

COMPARATIVE ANALYSIS OF MICROBIAL WATER QUALITY RISK ASSESSMENT PRACTISES IN CANADA

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POLICY BRIEF

This research was to help understand how new technologies associated with metagenomics could improve microbial water quality testing, and how such technologies might fit within existing water quality governance frameworks.

- We investigated current microbial risk assessment and management practices in BC and Ontario
- We analyzed and compared the approaches used by water utilities, public health authorities and watershed agencies to assess and manage microbial risk

KEY INSIGHTS REGARDING CURRENT MICROBIAL WATER QUALITY PRACTICES

There are 4 key limitations to current testing approaches:

1. Using *E. coli* as an indicator is problematic—the absence of *E. coli* does not mean water is free of pathogens (particularly of pathogenic viruses or protozoa).
2. Time delays between collecting samples and receiving test results (it takes 18–24 hours to generate a result).
3. Inability to accurately identify the source of contamination.
4. Inability to determine if a particular microorganism will cause disease in humans.

Adoption of improved microbial testing techniques (e.g. metagenomics) could enable:

1. Water to be tested for a broader spectrum of microbial parameters, including bacterial, viral and protozoan microbiota and specific pathogens of interest
2. Provide richer data much faster than current techniques
3. Improve risk assessment and management practices (given the above)

KEY FINDINGS

- **More holistic preventative source-to-tap approaches are necessary to protect human and ecosystem health.**
- **Our work on current microbial risk assessment practices in two Canadian provinces suggests there are considerable limitations to implementing this approach.**

- **Microbial risk assessment frameworks and management tools in Canadian provinces are variable along the entire source-to-tap framework, particularly:**
 - Between provinces
 - Within provinces
 - Between different types of management agencies
- **The microbial risk assessment approaches that agencies are using in the Canadian water sector have limited focus on microbial risk assessment, mostly focused on human health, with little focus on ecosystem health, and diverging considerably from the literature on best practices.**
- **Of the 18 microbial risk assessment agencies interviewed in both Canadian provinces (Ontario and BC), practices were limited and variable, both in terms of the scope of application and in terms of frequency of use.**

RESEARCH RESULTS

- **Four core results we highlight from this research:**
 1. **Water utilities are the primary collectors of microbial water quality data, however water quality monitoring type and frequency vary between agencies and provinces.**
 2. **Case study agencies appeared to inconsistently use formalized methods, with only two of 18 agencies using Quantitative Microbial Risk Assessment (QMRA).**
 3. **While many agencies lacked formalized risk management plans, all had a formal Emergency Response Procedure and 13 out of 18 interviewees felt confident in their ability to handle a microbial contamination event.**
 4. **Ontario and BC maintain fundamentally different governance approaches with respect to microbial risk; Ontario has mandatory operational requirements while BC has no legislative imperative. This governance complexity across provinces, and across the country, is important to consider moving forward with development, and eventual implementation of new testing tools.**

WHO IS THIS INFORMATION RELEVANT FOR?

- **Policy makers engaged with setting water quality risk assessment requirements.**
- **Personnel responsible for monitoring water quality and engaging in microbial risk assessment.**
- **Members of the public interested in water quality testing.**

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CITATION FOR FULL ARTICLE RELATED TO THIS POLICY BRIEF

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