

The Role of Hydrogeologists in Drinking Water Source Protection





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- Conservation Authorities who we are and what we do
- Drinking Water Source Protection in Ontario
 - What went wrong
 - What needed to be done
- Clean Water Act Protecting the source
 - Assessment Reports
 - Source Protection Plans
 - Implementation
 - Challenges





- Founded based on Conservation Authorities Act of 1946
- Local environmental agencies with watershed-based jurisdictions
- Regulate development in floodplains
- Protect wetlands, watercourses





Conservation Authorities





Drinking Water Source Protection

- Began in response to the Walkerton tragedy in May 2000
- Seven died and thousands became ill from drinking municipal water contaminated with *E. Coli* and *Campylobacter* bacteria
- A public inquiry recommended a multi-barrier approach to protect drinking water from source to tap
- Part 1 of the inquiry recommended steps to protect the drinking water systems (*Safe Drinking Water Act*)



Drinking Water Source Protection

- Clean Water Act Assessment Reports
 - Response to Part 2 of the Public Inquiry
 - Protect the sources of drinking water
 - Characterize the watersheds
 - Identify vulnerable areas
 - Highly Vulnerable Aquifers (HVAs)
 - Significant Groundwater Recharge Areas (SGRAs)
 - Intake Protection Zones for surface water sources (IPZs)
 - Wellhead Protection Areas for groundwater sources (WHPAs)

- Enumerate "Significant Drinking Water Threats"







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Water Supplies



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Wellhead Protection Areas





Scoring of Drinking Water Threats

Numerical Modelling



- Mapping of 2 yr, 5 yr, 25 yr time of travel in aquifers
 - WHPAs B, C, D (WHPA-A = 100 m radius from wellhead)
- Aquifer Vulnerability
 - Estimate of vertical time-of-travel from ground surface to aquifer
- Significant Groundwater Recharge Areas
 - Areas with recharge greater than average
- Intake Protection Area Mapping
 - Estimates of in-lake travel times to intake cribs





- Policies are based on science, and yet recognize the existing fabric of land development and the effects of human activities on the landscape
- Challenges of implementation of new policy tools met by ensuring rigorous public consultation, inter-agency meetings, and provincial oversight.



Implementation – Science to Policy

- Still a role for hydrogeologists
 - The policies for the jurisdiction of Toronto and Region Conservation took effect December 31, 2015
 - Explaining the science to the planning community
 - Reviewing Land Development Applications
 - Considering the impacts of infrastructure development
 - Updating vulnerable area mapping when new data become available





- Technical work and funding drawing to a close
- Potential future iterations of the Assessment Reports
- How do we retain the knowledge gained over the past ten years?





Questions?

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