EXPLORING SOLUTIONS *for* SUSTAINABLE RURAL DRINKING WATER SYSTEMS

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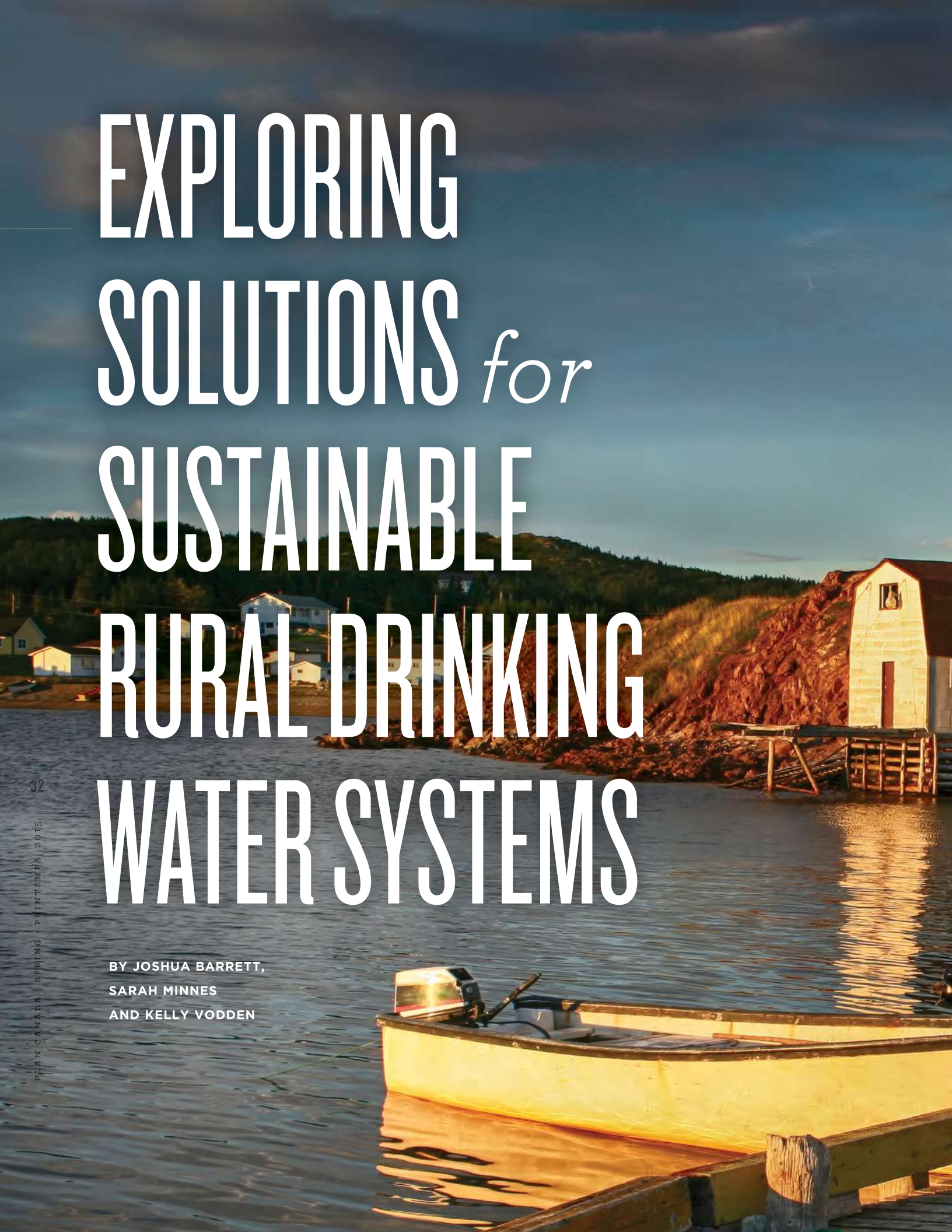

SUMMARY *This article summarizes the overall findings of the Exploring Solutions for Sustainable Rural Drinking Water Systems research project, which was undertaken from February 2013 to December 2014 in Newfoundland and Labrador (NL). The article outlines the serious capacity issues (e.g., technical, human, financial) in rural NL communities, which are preventing the sustainable management of their drinking water systems. Other issues with rural NL drinking water systems include high levels of disinfectant by-products and related health concerns, the prevalence of long-term boil water advisories, and degrading infrastructure. Recommendations for drinking water policy and governance in NL are provided.*

RÉSUMÉ *Cet article résume les conclusions générales du projet de recherche intitulé « Exploring Solutions for Sustainable Rural Drinking Water Systems » réalisé à Terre-Neuve-et-Labrador, de février 2013 à décembre 2014, mettant en lumière les graves problèmes de capacité technique, humaine et financière des communautés rurales de la province, qui compromettent la gestion durable des réseaux d'eau potable. Les problématiques associées aux réseaux d'eau potable de ces régions rurales incluent également la concentration élevée de sous-produits provenant des désinfectants et leurs effets sur la santé, la présence constante d'avis d'ébullition de l'eau, et la dégradation des infrastructures. Enfin, l'article formule des recommandations sur les politiques sur l'eau potable et la gouvernance de la province.*

Sustainable communities in Canada are dependent on safe and reliable drinking water systems. In an effort to understand the concerns facing rural Newfoundland and Labrador (NL) drinking water systems, the *Exploring Solutions for Sustainable Rural Drinking Water Systems* research project was initiated in late February 2013, with funding support from The Harris Centre–RBC Water Research and Outreach Fund as well as the Mitacs Accelerate internship program. This study focussed on the over 374 communities in NL with 1,000 or less residents, with a further focus on communities with public water systems. The project also explored appropriate solutions to identified challenges. The scope of this comprehensive project included four main components of drinking water systems: 1) source water quality and quantity; 2) infrastructure and operations; 3) public perceptions, awareness and demand; and 4) policy and governance.

The project was a collaborative effort between Memorial University faculty and students, Municipalities NL and the Professional Municipal Administrators. The research team included faculty expertise from a wide range of disciplines (e.g., environmental science, environmental policy, medicine, engineering) as well as an advisory committee comprised of federal, provincial, and local government and non-governmental actors with water-related responsibilities.

OVERALL FINDINGS

The state of drinking water systems in rural NL is varied. For example, in surveys and consultations with elected municipal officials, many municipalities reported high drinking water quality. However, considerable concerns for drinking water systems in rural NL were brought to the research team's attention through consultations with municipalities, policy workshops with experts in the field, community case studies, and two surveys (one directed towards community administrators and one for water operators). The most common concern vocalized by communities of 1,000 residents or less was aging and degrading infrastructure. For instance, on a survey given to community administrators, 59% of local service district administrators and 44% of administrators from municipalities of 1,000 residents or less indicated a "lack of funds to make necessary repairs or upgrades" as a challenge facing their drinking water system.

In regards to health risks, consultations revealed that many communities were concerned about high levels of disinfectant by-products. Disinfectant by-products, such as trihalomethanes (THMs) and haloacetic acids (HAAs) can occur when organics in the water react with chlorine. Disinfectant by-products are known carcinogens, with a range of potential long-term health impacts. In a related vein, chlorine use and misuse (i.e., too much or too little in the water) have also been noted as a prominent concern. Furthermore, the prevalence of long-term boil water advisories (lasting for more than one year) is an issue in the province (see Figure 1), with some advisories outstanding for more than two decades. Long-term boil water advisories were found to be predominantly found in communities with 1,000 residents or less, resulting in compromised access to safe, clean drinking water. Case studies and consultations further suggest that boil water advisories and disinfectant by-product concerns along with distaste for chlorinated and/or discoloured drinking water, encourages some residents to turn to untreated water sources such as roadside springs.

We found that many communities of 1,000 or less face a range of challenges in managing their drinking water systems, including lack of human resources and technical capacity. Inability to find, train and retain certified water operators in small communities threatens the safe operation of drinking water systems, as well as strategic management of drinking water infrastructure. We found that many of these communities did not have organized leak detection programs or access to all water-related blueprints and as-builts, especially in communities with uncertified water operators. However, it should be noted the Province's Department of Environment and Conservation attempts to combat the issue of uncertified operators with their mobile training unit.

The project also studied watershed management practices and strategies that can improve drinking water quality. Protection of source water supplies is largely a municipal responsibility. Yet due to a lack of human capacity at the local level, source water protection efforts are often overlooked in communities of 1,000 residents or less. In many of these small communities, fully implementing their mandated drinking water responsibilities is virtually impossible with existing human and financial resources. Issues of dwindling human resources were also found at the provincial level, constraining the level of support available for small communities. Overall, insufficient funding and human resources at both the local and provincial levels in NL threaten the sustainability of rural drinking water systems.

RECOMMENDATIONS FOR FUTURE POLICY AND PLANNING

The study provided a suite of recommendations for drinking water policy and governance in NL, including greater emphasis on the potential for regional solutions (e.g., regional certified operator programs) and better integration of actors and decision makers surrounding drinking water. In Ontario, for example, source protection committees under the *Clean Water Act* (2006)[1] are comprised of representatives from municipal, and commercial/ industrial sectors as well as academic, professional, First Nations, NGO and/or general public members. Furthermore, greater focus is needed on community-based solutions that focus on capacity development and the engagement and education of local decision makers, staff, the public, and other groups that can help local governments address their drinking water challenges. Regional watershed-based source water protection committees such as those in Ontario could be a venue for this type of capacity building; however more research is needed to develop a model appropriate for the rural NL context.

We also recommend special attention to addressing long-term boil water advisories and communities that exceed the Health Canada guidelines for safe levels of THMs and HAA, including cost-benefit analyses of requiring filtration and/or other disinfectant by-products reducing technologies. High levels of disinfectant by-products in other provinces in Canada have led many communities to choose: alternatives to chlorine as their primary disinfectant; enhanced treatments (e.g., membrane filtration, granular activate carbon, reverse osmosis);

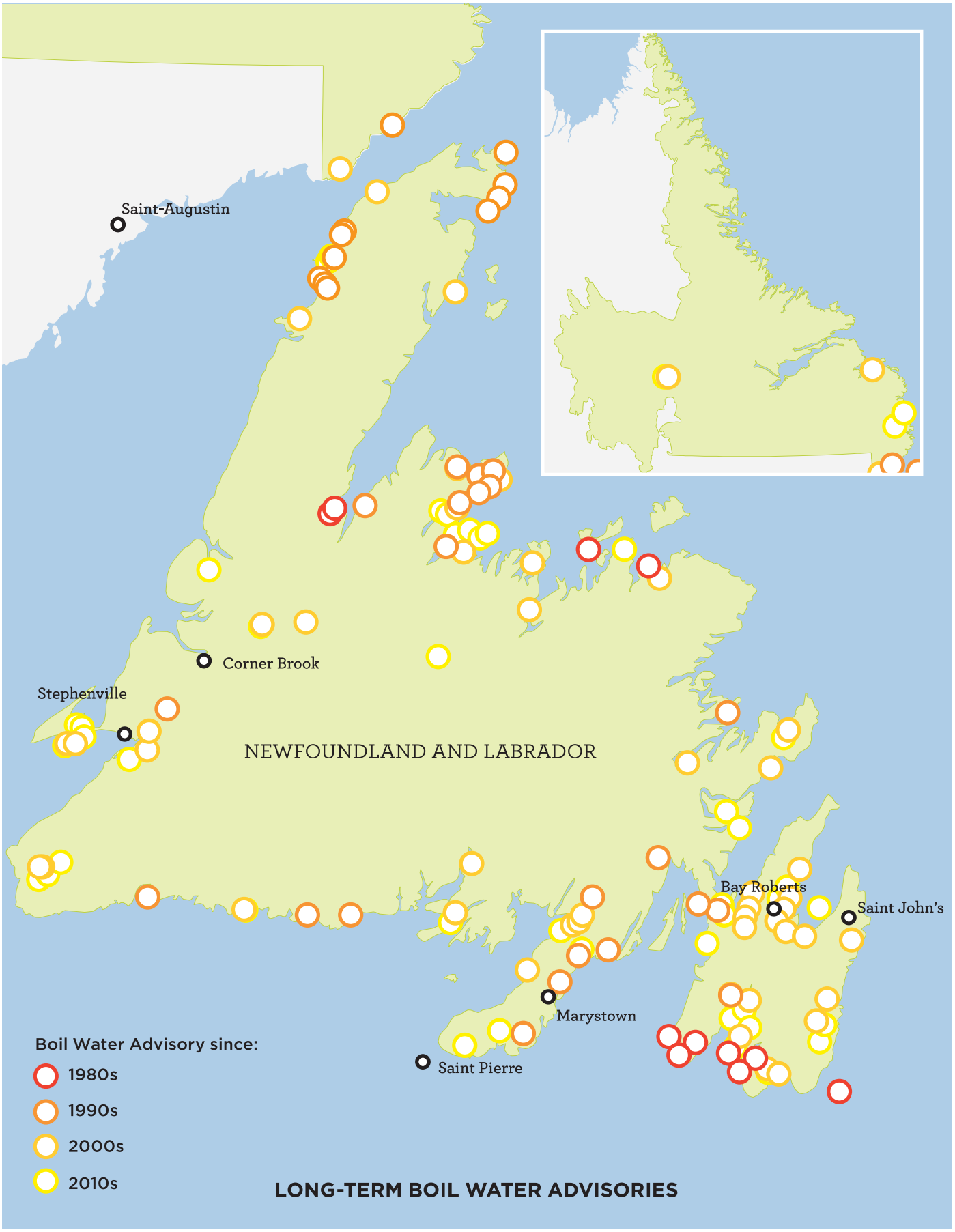

FIGURE 1: NL Communities on BWAs of 1 Year+. Adapted from map courtesy of Myron King, Environmental Policy Institute. Map illustration from freevectormaps.com.


PROTECTED PUBLIC WATER SUPPLY AREA
WATER RESOURCES ACT
It is an offence to undertake any development or activity in this area without prior written authorization from the Minister of Environment.
PROTECTED WATER SUPPLY AREA

and/or better source protection.[2] For example, Manitoba released a *Chlorine and Alternative Disinfectants Guidance Manual* to help with the selection and application of the most appropriate disinfectants, providing information on alternative or advanced systems such as chloramines, ozone, chlorine dioxide and ultraviolet radiation.[3] It is clear the communities in rural NL need more technical help and financial support in choosing appropriate filtration and treatment options for their communities.

Furthermore, conservation efforts, proper tracking of leaks and other asset management activities should not be overlooked as important actions for achieving sustainable rural drinking water systems. An example of a program from British Columbia that could be employed in rural NL communities and elsewhere is the Columbia Basin Trust "Water Smart" program. The program includes water loss management training, water metering assessment and support, a Water Smart Ambassador educational program, and other learning opportunities.[4] The program has been applied in multiple communities across the Columbia Basin, gaining positive results. More information on this program can be found at: https://www.cbt.org/watersmart/

Changes in both policy and operations are required to improve the state of drinking water systems in rural NL; however, this will be most effectively accomplished as a shared venture amongst local, provincial, and federal governments, together with academia, non-government organizations, industry, and citizens. The role of provincial planners in departments such as the Office of Public Engagement and Municipal and Intergovernmental Affairs, in helping small and sometimes remote communities that do not have community or regional planners of their own on staff should also be examined. The role of planners is especially important in improving regional collaborations and shared solutions for sustainable drinking water systems. More informed decision makers make better decisions.

Potable Water Dispensing Unit in the case study community of Black Tickle-Domino (Southern Inuit). Potable Water Dispensing Units, also known as Advanced Drinking Water Systems, are one alternative type of water system being explored by rural communities in NL. This option requires residents to retrieve water directly from this system. Photo credit: Maura Hanrahan

The pump house at Shambler's Cove Pond, Greenspond, NL. Photo credit: Jen Daniels

The final report for the Rural Drinking Water Project[5] stresses the importance of more education and training for municipal decision makers on water-related issues. Planners can also play a part in assisting with these efforts.

Ultimately, there are significant costs in distributing clean drinking water. Similar to many parts of rural Canada, NL is a large province, with many small, spread out communities, often with declining populations and limited tax bases. Many of the recommendations outlined in the final report of this research will require more funding for drinking water related solutions. Where this funding can and should come from is a topic that requires further dialogue and critical examination. We suggest that water services must be considered in current fiscal framework discussions and the true costs of water supply and distribution should be accounted for in municipal budgets and reflected in water and sewer rates, while keeping in mind equity concerns. An emphasis should be put on investing money strategically and efficiently, with the utilization of regional approaches and investments in long-term planning and asset management activities. Access to safe, acceptable, affordable, and physically accessible water is a basic human right, recognized by the United Nations. However, it should be recognized that drinking water services do not come for free.

The final report for this research can be found at: http://www.mun.ca/harriscentre/Rural_Water_Report.pdf. For access to other project presentations and final reports please visit our website: http://nlwater.ruralresilience.ca/?page_id=17 ■

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