occur. This is a likelihood given the irregular funding of the PWDU and other factors. There have been times the PWDU has not been operational because of lack of funding. The community’s crab processing plant, its main employer, closed several years ago, causing widespread unemployment, so the LSD cannot raise the required annual operational funding required: \$30,000. Yet the province considers water infrastructure to be a community responsibility. Each year Black Tickle applies for so-called one-time grants to fund its PWDU; in recent years these applications have been successful but there is a great deal of uncertainty and stress around the process as well as a culture of water insecurity and a perception of injustice, considering there is no piped water. Said an interviewee, “I just think there needs to be a more giving hand when it comes to money for improvements and training and operations of the systems. We had to fight like tooth and nail to get the money the last time. I think it’s a bit ridiculous when you think about the fact that it’s water and it’s a basic need and it’s a basic right.

I don't think that we should have to submit these proposals every year. It should be carried over from one year to the next unless something happened. I mean why would you have to beg for water?"

Black Tickle is one of many Indigenous communities in Canada in which drinking water crises have become the norm. Part of the problem is scale and inappropriate technology, a common occurrence in Indigenous communities in Canada where there is an ongoing practice of bringing high cost drinking water units to small population bases (Patrick, 2011). Thus, communities are left to deal with inappropriate design specifications, dependency on chemical treatment, lack of trained operators, and high operation and maintenance costs with increased human vulnerability resulting from technology failure (Patrick, 2011). Black Tickle's story clearly demonstrates how necessary it is to consider the four DWS components—access, availability, quality and preference—to ensure water security. Had preference and local knowledge been considered, a more appropriate scale solution than the existing PWDU might have been instituted in 2004. Despite the active lobbying of its Concerned Citizens Committee at the time, the people of Black Tickle were never consulted about the location and scale of the PWDU. As Goldhar *et al.* point out, a key step in advancing genuine water security involves adequately adapting technologies to meet local environmental demands; otherwise, the drinking water produced may be “undesirable” to residents and of “little use” (2013, 480-481). This has been borne out in the case of Black Tickle.

6.0 DISCUSSION

6.1 Capacity

Similar to many communities worldwide (Timmer *et al.*, 2007), the study communities all face significant capacity challenges. In terms of human capacity, these include education and training of water operators, especially in the case of Black Tickle, and access to expertise, also a critical issue for Black Tickle, but a problem for Steady Brook as well in terms of its BWAs.

Institutional capacity problems include limited ability to establish and/or implement SWP measures and raise revenue for upgrades, repairs and/or operations; this is, again, especially true of Black Tickle but we note that Steady Brook experiences similar frustrations and that Flat Bay

West-Birchy Bay Water Committee had a great deal of difficulty garnering its portion (10%) of provincial cost-share grants. In this respect, there are contradictory messages from government. On the one hand, there is some stated understanding of the importance of good governance to drinking water security: “The challenges are that communities don’t have good governance (and) they have insufficient staff and declining populations.” This, too, is a consideration of government’s: “All parties need to work together to have resources to sustain good local governance. There is a need to recognize the role of volunteers and the associated problems, which won’t sustain communities’ water system. Regional governance is the key. And communities need better local governance. Pouring money into it cannot always work. It is necessary to make local governance strong to deal with water management.” As the study demonstrates, a great deal is expected of communities – and volunteers. Some government officials in this study believe that communities can sustain themselves if they charge adequate taxes or fees. Steady Brook has indicated it will not raise taxes because of potential impacts on its low-income residents. Black Tickle is particularly disadvantaged because of its economic conditions. Further, there appears to be a worrying commitment to the move from government to governance. This does not appear to offer drinking water solutions to small rural communities, especially when not met with adequate capacity building at the local level in order to implement new responsibilities.

6.2 Volunteer Labour

In Flat Bay, volunteers have a history of identifying water problems and solutions, lobbying for improvements, communicating with local people, acquiring equipment, fund-raising, constructing buildings, and monitoring the water supply. One volunteer spent 200 hours on water issues in the summer of 2014 during a crisis (interview). Said one interviewee, “If we don’t do it, who’s gonna do it? It will fall down around us.” This comment demonstrates the effect of the shift from government to governance on drinking water management.

The dependence on volunteer labour raises several concerns for communities, especially since water security and other burdens tend to fall to a small number of volunteers. In addition, the pool of volunteers is small as all the study communities are aging as illustrated in Table 1. Other concerns include potential liability problems and the likelihood of volunteer burn-out and

inadequate succession planning. Though regional approaches would not aid remote communities such as Black-Tickle, it could be a solution for other communities such as Steady Brook. An example of a promising initiative at the provincial level, which Flat Bay is currently a part of, is the regional water and wastewater operator pilot program. This program has given support for three full-time regional operators in the eastern, western and central regions. This ensures that nearly 40 communities now share in the benefits of a certified operator overseeing their systems. This benefits low capacity rural communities greatly, such as those in the Western region who all share one regional operator. These towns include: Rose Blanche – Harbour Le Cou, Isle aux Morts, Fox Roost – Margaree, Burnt Islands, Ship Cove – Lower Cove – Jerry’s Nose, Piccadilly Head, Piccadilly Slant – Abrahams Cove, West Bay, Sheaves Cove, Flat Bay West, Flat Bay East and Black Duck Siding. Hopefully this program will benefit the town of Flat Bay West and reduces their susceptibility to future drinking water crises.

6.3 Source Water Protection

SWP is necessary for safe drinking water (Timmer *et al.*, 2007) yet only one of the three communities in this study – Flat Bay – indicated they are currently implementing SWP practices. Both Black Tickle and Steady Brook are aware that the absence of SWP is a problem, a potentially critical one. Yet SWP requires capacity to finance, plan, coordinate and implement technical and expensive measures (Timmer *et al.*, 2007). In common with many communities globally (Timmer *et al.*, 2007), the study communities lack such capacity in varying degrees. In the case of Steady Brook, it seems, implementation has been a challenge at both the local and provincial levels.

For financial, cultural and political reasons, many municipalities and LSDs in this province have limited capacity to raise levies. Raising levies works best in an environment of larger rate-payer bases (Robins, 2007, 14); in this province, there are such few examples outside St. John’s, Mount Pearl and other cities and large towns. Further, the current reliance on volunteers is not sustainable and can work only in heavily populated regions (Robins, 2007, 14). In addition, there may be liability issues; this study found that liability is something communities have not considered.

6.4 Community Linkages and Regionalization

Communities can receive advice from the provincial government and thus take advantage of expertise there for long-term planning but this does not always happen. According to one government official, some communities have built water treatment plants that are larger than necessary. He adds: “Their operational costs are going to be significantly higher than (they) need based on current population and population projections. So you need to invest some money first to control your leaks and then build a treatment plant of the appropriate size to need to meet your water demand. So we’re trying to steer a lot of communities to undertake the right approach.” He concluded, expressing a problem from government’s perspective: “We can’t tell a community what to do . . . we might identify a very effective solution for them but if they don’t consider it a priority then they’re not going to make a request for funding to do what needs to be done.”

According to this official, water management would run more smoothly if communities prioritized it as they do roads and other infrastructure such as municipal buildings. In 2015, only a tiny fraction of the responses to MIGA’s call for applications for infrastructure improvements related to drinking water. It is possible that communities do not understand they could apply for drinking water improvements through this call. This could be remedied through incentives, such as more favourable cost-share arrangements, or through requirements, such as making communities ineligible for other funding if their BWAs are not addressed.

This study revealed that, for drinking water management, rural communities in NL rely on both horizontal and vertical linkages to a high degree; this reliance is exaggerated because of limited capacity at the community level and remoteness in the case of Black Tickle. In this province, the media plays an important role as a horizontal linkage. In the Maritime provinces, regionalization has been viewed as at least a partial solution to some of the problems cited here (Kot *et al.*, 2011; Bakker and Cook, 2011). Increased information and resource sharing can offer rural communities greater leverage (Kot *et al.*, 2011). Regional efforts can be challenging for extremely remote communities like Black Tickle but not impossible, especially if the geographical and cultural experience and greater capacity of NCC is utilized. At the community level, a push towards regionalization is more likely when a majority of communities perceive

high problem severity such that degradation is severe, obvious, and negatively affects their ability to maximize self-defined goals (Memon and Waber, 2010).

6.5 New Government Initiatives

In this province, both government and communities recognize how capacity limitations at the community level hamper the achievement of drinking water goals. Accordingly, MIGA has launched a pilot project under its Integrated Community Sustainability Plan (ICSP) initiative. According to the department, “In its most basic form an ICSP is a long-term strategic plan that should encompass most aspects of municipal planning. Integrated Community Sustainability Plans means a long-term plan, developed in consultation with community members, that provides direction for the cities, towns and regions to realize sustainability objectives it has for the environmental, cultural, social, economic and governance dimensions of its identity”. For municipalities, ICSPs were a requirement of the Gas Tax Agreement (GTA). The pilot project involved hiring water specialists on a regional basis and was in progress at the time of this study. As a government official pointed out to us, remote communities like Black Tickle will not be able to access regional water operators, although it is possible that other communities will benefit from this approach.

The *Maintenance Assurance Manual* (MAM) is a new provincial government initiative, developed by MIGA initially, that aims to advance the multi-barrier approach through advancing human capacity. The MAM was in the development phase at the time of the study. As a government interviewee explained, “(The manual will) deal with situations on a case by case basis. It serves as a tool to monitor and support drinking water operators to maintain water systems as well as apply for a possible funding. It will assist communities to maintain water systems on their own by including such features as water consumption log templates.” MAMs could potentially address some of the concerns about liability as the manual emphasizes best practices related to preventative maintenance of infrastructure. MA planned to educate and circulate the manual templates to communities. The problem however, is that at the time of this research, though the templates are available, no resources are available to help communities to complete their MAMs, such as a guidance document.

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

It is clear from the study that communities in rural Newfoundland and Labrador face drinking water crises, which even though there is no standard definition for what constitutes a water crisis. All three communities have faced at least one of these categories of water crises including contamination, infrastructure, water shortages and weather. Secondly, the provincial government does not have conservation plans in place for water management and deals with drinking water crises on a case by case basis. Finally, only one of the study communities - Flat Bay – has consistently implemented SWP.

These issues are attributed to the limited decentralized water systems of the province. Decentralization does not adequately respond to any of the dimensions of DWS: access, availability, quality or preference. Nor does it operate from the perspective of water security as a right. The central problems are local capacity and financial resources. Limited local capacity means that local governments might be less proactive in protecting drinking water sources and instead make unwise decisions, such as investing in inappropriate technologies. With limited capacities to manage drinking water systems in the province, the contributions of volunteers cannot be underrated. However, the current reliance on volunteers is problematic and can work only in heavily populated regions where there are a lot of options in terms of individuals with the requisite expertise to work on drinking water systems. In rural communities, such as those outlined in this report, the number of volunteers is often limited and volunteers are highly susceptible to burnout.

The provision and access of safe drinking water is a right and should require different approaches to its management. These approaches involve looking at all areas of safe drinking water provision and management and clearly putting in place measures to ensure that there is no deficiency in any of these areas. Such measures should not just ensure that responses are provided only when there is drinking water crisis but that there is committed emphasis on the prevention of such crises. One promising development in this area is ENVC's development of a new SWP toolbox for BWAs that has been successfully piloted in Portugal Cove South on the

Avalon Peninsula; prior to the project, the community had been on a BWA for 28 years (Dawe, 2016).

7.2 Recommendations

We make the following recommendations to advance drinking water crisis prevention in an attempt to shift the focus from crisis response.

For the provincial government:

1. Establish a broader definition of water crisis: The provincial government should not only see challenges with the source water as the only drinking water crisis criterion but also include issues relating to contamination, infrastructure, water shortages, weather, and aesthetic issues like taste, smell and appearance. The broader definition should also take into consideration factors that determine whether a particular instance relates to drinking water crisis including duration, funding required and the extent of effects from such challenge(s).
2. Develop a comprehensive water management plan for the entire province, created collaboratively meaningfully engaging local level government, residents, academics, non-governmental organizations and apex organizations such as Municipalities Newfoundland and Labrador.
3. Create community- or region-specific water emergency preparedness plans that focus on preventative actions. Such plans are necessary to ensure that rural drinking water needs are met. It would also ensure that drinking water systems, including infrastructure, are adequately monitored and evaluated so that needs are met and crises, prevented. Such emergency preparedness plans could be incorporated into existing Maintenance Assurance Manual creation efforts.
4. Recognize that decentralization cannot work unless local organizations have sufficient resources. Such resources should include financial resources to train and pay operators as well as education and training for the implementation of source water protection stewardship and monitoring efforts. Access to drinking water is a basic right and its provision and management should not be left in the hands of volunteers, especially as the stakes are so high in terms of health.

For municipalities and LSDs:

5. Recognize the importance of the development of horizontal linkages, which can serve as advocates for resolving drinking water crises. This is especially true of communities without businesses and other influential voices. Rural communities should work with media and civil society to channel their drinking water challenges and push for long term solutions to such challenges.
6. Recognize the importance of vertical linkages. The provincial government, especially ENVC and MIGA (now MA) should be viewed as a resource and a source of expertise that can advance drinking water goals.
7. Prioritize DWS improvements over other infrastructure improvements; in other words, request these improvements in response to MIGA's annual call for infrastructure improvements.

For the provincial government and communities:

8. Communities should be consulted about their particular situations and their need to participate in drinking water management. This includes putting in place water management committees in each rural community to serve liaison, education and advocacy roles. These committees should all interact with provincial, regional and local actors (e.g., residents). This would promote better community-level understanding of drinking water management and issues and related community responsibilities, such as avoiding activity around source waters and their role in monitoring and protecting their watersheds.

SELECTED BIBLIOGRAPHY

- Act, M. (1999). SNL 1999, c M-24. *Municipal Powers Act, RSQ c C-47.1*, 4-6.
- Ananda, J., & Proctor, W. (2013). Collaborative approaches to water management and planning: An institutional perspective. *Ecological Economics*, 86, 97–106. doi:10.1016/j.ecolecon.2012.10.018.
- Bakker, K., & Cook, C. (2011). Water governance in Canada: Innovation and fragmentation. *International Journal of Water Resources Development*, 27(2), 275-289. *Management*, 54(2), 240–54. doi:10.1007/s00267-014-0301-3.
- Dawe, P. (2016). *Standard operating procedures for the reduction of boil water advisories in Newfoundland and Labrador*. Presented at Municipalities Newfoundland and Labrador's 2016 Municipal Symposium. Retrieved June 22, 2016 from <http://www.municipalnl.ca/userfiles/files/Boil%20Water%20Advisories%20Update.pdf>
- De Loë, R. C., Di Giantomasso, S. E., & Kreutzwiser, R. D. (2002). Local capacity for groundwater protection in Ontario. *Environmental Management*, 29(2), 217–233.
- Gerlak, A. K., & Wilder, M. (2012). Exploring the textured landscape of water insecurity and the human right to water. *Environment: Science and Policy for Sustainable Development*, 54(2), 4-17.
- Goldhar, C., Bell, T., & Wolf, J. (2013). Rethinking existing approaches to water security in remote communities: An analysis of two drinking water systems in Nunatsiavut, Labrador, Canada. *Water Alternatives*, 6(3), 462–486.
- Government of NL (2002). *Water Resources Act*. (Amended:2004 cL-3.1 s66; 2008 c47 s20; 2008 cE-9.1 s28). Retrieved June 20, 2016 from <http://www.assembly.nl.ca/legislation/sr/statutes/w04-01.htm>
- Government of NL (2015). *Drinking Water Safety in Newfoundland and Labrador Annual Report 2014*. Department of Environment and Conservation, NL.. Retrieved June 20, 2016 from http://www.env.gov.nl.ca/env/waterres/reports/drinking_water/annual_report_2014.pdf
- Government of NL (2016). *Drinking Water Safety in Newfoundland and Labrador Annual Report 2015*. Department of Environment and Conservation, NL.. Retrieved June 20, 2016 from http://www.env.gov.nl.ca/env/waterres/reports/drinking_water/annual_report_2015.pdf
- Hanrahan, M., Sarkar, A., & Hudson, A. (2015). Water insecurity in Indigenous Canada: a community-based inter-disciplinary approach. *Water Quality Research Journal of Canada*, wqrjc2015010.

- Hearn, D. (2005). *Steady Brook watershed management plan*. Steady Brook, NL: Western Newfoundland Model Forest. Retrieved from http://www.env.gov.nl.ca/env/waterres/quality/drinkingwater/pdf/SteadyBrook_Management_Plan.pdf
- Hearn, D. (2007). A municipal guide to the development of a watershed management plan. Retrieved June 20, 2016 from http://www.env.gov.nl.ca/env/waterres/quality/drinkingwater/pdf/Municipal_Guide_Management_Plan.pdf
- Kot, M., Castleden, H., & Gagnon, G. (2011). Unintended consequences of regulating drinking water in rural Canadian communities: Examples from Atlantic Canada. *Health & Place*, 17(5), 1030–7. doi:10.1016/j.healthplace.2011.06.012.
- Memon, A., & Weber, E. P. (2010). Overcoming obstacles to collaborative water governance: Moving toward sustainability in New Zealand. *Journal of Natural Resources Policy Research*, 2(March 2015), 103–116. doi:10.1080/19390451003643593.
- Minnes, S., & Vodden, K. (2014). Exploring solutions for sustainable rural drinking water systems: A study of rural Newfoundland and Labrador drinking water systems. *The Harris Centre: St. John's*. Retrieved June 20, 2016 from http://www.mun.ca/harriscentre/Rural_Water_Report.pdf
- Minnes, S. (2014). Commercial logging in a protected water supply area: Spotlight on Corner Brook Pulp and Paper Limited's operations in the Town of Steady Brook. Retrieved June 20, 2016 from <http://nlwater.ruralresilience.ca/wp-content/uploads/2013/04/Case-Study-Steady-Brook-FINAL.pdf>
- Mukheibir, P. (2010). Water access, water scarcity, and climate change. *Environmental management*, 45(5), 1027-1039
- Norman, E. S., Bakker, K., & Cook, C. (2012). Introduction to the themed section: Water governance and the politics of scale. *Water Alternatives*, 5(1), 52–61.
- Norman, E. S., Bakker, K., & Dunn, G. (2011). Recent developments in Canadian water policy: An emerging water security paradigm. *Canadian Water Resources Journal*, 36(March 2015), 53–66. doi:10.4296/cwrj3601053.
- Patrick, R. J. (2011). Uneven access to safe drinking water for First Nations in Canada: Connecting health and place through source water protection. *Health and Place*, 17(1), 386–389. doi:10.1016/j.healthplace.2010.10.00.
- Rawlyk, F. X., & Patrick, R. J. (2013). Capacity needs for source water protection plan implementation: Lessons from the South Saskatchewan River. *Canadian Journal of Urban Research*, 22(1), 20–45.

- Reid, P., & Vogel, C. (2006). Living and responding to multiple stressors in South Africa—Glimpses from KwaZulu-Natal. *Global Environmental Change*, 16(2), 195-206.
- Rowley, J. (2002). Using case studies in research. *Management research news*, 25(1), 16-27.
- Robins, L. (2007). Nation-wide decentralized governance arrangements and capacities for integrated watershed management: Issues and insights from Canada. *Environments*, 35(2), 1-47.
- Sarkar, A., Hanrahan, M., Hudson, A., & Hudson, A. S. M. H. A. (2015). Water insecurity in Canadian Indigenous communities: some inconvenient truths. *Rural and remote health*, 15(3354).
- Statistics Canada (2012). Flat Bay, Newfoundland and Labrador (Code 100130) and Newfoundland and Labrador (Code 10) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E>
- Statistics Canada (2012). Steady Brook, Newfoundland and Labrador (Code 1005011) and Northwest Territories (Code 61) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E>
- Statistics Canada (2012). Black Tickle-Domino, Newfoundland and Labrador (Code 100263) and Newfoundland and Labrador (Code 10) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E>
- Timmer, D. K., de Loë, R. C., & Kreutzwiser, R. D. (2007). Source water protection in the Annapolis Valley, Nova Scotia: Lessons for building local capacity. *Land Use Policy*, 24(1), 187-198. doi:10.1016/j.landusepol.2005.05.005.
- UN (United Nations) (2000). Millennium Declaration: Resolution adopted by the General Assembly. New York, 18 September 2000.
- van der Zaag, P., & Savenije, H. G. (2004). *Principles of Integrated Water Resources Management*. Unesco-IHE.
- Water Resources Management Division. (2016). *Source water protection: Our water supply is protected- where do we go from here?* Presented at Municipalities Newfoundland and Labrador's Drinking Water Workshop. Retrieved June 22, 2016 from <http://www.municipalnl.ca/userfiles/files/Source%20Water%20Protection%20Dept%20of%20E&C%20low%20res.pdf>

APPENDICES

Appendix I: Interview Guide for Communities

1. Who/ which organization is in charge of or leads community governance?
2. Who/which organization is responsible for the community water system?
3. Does the community receive regular and stable funding for its water system?
4. What education/training has been given to the community about its water supply?
5. What is the population in your community?
6. How many households does the community have?
7. What is the average household size?
8. Is the community aging or is there a good distribution of all ages?
9. Can you describe the local economy? (What do most people do for living? What is the unemployment rate? Do people work away?)
10. Are there any vulnerable groups within the population that might have special needs or requirements?
11. What are the community's transportation links?
12. What other infrastructure does the community have (e.g. school, clinic)?

SECTION B - The Community Water System:

1. Please describe the community's water system, including treatment systems and distribution.
2. What is the source of the community water supply? (e.g. Ground water, spring water, surface water, etc.)
3. What human activities take place around the main water sources?

4. Are there any protection measures around the main water sources? (e.g. Fencing)
5. Are there seasonal or weather variations that impact water quality and quantity?
6. Is water quality monitored? How? How often? Where?
7. Is the water distribution system simple and easy to control?
8. Are treatment plant operators trained?
9. Are the storage tanks protected? (e.g. Rainproof, locked gates)
10. Does the water system/infrastructure work in good condition?
11. What construction materials are used in the infrastructure, and how old is the infrastructure?
12. What is the average pressure in the system, and does it vary?
13. How is wastewater handled?

SECTION C - Descriptions of Water Crisis:

1. How did the water crisis happen? What caused it?
2. When did you realize it was a problem that needed immediate action?
 - In what circumstances?
3. Does the community have a water crisis response plan?
4. How did the community respond? (What did you do? What steps did you take?)
5. What were the options available to the community to deal with the crisis?
6. Were there allies or resource people in the community could call on during the crisis?
 - If so, what was their role?
7. How were residents notified about the water issue?

8. Were you able to obtain drinking water?

- How was water distributed to the community during the crisis?

See Q6.

9. Was the amount of available drinking water adequate?

- How much water was distributed per person per day during the crisis?

10. What were your ongoing concerns during the water crisis?

11. How long did the water crisis last?

12. Did the water shortage result in any long-term impacts on the community?

SECTION D - Community and Government:

1. How did the provincial or federal government respond? What did they do?

2. What steps did they take?

3. Did they have a response plan?

What options or alternatives were presented to the community?

4. Did the government declare state of emergency/ issue any orders/alerts?

5. Did the government launch any monitoring programs during the crisis or to follow up?

6. Did the government hold any public meetings after the crisis soliciting opinions?

7. How did government communicate with you before/ after the crisis?

8. Can you comment on government's water crisis responses?

9. Is there a response plan in case of water crisis (shortage /contamination) in your community?

10. Do you have suggestions to improve government responses to water crises?

Appendix II: Interview Questions for Government Officials

1. Does the NL government have any water crisis response plans or procedures?
 - Please describe the principles behind these plans.
 - Please describe the plans and procedures themselves?
2. Some communities in NL have experienced water shortages. Can you describe the government's responses to these situations? Are there any guidelines for the required amount of water for using during an emergency?
3. How do you manage emergencies in a decentralized water supply system? Any established protocols and existing organizations?
4. Do departments share responsibilities in planning for or responding to water crises? If yes, how?
5. How do interdepartmental communications work in an emergency?
6. Are there successful cases of interdepartmental emergency coordination?
7. Traditional responses to water shortages here and throughout North America tend to concentrate measures on reducing water demand and providing short-term water supplies but overlooking long-term solutions. Is this a fair assessment? Can you comment on it?
8. Has the government implemented any long-term conservation plan for communities with frequent water shortages? Or more generally?
9. Has the NL government launched any initiatives that are aimed at enhancing the capacity of small water systems?
10. What is the role of communities in water crises?
11. How can the multi-barrier approach be implemented at the community level?
12. Are any other policy options being considered?
13. What is the government's regional planning process for water crisis response?
14. What are the challenges that government faces? Can you identify any tradeoff decisions?
15. Can you give us some description of technical specialists who work with the community water system? What is their scope of practice?
16. Do NGOs have a role to play here? If so, can you describe that role?
17. Do you have suggestions or comments that haven't been covered?