



Policy brief

Groundwater for Municipal Water Supplies and Community Environmental Health

Science-Policy Workshop at the Morwick Groundwater Research Centre, November 2025

Groundwater supplies drinking water to millions of Canadians and is the primary source of water for many rural, small, and Indigenous communities. Protecting these supplies requires more than technical expertise - it requires governance systems that integrate science, monitoring, community knowledge, and long-term planning. As population growth, climate change, and competing water demands place increasing pressure on groundwater resources, ensuring equitable access to safe drinking water has become both an environmental and public health priority.

The Groundwater Science-Policy Workshop identified that Ontario's principal challenge is not a lack of groundwater science, but fragmented and reactive governance. Bridging institutional gaps across governance scales, strengthening local capacity, and integrating scientific evidence into planning and decision-making are essential to building resilient municipal (and private) water systems that are protective of community and environmental health.

KEY PRIORITIES

- **Expand aquifershed-based groundwater protection** through federal-provincial agreements that rebuild trust with First Nations, support Indigenous-led water governance, and strengthen support for private well owners and small drinking water systems.
- **Fund regional hydrogeology service hubs** to provide shared technical expertise, workforce development, and groundwater training for municipalities and small communities with limited capacity.
- **Require long-term post-development groundwater monitoring and model validation** to complement development approvals and improve adaptive groundwater management.
- **Update provincial groundwater guidance** every five years to incorporate advances in hydrogeological science, monitoring technologies, and emerging best practices.
- **Integrate regular groundwater assessments into municipal planning** through development of provincial growth targets, Official Plans, infrastructure planning, climate adaptation strategies, and asset management.
- **Launch a Provincial Groundwater Literacy Strategy** to strengthen public understanding, support community stewardship, employ citizen-science, and improve trust in evidence-based groundwater policy.

Key Policy Challenges and Recommendations

1. Bridge governance gaps - not just infrastructure gaps

Access to safe drinking water depends as much on effective governance as it does on infrastructure and source water conditions. Although larger municipalities often have the resources and regulatory support needed for long-term water management, many small, rural, and Indigenous communities continue to face barriers related to funding, technical capacity, governance, and policy support. Current governance creates uneven levels of protection. Source Water Protection Plans developed under the Clean Water Act generally exclude private well owners and First Nations because of federal-provincial jurisdictional differences, creating gaps in source water protection coverage. Therefore, communities and private owners often receive limited technical guidance despite often relying entirely on groundwater for their water supplies. Access to safe drinking water depends as much on effective governance as it does on reliable infrastructure.

Equitable groundwater governance requires that all communities have meaningful opportunities to participate in decision-making, while recognizing that solutions must reflect local priorities, knowledge systems, and governance contexts rather than adopting uniform provincial approaches.

Recommendation

Expand groundwater protection through co-ordinated federal-provincial agreements that support meaningful, First Nations-led engagement (see proposed Bill C-37 “First Nations Clean Water Act”), recognizing the historical harms that have undermined trust in government-led processes, while strengthening support for private well owners and small drinking water systems.

2. Build local groundwater capacity instead of relying solely on external expertise

Scientific advancements can only improve groundwater management if communities have the capacity to interpret and apply them. Many smaller municipalities operate with limited hydrogeological expertise, rely heavily on costly external consultants, and lack the financial resources to retain specialized groundwater professionals.

Improving groundwater governance requires sustained investment in people as well as infrastructure, across community scales. Local training, technical guidance, outreach materials, and workforce development should be viewed as core components of groundwater security rather than optional supports. Building groundwater literacy among municipal staff, elected officials, and community members also strengthens confidence in evidence-based decision-making.

Recommendation

Establish regional/groundwatershed hydrogeology service hubs that allow neighboring municipalities to share hydrogeologists and groundwater specialists through provincial cost-sharing programs, while expanding training opportunities for municipal staff, operators, private well owners, and early-career groundwater professionals via academic or applied placements and internships (see newly-formed “Ontario Municipal Hydrogeologist Working Group” and the Walkerton Clean Water Centre as regional examples with meaningful potential for collaboration and synergies).



3. Move from regulatory compliance to adaptive groundwater monitoring

Ontario has strong scientific expertise to characterize groundwater systems, yet monitoring programs are often designed to meet regulatory requirements rather than support adaptive management and long-term resource stewardship. While groundwater investigations are commonly required during the development approval process, long-term monitoring after development is often limited. When monitoring continues, responsibility is typically transferred to municipalities. Without continued monitoring, municipalities cannot determine whether groundwater models accurately predict system behaviour or whether cumulative impacts from growth, pumping, and land-use change are emerging over time.

Evidence-based groundwater management requires continual monitoring, regular model validation, and accessible data that can support both policy decisions and public confidence. Monitoring should also extend beyond individual projects to assess watershed-scale responses and cumulative impacts.

Recommendation

Require major developments and municipal groundwater projects to undertake post-development groundwater monitoring and periodic model validation, supported by public reporting and accessible monitoring data. This would allow groundwater models to be refined over time as scientific understanding improves and new monitoring data become available. An expanded Provincial Groundwater Monitoring Network (PGMN), supported by conservation authorities, could help support this effort.

4. Update groundwater policy at the pace of scientific innovation

While groundwater science and monitoring technologies have advanced significantly, policies and technical guidance have not always kept pace. Municipal groundwater planning frequently relies on studies completed decades earlier, despite significant changes in land use, groundwater demand, climate conditions, and available monitoring technologies. Emerging approaches (including multi-level monitoring systems, advanced geophysical methods, distributed sensing technologies, artificial intelligence, and integrated groundwater models) provide unprecedented opportunities to improve groundwater management decisions. However, scientific advances can only improve policy if governance frameworks and practitioner knowledge evolve alongside them.

Knowledge translation is equally important. Scientific evidence should be communicated in ways that are accessible to consultants, municipal decision-makers, and the public, including practical guidance, health implications, and economic analyses that support informed policy choices.

Recommendation

Introduce mandatory five-year reviews of provincial groundwater guidance documents (e.g. Permit to Take Water - PTTW) and technical standards to incorporate advances in monitoring technologies, hydrogeological science, and best management practices. Focus on where issues arose, how these were not predictable, and what was/is needed to inform long-term solutions - tailored to local aquifer or community-scale using insights from operational management.



5. Shift from crisis response to long-term groundwater risk planning

Ontario's groundwater policies have often evolved in response to crises rather than through proactive planning. The Walkerton tragedy fundamentally reshaped drinking water policy, demonstrating the consequences of inadequate groundwater protection. As climate change, urban growth, and competing water demands intensify, groundwater governance must anticipate future risks rather than respond after they occur to accomplish intended goals.

Groundwater considerations should be integrated into long-term community planning to inform growth management, water and wastewater infrastructure planning, and climate adaptation. Planning should also recognize groundwater-dependent ecosystems and adopt a One Health perspective that links groundwater protection with culturally relevant ecosystem integrity, environmental health, and human well-being. Scenario-based planning and vulnerability assessments can help communities evaluate future risks before groundwater quantity and/or quality become compromised.

Recommendation

Require provincial ministries and municipalities to incorporate groundwater vulnerability assessments, long-term water security scenarios, and groundwater-dependent ecosystem considerations into Official Plans and growth management strategies (see City of Guelph "Water Supply Master Plan" as a municipal example).

6. Build groundwater literacy as a foundation for public trust

Public understanding of groundwater remains one of the weakest components of groundwater governance. Scientific information is often difficult to access or interpret, while many residents (including private well owners) receive little education about groundwater protection, monitoring, or their own responsibilities.

Building public trust requires more than making information publicly available. Effective communication must translate scientific evidence into practical and culturally relevant knowledge that communities can understand and apply. Education and outreach should begin early through schools and community programs, while supporting local stewardship initiatives that encourage shared responsibility for groundwater protection. Strengthening groundwater literacy also creates the social foundation needed for evidence-based policy (which may include critical trade-offs), long-term stewardship, and meaningful community participation in groundwater decision-making.

Recommendation

Develop a Provincial Groundwater Literacy Strategy that supports community outreach, school-based education, private well owner programs (including intuitive well-testing kits and digital mapping dashboards), and locally tailored awareness campaigns that connect groundwater protection with public health and community resilience (see the "Waterloo Wellington Children's Groundwater Festival" and "Well Aware/Well Wise" as regional examples; as well as The Groundwater Project as a global example with resources adaptable to given contexts).

Conclusion

Groundwater protection for municipal water supplies is fundamentally both a governance and public health challenge. Ontario possesses the scientific knowledge and technical tools needed to support sustainable groundwater management, yet institutional fragmentation, uneven technical capacity, and reactive responses continue to limit their application.

Strengthening groundwater governance will require moving beyond crisis-driven responses toward proactive, evidence-informed planning that integrates science, local knowledges, and community priorities. By bridging governance gaps, investing in technical capacity, modernizing monitoring, and building groundwater literacy, Ontario can strengthen drinking water security while advancing environmental health, equity, and long-term resilience for communities across the province.

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