Collaborative Water Sharing Between First Nations and Municipalities in Ontario

Preliminary Empirical Findings – Quality Outcomes of Water Sharing Arrangements

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Key Empirical Research Questions: *Do WSAs effect drinking water quality outcomes for the recipient systems? Does this 'WSA effect' vary depending on whether the recipient system is a First Nation water system, or a municipal water system?*

Across the province of Ontario, many communities receive treated water from a neighbour. We refer to these exchanges as water sharing arrangements (WSAs). We investigate the effect of WSAs on drinking water advisories (DWAs) for recipient systems. DWAs indicate that drinking water may be unsafe, or is deemed unsafe by water quality test results.

We assess our key research questions using a unique dataset that characterizes the nature of water supply in communities within the province of Ontario in the years 2009-2010. (This specific year is chosen because we have access to detailed information on water quality in First Nations communities during this period.) Our dataset consists of 710 water systems: 145 First Nations systems, and 565 municipal systems. It also includes key characteristics of the communities associated with each water system. These characteristics may also impact water quality.

Variable	Mean (Std. Dev.)	Min	Max
Community Located in Northern Ontario	0.311 (0.463)	0	1
Population Density (100s of people per square kilometer)	173.35 (459.53)	0.3	3972.4
Distance to Closest Neighbour (kilometers)	7.75 (14.5)	0.053	178.42
Census Division Median Income ($s)	26,285.35 (2546.61)	19,894	35,433
System Supplied Exclusively by Groundwater	0.415 (0.493)	0	1
System Classified as "Large Residential" – 100+ Connections	0.686 (0.464)	0	1

Summary statistics for some of these variables are provided in the Table above. Importantly, all WSA donor systems in our analysis are municipal systems, but recipients consist of both municipal and First Nations systems.

Drinking Water Quality Standards and Enforcement in Ontario: the Institutional Gap Between First Nations and Municipalities

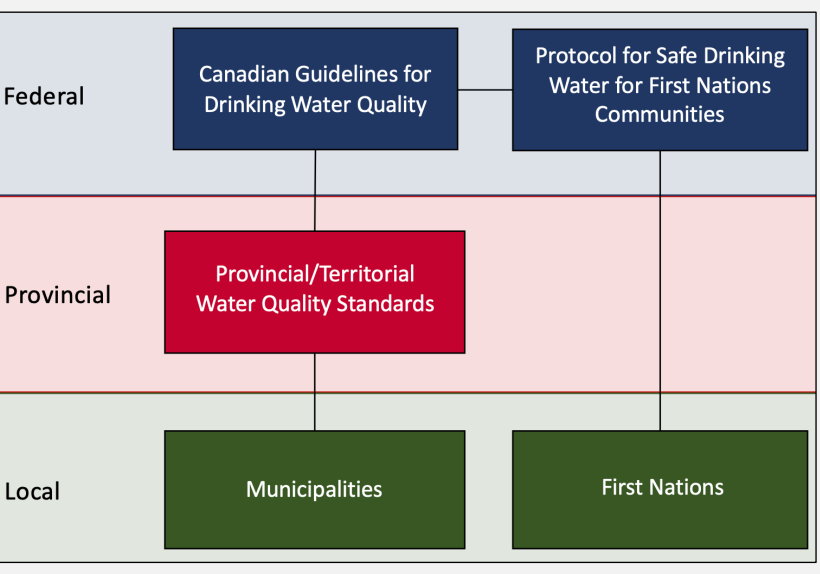

Figure 1: Governance of Drinking Water Safety in Municipalities and First Nations

There are many important differences between First Nations and municipalities in Ontario, with respect to the institutions governing water quality and safety. The figure on the left helps to illustrate these differences.

In Canada, Provinces and Territories are responsible for enforceable drinking water quality standards. These standards are based on the federal guidelines for drinking water quality, which are adopted with varying levels of stringency by each Canadian province and Territory. These federal guidelines also provide the basis for the *Protocol for Safe Drinking Water in First Nations Communities*. However, this protocol is not legally enforceable to the same degree that provincial water quality standards are enforceable.

For Ontario municipalities, the provincial government – through the Ministry of the Environment, Conservation and Parks (MOECP) – lends state capacity for drinking water quality monitoring and enforcement. Because First Nations each have a distinct nation-to-nation relationship with the federal government and do not fall under provincial jurisdiction, they do not have access to the same provincial capacity for water quality monitoring and enforcement that municipalities enjoy. And First Nations do not currently have a comparable third party institution to assist them in achieving positive water quality outcomes. Instead, First Nations must develop their own regulatory regimes for water quality monitoring and enforcement on a community-by-community basis, drawing from their federal protocol; this is both challenging and costly.

Hypotheses

1.We hypothesize that WSAs will improve water quality outcomes for recipient First Nations water systems.
2.We do not expect to find a similarly strong 'WSA effect' on water quality for participating municipalities.

Basis for Hypotheses:

1.Participating in a WSA and purchasing water from a neighbouring municipality allows First Nations to tap into the state capacity associated with the province's third party water quality monitoring and enforcement.
2.Municipalities already benefit from access to provincial state capacity for water quality monitoring and enforcement, whether they are engaged in a WSA or not.

Key Findings

Figure 2 to the right provides a comparison of the proportion of DWAs for independently supplied water systems (in the left column) versus those supplied in whole or in part through a WSA (in the right column). This comparison is given for all water systems in the dataset (in the top panel), municipal water systems (in the middle panel) and First Nations water systems (in the bottom panel).

As demonstrated by the top panel, water systems supplied through WSAs have a lower prevalence of DWAs – 5%, compared to a 16% prevalence for independently supplied water systems. A comparison of the middle and bottom panels of the figure demonstrate that this difference is driven by First Nations water systems. As the middle panel illustrates, municipalities that are independently supplied have an almost identical DWA prevalence as those that are supplied through WSAs: 5% versus 4%, respectively. In contrast, there is a large difference in DWA prevalence between First Nations supplied through WSAs and those supplied independently: 17% versus 50%, respectively.

Preliminary regression results mirror the summary statistics provided in Figure 2. Controlling for other community characteristics that may influence water system outcomes, we find that participating in WSAs significantly reduces the likelihood that a First Nations water system will be under a DWA – by somewhere between 33% and 52%, depending on the model specification. As expected, we do not find a similarly significant effect for municipalities.

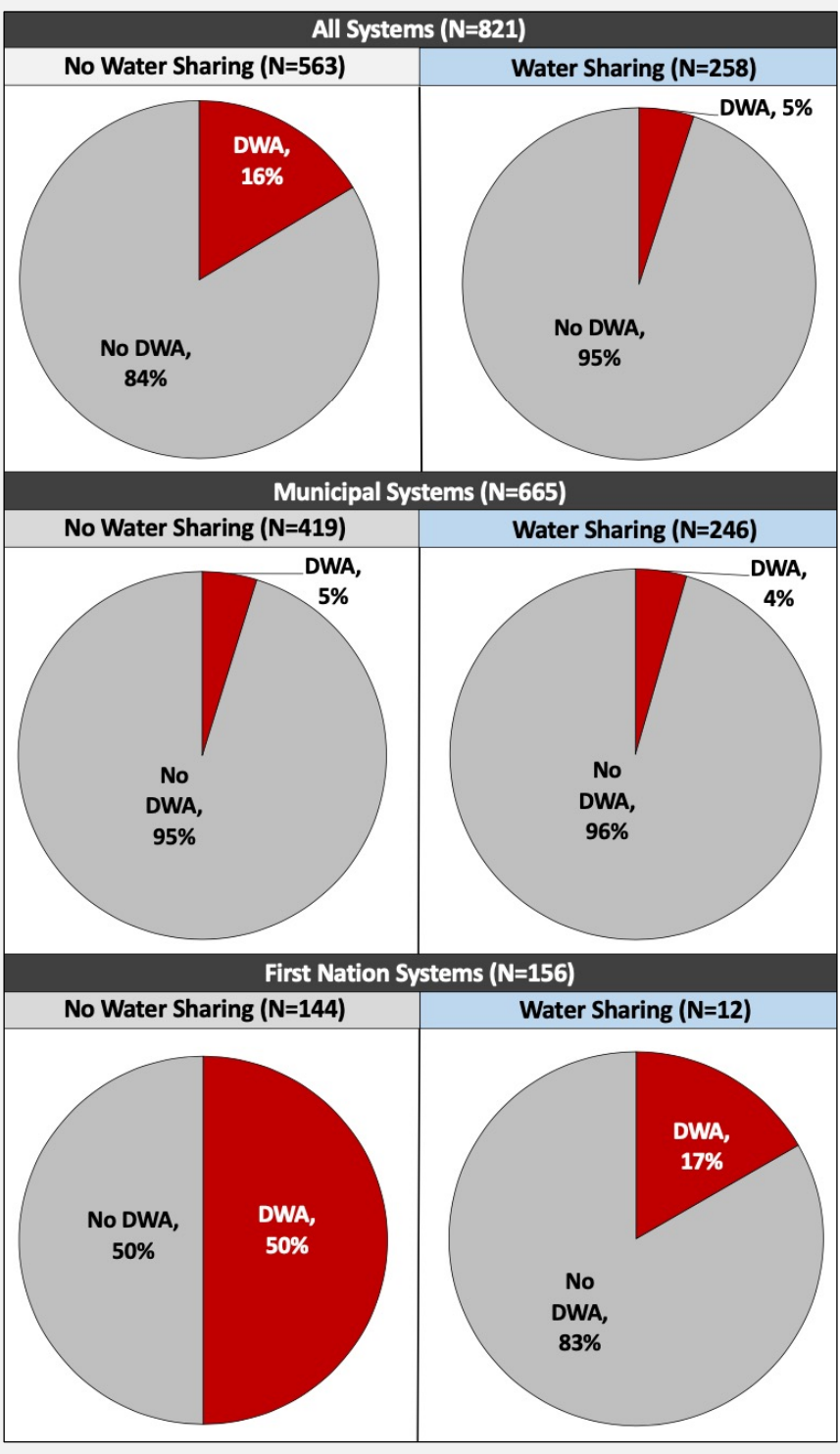

Figure 2: Proportion of Water Systems with Drinking Water Advisory (DWA) Reported in 2009/10 - All Systems, Municipal Systems and First Nations Systems

Limitations of Analysis

It is possible that communities that choose to engage in WSAs may have characteristics that also make them less likely to experience DWAs. For example, communities with greater capacity for water quality monitoring may also have greater capacity to negotiate a WSA with a neighbour. This poses a challenge to assessing the effect of WSAs on DWAs. To address this challenge, we also use a joint estimation approach, that allows us to simultaneously estimate the likelihood of WSAs, and the effect of WSAs on BWAs. This approach helps to control for the possibility that these two variables are simultaneously determined. These joint estimation results are not meaningfully different than the key results we report above; our key findings remain consistent.

Implications

From a policy perspective, our results indicate that there may be benefits to exploring the potential to increase mutually beneficial exchanges between First Nation communities and municipalities. Opportunities for joint economic development exist above and beyond WSAs.

The costs associated with negotiating these types of exchanges are impacted by historic, political and social issues rooted in the history of Canadian colonialism and marginalization of Indigenous communities. Targeted case studies will play a critical role in better illuminating these issues, and supporting efforts to reduce transaction costs in cases where communities are interested in partnerships.