



Policy Brief 3

Infrastructure and Operations of Drinking Water Systems In Rural Newfoundland and Labrador

SUMMARY

In rural Newfoundland and Labrador (NL) issues with aging and degrading infrastructure were prominent during this research. Specifically, communities of 1,000 residents or less more frequently reported infrastructure and operational issues compared to larger communities. For example, it was found that communities of 1,000 residents or less were more likely to have uncertified water operators. A lack of asset management of drinking water systems in communities with uncertified water operators is further contributing to issues of degrading infrastructure. Key concerns in regards to asset management included a lack of: as-builts and mapping of infrastructure, organized leak detection, and strategic plans to improve infrastructure and operations. Furthermore, new water systems were sometimes installed that failed or quickly broke down, as the new technology did not take into account the human, technical, and financial capacity in small towns. Though significant provincial funding has been invested in drinking water systems in the province, the projected infrastructure needs of communities of 1,000 residents or less over the next ten years will require an even larger contribution. Lastly, though sometimes noted as an innovation, municipal representatives voiced mixed feelings over potable water dispensing units. We recommend greater emphasis on enforcing water operator certification in NL. Expanding the Permit to Operate Drinking Water Inspection Program could aid in this. Furthermore, asset management activities need to become part of regular standard operating procedures in rural NL. Greater incentives for regional sharing and more specifically regional operator programs are also recommended to provide equipment and expertise to communities that otherwise would not be able to afford it.

BACKGROUND

For the purposes of this brief, “infrastructure” refers to all infrastructure related to public drinking water systems, including water intakes and treatment plants, pump houses, and distribution lines. “Operations” refers to the operations and maintenance of drinking water systems, including daily procedures, operator training and certification, and proactive maintenance such as leak detection. The findings and recommendations below outline the main findings pertaining to water infrastructure and operations of the 2013-2014 research study entitled *Exploring Solutions for Sustainable Rural Drinking Water Systems*.

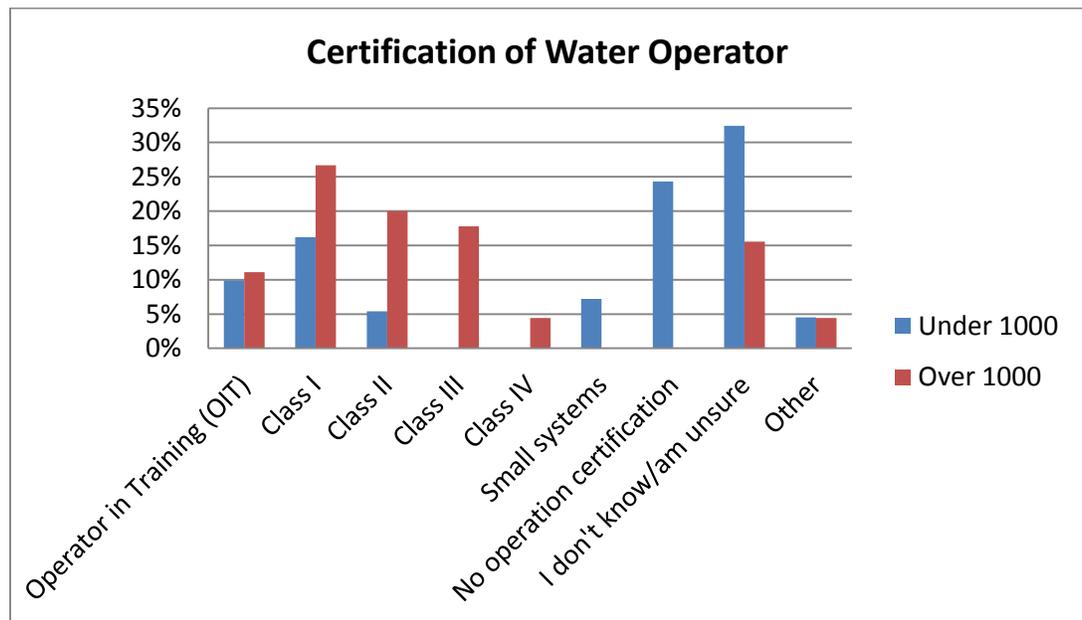
AREAS OF CONCERN

AGING AND DEGRADING INFRASTRUCTURE Aging and degrading infrastructure was noted as a concern for the majority of communities of 1,000 residents or less through consultations with municipal representatives and in surveys directed towards community administrators and water operators. For example, Woody Point’s water supply system was installed in 1975, and

while the system has undergone minor repairs, there have not been any system upgrades since installation. Challenges with infrastructure deficit and addressing infrastructure issues are common throughout Canada (see Mirza, 2007). From 2008-2014, the department of Municipal and Intergovernmental Affairs gave an average of \$15.8M per year to communities of 1,000 residents or less for drinking water infrastructure projects, and an average of \$3.8M per year for water and sewer joint projects. A recent survey by Municipalities Newfoundland and Labrador indicated that communities of 1,000 residents or less anticipate spending over \$28M per year over the next ten years on water related capital costs. Thus previous levels of expenditure will need to increase significantly to meet anticipated needs of communities of 1,000 residents or less.

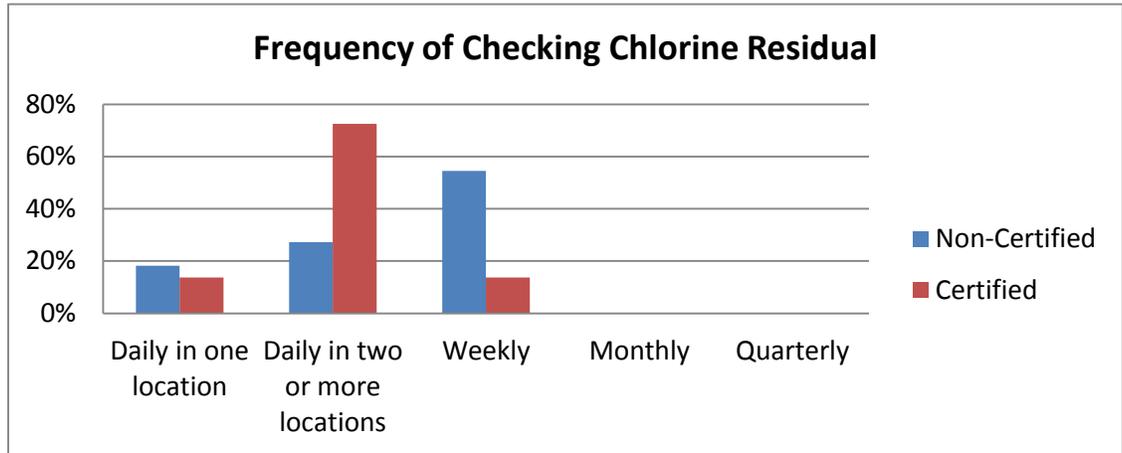
Consultation revealed new infrastructure installed was sometimes inappropriate for the local context, as there was not always the necessary local expertise to operate or repair the infrastructure. Furthermore, a lack of asset management (a means to improve the lifespan and functioning of infrastructure) was found in terms of the operations of water systems in rural NL. Issues associated with asset management included limited maps and as-builts of water infrastructure, a lack of organized leak detection programs, no strategic planning for moving forward with solutions, and an absence of full cost accounting (i.e. accounting for the complete or true cost of drinking water systems, including all direct and indirect costs that are upfront, operational, and in the future).

**OPERATOR
EDUCATION,
TRAINING, AND
CERTIFICATION**



According to survey results, uncertified water operators (those who have not begun any formal training with the Department of Environment and Conservation’s Operator Education, Training, and Certification program) are more prevalent in communities of 1,000 residents or less. It was found that certified water operators were more likely than non-certified operators to: have a Capital Works Plan that focused on expanding, improving, repairing, or replacing the municipal water system; have complete maps of pipe infrastructure; have an office or filing area for drinking water system information; and have a maintenance plan for the water treatment system/plant operations. Uncertified water operators were more likely to only check chlorine residual levels in

their town weekly rather than daily in two locations (as required provincially). Lastly, succession planning for water operators was also an issue in rural towns in NL. In small communities, operators, often volunteers, are given the great responsibility of operating their town’s drinking water system. Finding volunteers who are qualified and willing to take this job on is difficult. Furthermore, valuable knowledge about the system and operations is often not passed on before the previous water operator resigns from duties.



POTABLE WATER DISPENSING UNITS (PWDU)

PWDUs (aka advanced drinking water systems) were noted as both an innovative solution, and an “expensive band-aid”. However, it was found that most PWDUs installed were working properly and addressed issues that were in the community prior to the PWDU (e.g. health concerns with the public water system; limited funding to install or maintain a direct-to-home public water system; and chronic or long-term boil water advisories). However, there were concerns with PWDUs due to rising costs of installation. Additionally, in the community of Black Tickle-Domino, residents complained that the PWDU was not placed in an optimal location, it was physically strenuous to manually collect the water, and PWDU usage was limited due to frequent malfunctions.

POLICY RECOMMENDATIONS

AGING AND DEGRADING INFRASTRUCTURE

1. Increase funding and support for asset management activities as well as management of relevant data concerning drinking water systems.
2. Implement Maintenance Assurance Manuals across the province with manuals that consider the particular challenges faced in small drinking water systems.
3. Include full cost accounting and appropriate pricing for water services in fiscal framework discussions.
4. Continue to invest and plan for re-investment to address the infrastructure deficit in rural NL with particular attention to communities experiencing chronic problems (e.g. long term BWAs and high DBPs).

OPERATOR EDUCATION, TRAINING, AND CERTIFICATION

5. Include mandatory certification for all water operators as part of the Water Resources Act legislation.
6. Foster enhanced compliance with provincial drinking water policies and regulations. For example:
 - 6.1. Expand the Permit to Operate Drinking Water Inspection Program and make Permits to Operate publicly available on the Water Resources Portal.
 - 6.2. Provide more capacity (financial, human and technical) and opportunities for capacity building at all levels specific to enhancing compliance with water policies and regulations
 - 6.3. Make self-reporting mandatory for public water system operators, so requirements under policies and regulations are clear.
7. Enhance succession planning for water operators and designation of back up water operators.
8. Provide further incentives and sustained support for regional operators and other regional service sharing and drinking water management initiatives.
9. Offer more regional training opportunities for water operators.
10. Provide greater education and capacity building opportunities concerning best practices on the management of drinking water systems for decision makers such as mayors, councillors and town staff.

FUTURE RESEARCH NEEDED

1. Review of small systems operational best practices and an ongoing review of technologies that are appropriate and feasible for the rural NL context.
2. Feasibility of remote technologies such as chlorine analyzer readers for small water systems.
3. Effectiveness of PWDUs as a rural drinking water solution.
4. Feasibility of regional water operators and other regional approaches.
5. Accurate full cost accounting for drinking water service provision.



PWDU in Black Tickle-Domino

SOURCES FOR FURTHER READINGS

Bakker, K. (Ed.). (2007). *Eau Canada*. Vancouver: UBC Press.

CBCL Limited. (2012). *Managing Municipal Infrastructure in a Changing Climate*. St. John's. Retrieved from [http://www.municipalnl.ca/userfiles/files/DEC-00306-Infrastructure Workbook %28Web-Email Quality%29.pdf](http://www.municipalnl.ca/userfiles/files/DEC-00306-Infrastructure%20Workbook%28Web-Email%20Quality%29.pdf)

Cooper, T. (2013). *Creating and Crumbling: Municipal Infrastructure Strategic Risks*. Prepared for Municipalities Newfoundland and Labrador. Retrieved from <http://www.municipalnl.ca/userfiles/files/Municipal%20Infrastructure%20Rpt%20Tom%20Cooper.pdf>

Connelly, S., Markey, S., & Roseland, M. (2009). Strategic sustainability: Addressing the community infrastructure deficit. *Canadian Journal of Urban Research*, 18(1), 1–23.

Dolter, S. (2014). *Drinking Water Policy Workshop*. Prepared for the Environmental Policy Institute. Report for the *Exploring Solutions for Sustainable Rural Drinking Water Systems Project*. Retrieved from http://nlwater.ruralresilience.ca/wp-content/uploads/2013/04/EPI_WaterPolicyProceedings_Final_Final_HC.pdf

Hardie, D., & Alasia, A. (January 2009). Domestic Water Use: The Relevance of Rurality in Quantity Used and Perceived Quality. *Rural and Small Town Canada Analysis Bulletin*, 7 (5). Retrieved from, <http://www.statcan.gc.ca/pub/21-006-x/21-006-x2007005-eng.pdf>

Heare, S. (2007). *epa communiqué : Achieving Sustainable Water Infrastructure*. *American Water Works Association*, 99(4), 24–26.

Infrastructure Canada. (2011). *Building for Prosperity: Public Infrastructure in Canada*. Ottawa, ON. Retrieved from <http://www.infrastructure.gc.ca/alt-format/pdf/Plan-Booklet-Livret-eng.pdf>

Kot, M., Castleden, H., & Gagnon, G. a. (2011). Unintended consequences of regulating drinking water in rural Canadian communities: examples from Atlantic Canada. *Health & Place*, 17(5), 1030–7.

- Minnes, S., & Vodden, K. (2014). *Exploring Solutions for Sustainable Rural Drinking Water Systems: a study of rural Newfoundland and Labrador drinking water systems*. Corner Brook, NL. Retrieved from http://www.mun.ca/harriscentre/Rural_Water_Report.pdf
- Mirza, S. (2007). *Danger Ahead: The Coming Collapse of Canada's Municipal Infrastructure*. Retrieved from https://www.fcm.ca/Documents/reports/Danger_Ahead_The_coming_collapse_of_Canadas_municipal_infrastructure_EN.pdf
- Moriarty, P.; Smits, S.; Butterworth, J. and Franceys, R. 2013. Trends in rural water supply: Towards a service delivery approach. *Water Alternatives* 6(3): 329-349
- Ramalho, C., Van Zyll de Jong, M., Will, A. & Macleod. (2014). Exploring the Sustainability of Drinking Water Systems in Newfoundland and Labrador: A Scoping Document. Report for the *Exploring Solutions for Sustainable Rural Drinking Water Systems Project*. Grenfell Campus- Memorial University of Newfoundland, NL. Retrieved from http://nlwater.ruralresilience.ca/wp-content/uploads/2013/04/FINAL_Rural-Drinking-Water-Scoping-Document_June11_Submitted-to-HC.pdf
- Roseland, M. (2012). *Toward Sustainable Communities* (4th ed.). Gabriola Island: New Society Publishers.
- United States Environmental Protection Agency (USEPA).(2012). *The Facts About Sustainable Water Infrastructure*. Retrieved July 11, 2014 from http://water.epa.gov/infrastructure/sustain/localofficials_facts.cfm
- Vreugdenhil, H., J. Slinger, W. Thissen, and P. Ker Rault. 2010. Pilot projects in water management. *Ecology and Society* 15(3): 13. [online] URL: <http://www.ecologyandsociety.org/vol15/iss3/art13/>

ABOUT THIS POLICY BRIEF

This policy brief is part of a two-year research project entitled *Exploring Solutions for Sustainable Rural Drinking Water Systems*. This project focused on communities of 1,000 residents or less in rural Newfoundland and Labrador (NL) and the unique challenges these communities face concerning their drinking water systems. The project also explored appropriate solutions to identified challenges. The scope of this interdisciplinary project was large, exploring 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. It is important to acknowledge that these aspects of the drinking water system are interrelated.

This research was led by Dr. Kelly Vodden (Memorial University, Grenfell Campus) in collaboration with Municipalities Newfoundland and Labrador (MNL) and Professional Municipal Administrators (PMA). Funding support from the *Harris Centre – RBC Water Research and Outreach Fund* and the *Mitacs-Accelerate* internship program is gratefully acknowledged. Please see the project website for the full list of partners as well as associated reports and resources: <http://nlwater.ruralresilience.ca>

For the full final report for this project that includes more information on all topics discussed in this brief, please see: http://www.mun.ca/harriscentre/Rural_Water_Report.pdf

For more information about this brief please contact Sarah Minnes, Environmental Policy Institute, Memorial University of Newfoundland-Grenfell Campus (sminnes@grenfell.mun.ca) or Kelly Vodden, Environmental Policy Institute, Memorial University of Newfoundland-Grenfell Campus (kvodden@grenfell.mun.ca).

