Watershed based source water protection in a multi-barrier context to protect drinking water

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What is CELA?

- The Canadian Environmental Law Association ("CELA") is a non-profit public interest organization. CELA uses existing laws to protect the environment and advocate for environmental law reform.
- CELA is also a legal aid clinic and appears before tribunals and courts on behalf of low-income individuals, citizen groups, and not-for-profit organizations who otherwise would not be able to afford legal assistance.

Overview

- Multi-barrier approach to protecting drinking water: Drinking Water Inquiries – Walkerton & North Battleford
- Role of source water protection in keeping water safe
- Types of contaminant pathways
- Types of measures to protect source water
- How source water protection fits in a safe drinking water framework

Photo from Walkerton Inquiry Report Volume 1

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North Battleford water inquiry wraps

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The judicial inquiry into what went wrong with the water supply in North Battleford, Saskatchewan, has heard final arguments.

More than 7,000 people fell ill last year when the town's water supply became tainted with the cryptosporidium bacterium. The outbreak was traced to the city's water treatment plant.

The official inquiry into the water crisis is now wrapped up and, until the end, the city stuck to its original position that there is no proof water is to blame for thousands of people getting sick last spring.

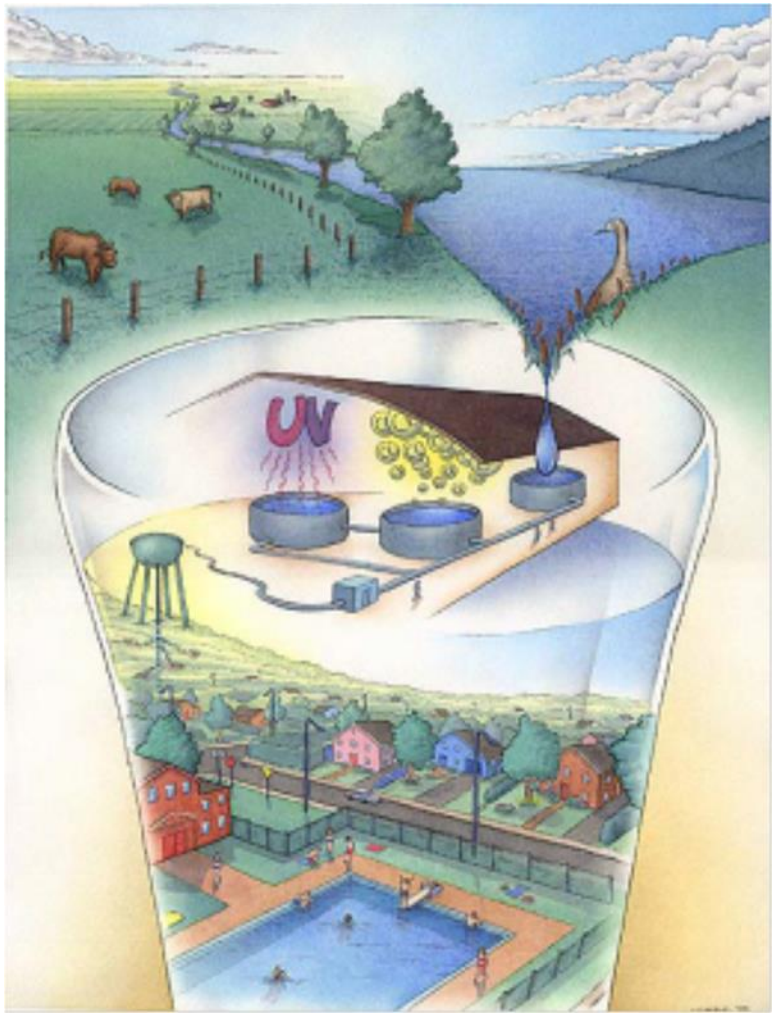
Ted Priel, the lawyer for North Battleford, said the city doesn't fully accept that the illnesses were caused by a failure at the water treatment plant. Priel said, "It is far more probable that this parasite entered the system before March 20."

Priel also told the inquiry that if there was a problem, then the problem was with the provincial government. "Should we be criticized for producing water that meets the regulations and meets the objectives when we are told by the regulator safe water can be demonstrated if you do meet our

Walkerton, Ontario and North Battleford, Saskatchewan

- Contaminated municipal drinking water caused deaths in Walkerton and thousands of serious illness in both of these communities in the years 2000 and 2001
- Provincial Inquiries were held as to the causes, and to provide recommendations as to how to prevent these tragedies in the future
- Causes included complacency, lack of training, a broken over-sight system, misunderstood risk, and pathways for serious contaminants to impact the drinking water
- In Walkerton critical pathogens (*e.coli 057/H7* and two others), flooded one of the town's groundwater wells through the subsurface from a nearby manure pile following torrential rains; there were pathways to the subsurface and "karst" limestone geology with extensive fractures allowing fast travel to the well; at the time it was not being chlorinated. There was also ignorance and deception.
- In North Battleford, the source of contamination was endemic *cryptosporidium parvum* in the North Saskatchewan River, which was very difficult to treat.
- Both Inquiries recommended a "multi-barrier" approach

Post-Walkerton Recommendations



Watershed approach: includes all activities impacting water quality throughout the watershed

Multi-barrier approach: from source water protection to treatment technology, distribution system maintenance, water quality monitoring, and emergency response planning

- If one barrier should fail, there are more safeguards to prevent contamination

The first barrier is the protection of the sources of drinking water.

Canadian Environmental Law Association
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Image source: CCME 2004, per Aboriginal Affairs and Northern Development Canada (link)

Multi-barrier approach to safe drinking water

- Following the two Inquiries, both Ontario, Saskatchewan, and other jurisdictions instituted a multi-barrier approach to protecting municipal drinking water
- At the same time, the Canadian Council of Ministers of the environment put out a paper endorsing a multi-barrier approach, and guidance for First nations systems was issued to the same effect.
- All of them stated that the first “barrier” should be source water protection – keep contaminants out of drinking water sources in the first place

What is Source Water Protection (SWP)?

Source water:

- Surface water or ground water
- Feeds private wells and municipal drinking water systems

Examples: lakes, rivers, wetlands, underwater aquifers

SWP:

- Preventing source water contamination or depletion
- Common threats include run-off from farms, sewage disposal, industrial waste, fuel storage tank leaks and others
- Easier and cheaper to protect, than to clean up a water source after contamination is found

What are the barriers in a multi-barrier approach

- Watershed based source water protection
- Monitoring the supply at the intake
- Treating water at the point of supply and in the distribution system
- Monitoring treated water and distribution system
- Training of water operators and certification of labs
- Robust reporting of adverse results as against health based standards
- Prompt responses to adverse results – warning the public and mitigating the issue

A mandate for the regulation of safe drinking water requires:

1. source water protection;
2. the setting of standards, policies and regulations for operation;
3. the setting of standards for design, construction and upgrades of water treatment facilities;
4. the issuing of licenses or permits to operate; and
5. a compliance/enforcement policy directed at upholding all requirements imposed.

(As reported in the North Battleford Inquiry report)

Potential sources of contamination

- Agriculture may introduce pesticides and nutrients into water sources.
- Residential activities also introduce potential risks to source water such as domestic animals, sewage disposal systems, landfills, lawn care, road networks, road salts, personal care products, pharmaceuticals and abandoned residential wells.
- Commercial and industrial activities add additional risks in the form of waste products, hazardous goods transportation, toxic by-products, dry cleaning wastes, car wash wastewater, fuel storage leaks, etc.
- Past industrial activity such as railroad routes, aging oil tanks, mine tailings, and other early industry may also contribute to water quality degradation.

Categorizing the threats – beginning to map a strategy

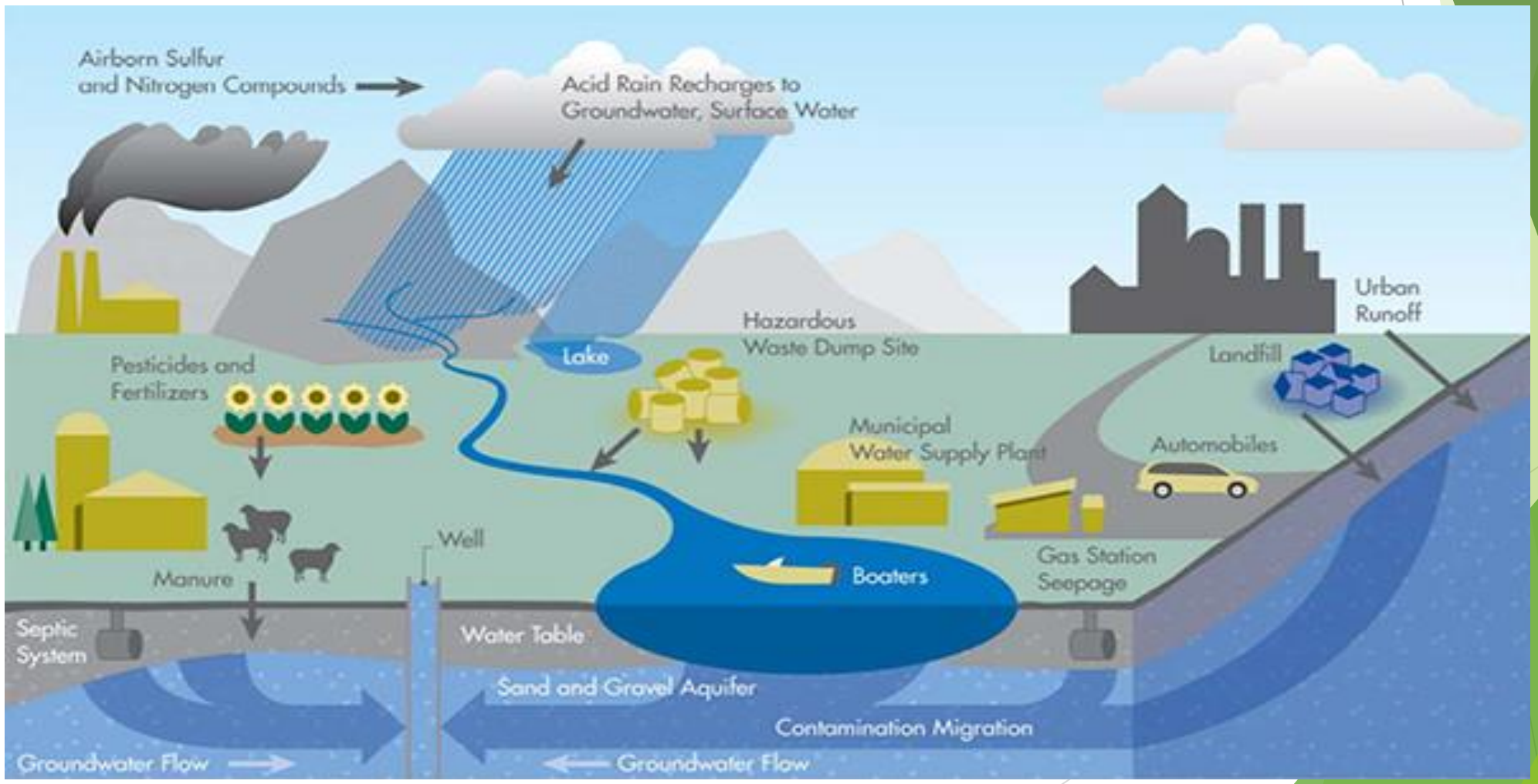
- Physical – eg turbidity from non-point sources
- Microbial – eg pathogens from sewage effluent to water or manure spreading on land
- Radioactive – can be natural or anthropogenic – eg radon is present naturally in many areas of Canada
- Inorganic – eg metals such as arsenic or lead, or nitrates from fertilizers
- Organic – eg Volatile Organic Chemicals such as de-greasing or dry cleaning solvents

Potential pathways

- Identify and map all of the locations of drinking water sources for the community
- This can (and should) include not only community-wide treatment systems but also other sources such as wells
- Ideally technical information can identify soil characteristics and other factors that affect the “time of travel” of any contaminants from the source or surface to the water supply – e.g. vulnerable or groundwater recharge areas
- Even without that technical information, good steps can be taken based on local knowledge and available information – communities can take an approach of continuous improvement

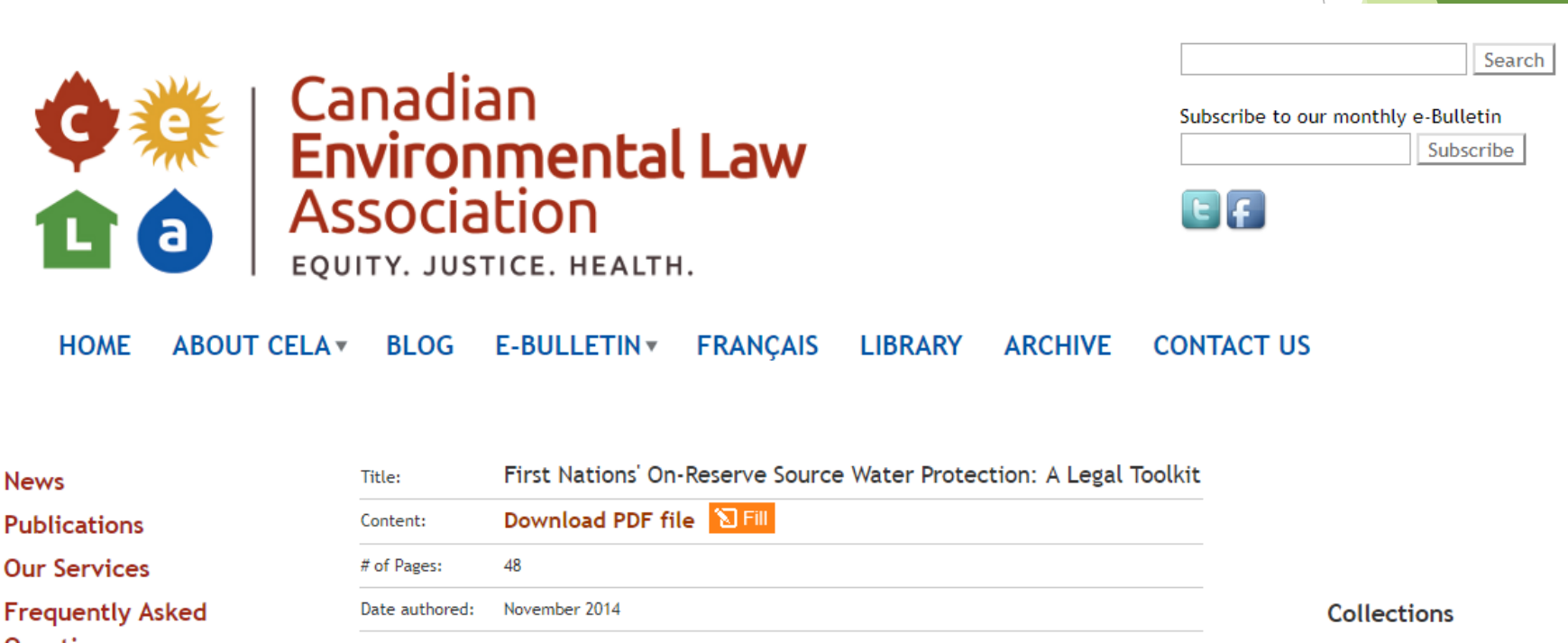
How contaminants reach drinking water sources

Image source Pollution Probe The Source Water Protection Primer 2004



First Nations Developed Source Water Protection Plans

- CELA did pilot work with Pays Plat First Nation and Grassy Narrows First Nation to develop community based source water protection plans
- We are now working with Chippewas of the Thames, Oneida of the Thames and Munsee-Delaware First Nations to advance that work further



Prioritizing areas for attention

- Consider whether contaminants could travel through surface water to the water supply, or through soils and groundwater to the water supply
  - Eg look upstream in a river; or look at the circulation patterns in a lake or near-shore currents to determine possible “threats” to the water supply
- For groundwater, access the best available information such as understanding if the soils are permeable or not; if there have been pathways put into the sub-surface (such as a former oil and gas well); if there is bedrock, whether it is fractured
- Establish barriers to prevent those contaminants from getting to the supplies

http://www.cela.ca/sites/cela.ca/files/FNSP-Toolkit.pdf

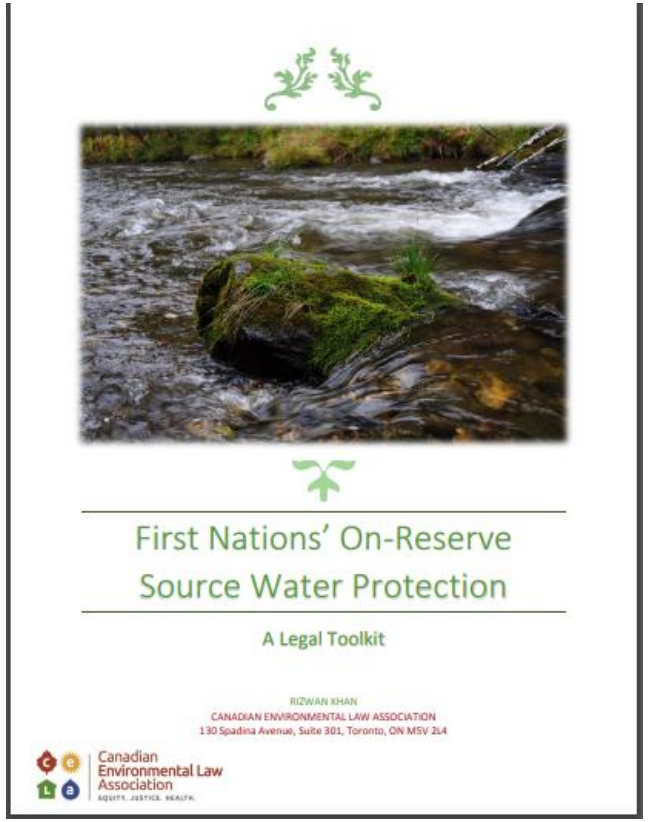
What are the barriers that can protect water supplies from contaminant sources

- Source protection plans in communities can consider what measures would stop contaminants from getting to the water supply and decide which of those measures to adopt
- For example for the area closest to a groundwater well that supplies the community, (or within a specified “time of travel”) land use plans could prohibit the riskiest activities (eg no landfill or manure spreading in that zone)
- For areas further away, contingency planning could be adopted such as spills reporting, emergency measures, berms, clean up systems related to fuel depots – this presumes that there is time to respond and clean up before the contaminants could reach the drinking water source.

Plan development and response measures

- There are well developed lists of measures that can respond to particular threats – eg. Agricultural threats could be dealt with by activity prohibition buffers around the water in-takes, ending in-stream watering of cattle, and nutrient management
- However, communities have to decide which measures they wish to adopt, and it's best if they are broadly supported, with mandatory tools or enforcement actions limited to the most critical issues or egregious action
- There are often multiple approaches that can be taken and each community needs to decide which one works best for the situation – eg will relying on outreach and education work, or in another case should there be adoption of mandatory instruments such as permitting systems or by-laws? Sometimes incentives can help eg funding to upgrade septic systems (a source of pathogens) or older water wells (a pathway to groundwater).

Resources and toolkits for source protection plans in First Nations communities



http://www.cela.ca/collections/water

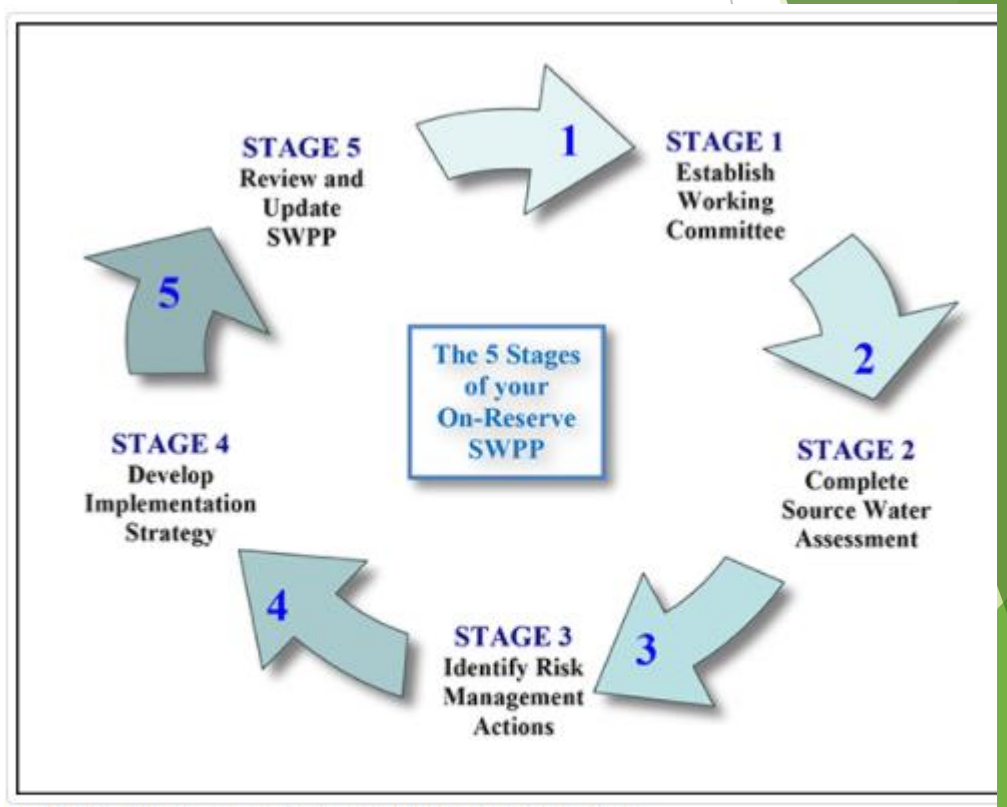


Figure 8: On-Reserve Source Water Protection Plan
This image graphically represents the five steps of the source water protection plan process, which are listed and presented in detail in the text below the image. The image shows arrows that form a circle. This circle illustrates the planning cycle.

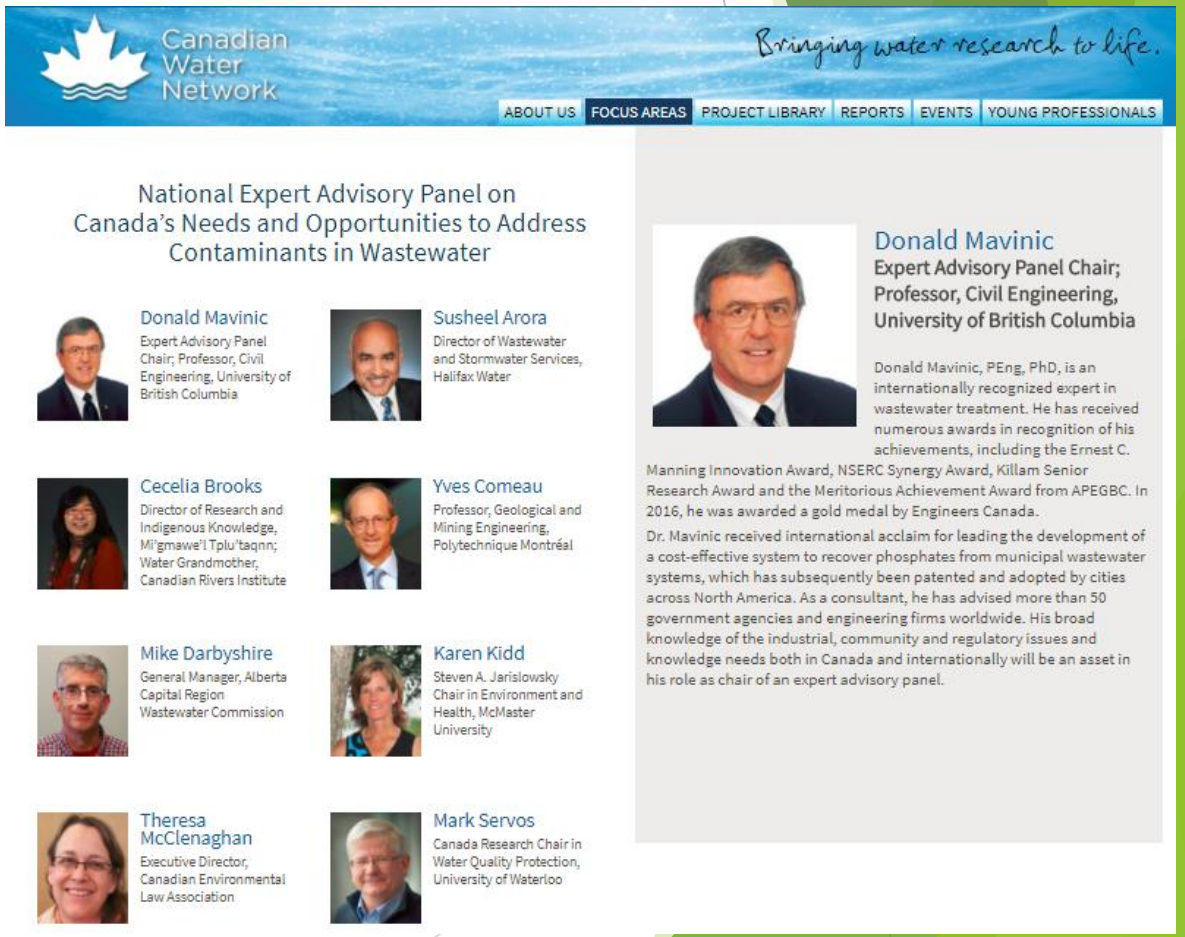
http://www.aadnc-aandc.gc.ca/eng/1398369474357/1398

Source water protection in safe drinking water context

- Looking upstream to source water protection is one essential step in protecting drinking water
- Other efforts to implement a multi-barrier approach are also essential such as selecting appropriate treatment for the types of contaminants in the source water that cannot be prevented
- Source water protection can also help protect drinking water in contexts without a central treatment system such as communities where people take water directly to their homes from their own wells or a lake

A current opportunity / reminder re contaminants in wastewater

- Some of you would have been sent a survey over the holidays – but we are still interested in responses
- The questionnaire can be found at: http://ca.surveygizmo.com/s3/50014982/Canada-s-Needs-and-Opportunities-to-Address-Contaminants-in-Wastewater



Acknowledgements and thanks

- Thanks to CELA's lawyers over the years working on our First Nations source water protection projects: Erica Stahl (now at WCELA); Rizwan Khan; and Kerrie Blaise
- We wish to pay tribute to the late George Henry, former Chief and Councillor, and elder, at the Chippewas of the Thames First Nation who was instrumental in the vision for pursuing the current source water protection work we are undertaking in three First Nation communities on the Thames River in southwest Ontario; he was passionate about clean drinking water and Great Lakes protection, passing knowledge on to future generations, and including the community deeply in decision making.
- CELA appreciates the support of our funder, Legal Aid Ontario, along with funders who have supported our water source protection work with First Nations communities in Ontario, namely the Law Foundation of Ontario and Tides Canada